



POLISH-UKRAINE  
RESEARCH INSTITUTE



# AVIATION IN THE XXI-ST CENTURY

INTERNATIONAL CIVIL AVIATION ORGANIZATION  
NATIONAL ACADEMY OF SCIENCES OF UKRAINE  
MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE  
NATIONAL AVIATION UNIVERSITY



## PROCEEDINGS

### THE SIXTH WORLD CONGRESS "AVIATION IN THE XXI-st CENTURY"

#### "Safety in Aviation and Space Technologies"

Volume 3

September 23-25, 2014  
Kyiv, Ukraine



аеропінзв  
англійська мова для авіаперсоналу  
**ADAMANT**  
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## **INVESTMENT ACTIVITY IN UKRAINE: AIMS AND OBSTACLES**

*The article discloses the main tasks and difficulties of Innovation development model in Ukraine, the conflict of interests on the way of its implementation and some causes of hard conditions for doing business in Ukraine.*

The strategic investment policy priorities in Ukraine include the realization of national sustainable development goals and strategic development priorities, such as: investment in forward economic activities that have export orientation; enforcement of public and private domestic mutual investment; investment as a contribution to the work opportunities settlement, to the qualitatively improving of productive capacities and to the Ukraine's competitiveness maintenance in the world market.

The comprehensive analysis of Ukrainian investment policy contains the list of investment policy guidelines:

- investment and sustainable economic development strategy;
- investment regulation and promotion;
- investment-related policy areas;
- investment policy effectiveness.

Generally it concerns such items as:

- a) integration of investment policy in sustainable development strategy of the proper country;
- b) maximizing the contribution of investment to the economic value added and to the world competitiveness of Ukrainian exporters;
- c) establishment, arrangement and procedures of investment-specific policies designing;
- d) treatment and protection of investments and investors responsibility;
- e) investment promotion and facilitation;
- f) coherence of investment policy aims with trade policy, monetary and credit policy, fiscal policy, intellectual property, competition and state aid policies, labour market regulation, access to land, corporate responsibility and governance Code, environment protection, infrastructure and public-private partnerships;
- g) arrangement of effective public institutions to implement investment policy;
- h) measurement indicators of investment policy effectiveness.

The difficulties, which innovative activity of economic agents faces, lay in the sphere of less financial funds for current activity, including working capital; in the existence of too high rates on credit in commercial banks; in the insufficient financial support of the state enterprises; in existence of high economic risks and the lack of effective opportunities to reduce the payback period of funds invested in acquiring the modern equipment and implementation of advanced scientific and technological projects. The financial difficulties on the way on innovation development in Ukraine also include the lack of involvement of domestic insurance companies in the investing process, the practical absence of venture capital firms with strong financial resources,

the lack of practical possibilities for investment in the Ukrainian innovation business by local independent investors and especially individuals through existence of closed joint-stock companies, as well as the great value of every one package of shares in privatization of state enterprises and attracting strategic investors. Besides, many problems are connected with the stock creation of a particular sphere of research infrastructure, which would have tax benefits and equity system of its representatives in the real sector incomes after the implementation of “know-how”.

Thus, the investment process in Ukraine is a complicated multifactor system, that has its stimulating components and internal deterrents simultaneously, that contradict with the investment growth or even prevent the development of innovative process.

Complex tax and customs Codes, discounted laws and regulations, poor corporate governance, weak enforcement of contract law by courts which allow and sometimes protect corporate raiding, and official corruption still remain, although the Government of Ukraine has listed improving the investment climate as a goal of economic policy: Ukraine ranks the 145 place of 183 economies in the World Bank's Doing Business Report for 2011. Due to the high level of corruption in Ukrainian courts, foreign investors often seek arbitration outside the country.

The foreign direct investment supposes not only the FDI to Ukraine from abroad, but also FDI from Ukraine to other countries. So, 2010<sup>th</sup> Ukraine's FDI to other countries equaled \$ 6.86 billion, while 95.2 % of Ukrainian investment (or \$ 6.5 billion) went to EU countries, the lion's share of which (99.26 %) went to Cyprus. The second largest destination for FDI from Ukraine was Russia, which received 2.7 % of Ukrainian's FDI.

2012 year was a surprisingly unfruitful year in Ukraine: shares were bought only by risk companies. Firstly in Ukrainian history money transfers provided by Ukrainian “guest workers” from abroad exceeded the foreign investment to Ukraine.

The main highlight of Ukrainian bureaucracy and corruption, that discouraged the international companies, was the “famous” process for awarding tenders and contracts. At the same time there are many restrictions on foreign investment under Ukrainian law: some natural monopolies, the rocket industry, the production of bio-ethanol, printing of banknotes and blank securities forms. In some cases government sets limits on foreign participation: for example, the share of foreign investor's participation in Ukraine publishing houses is limited to 30 %. Investment in energy sector as well as to other “strategically important areas” can also be problematic. Foreign investors are prohibited from founding TV or radio stations, they cannot buy agricultural land. Most joint ventures with multiple partners and share acquisitions require Anti-Monopoly Committee's approval.

The privatization process in Ukraine is overseen by the State Property Fund. It had a multi-year plan to privatize 90% of all remaining state assets between 2011 and 2014 with estimated revenues of UAH 70-80 billion (\$ 8.75-10 billion on the date of 2011 currency exchange rate), but these processes of privatization are not enough transparent because publication of information about the organizational and financial situation in any company is absent. That's why it is very hard to establish the clear administration control over incorporation of a company or the legality of certain acts. Therefore, one of the main tasks for Ukraine in the sphere of investment policy is to create and adopt the Unified State Register of legal persons and physical

persons – owners (entrepreneurs and companies) and the open publication of data about the situation in the companies. Except that, Ukraine must provide effective implementation of the Competition and Bankruptcy legislation; equal treatment to European and Ukrainian Companies; identification of barriers to establishment in order to avoid them; changes in Company law; adoption of a Code on corporate governance and codification of entrepreneurship laws with European ones. The poor corporate governance is considered to be the key problem of Ukrainian investment climate (inadequate protection for shareholder rights, insufficient disclosure, asset-stripping, voting fraud etc.).

In the sphere of Government Procurement the Ministry of Economic Development and Trade continues to have regulatory and supervisory authority. At the same time the Anti-Monopoly Committee of Ukraine has the power to review disputes arising from public procurements. Courts may also hear government procurement-related cases.

That's why the main changes introduced by the law in Ukraine include the possibility for non-residents to participate in the procurement procedures on a parity with Ukrainian residents; tougher qualification requirements of bid participants, especially concerning their indebtedness according to the bank statement; removal of some procurement mechanism such as: "reduction" and "bids with limited participation".

The main obstacles that foreign firms face in the field of procurement rules in Ukraine are the following:

- the lack of public announcement about tender requirements;
- non-transparent preferences in tender awards;
- the imposition of special conditions that lay beyond the original tender requirements;
- ineffective resolution mechanisms, that allow a losing bidder to block the tender after the contract has been awarded.

In fact, foreign investors usually criticize Ukrainian legal system for its inefficiency, unpredictability and susceptibility to political interference and interests conflict. Even when they obtain favorable investment decisions, these decisions could be not enforced due to the State Enforcement Service, which reports to the Ministry of Justice.

In 2012 Ukraine's TI Corruption Index ranking was 152 out of 182; Heritage Economic Freedom ranking was 164 out of 179; World Bank Doing Business ranking was 152 out of 183; Global competitiveness index ranking was 82 out of 144 (in 2013 its position was 73<sup>rd</sup> place among 144 countries).

In Ukraine many laws must be brought in line with international standards, especially changes might be introduces to the Bankruptcy Law, to the Law about Audit, to the Tax Code, to the Intellectual Property Rights Defense Legislation, to the Commercial Code, to the Law of Transferred Prices. And of course, the absolutely new Law of State Aid must be adopted in Ukraine.

The Commercial Code in Ukraine is often contrary with the Civil Code in the sphere of market economy principles, because the Commercial Code aims to preserve a privileged position for the public sector in the economy and often insists on the government interference into private commercial affairs.

The Ukrainian Law "On Ownership" recognizes private ownership and it permits

residents, foreign non-residents, foreign investors and joint ventures to use property for commercial purpose, to lease property and keep revenues and profits from this property, but the mechanisms for the transfer of ownership rights are weak, especially in the sphere of effective control of company decisions from the side of the government.

According to international organizations, Ukraine still continues to have a poor business and investment environment. “Doing Business 2011”(the World Bank business report”) estimates that it takes 28 days and 11 procedures on average to open a business in Ukraine.

Foreign investors usually regard Ukrainian system of technical regulations (standards, testing, licensing, certification) as an important obstacle to trade and investment, especially, in the line with the WTO Agreement on Technical Barriers to Trade (TBT). Standardization in Ukraine is a part of the state regulatory system. Compulsory certification is required in Ukraine for over 300 types of goods and services, but mandatory certification in Ukraine applies to final goods rather than to the production process and most current standards do not correspond to international standards.

The very special problem in the economic policy of Ukraine is the problem of state aid. Speaking about the state aid we must emphasize that such a legislation in EU, i.e., proclaims accountability, transparency, limited continuity and scope of state aid. But Ukrainian legislation still not has a special law of regulation that would define the principles, objectives, instrument and means of control of the state aid, nevertheless Ukraine is a member of WTO and just wants to have economic association with EU. There is also no a special institution in Ukraine that would control the volumes and directions of state aid, that is being still regulated by the Antimonopoly Committee of Ukraine.

The Ukrainian state aid definition must suppose the following (like in EU):

- 1) special tax regime;
- 2) government guarantees given to the individual companies or sectors;
- 3) understandable procedure of subsidies given to the proper firms and reglamentation of choice principles of the beneficiaries of state aid.

In the case when diminishing of state aid to the large (and not efficient) industrial enterprises results in the unemployment increase, some of the economized state money (that were previously paid as subsidies to great business) will be spent on the “self-hiring” labour system establishment for those excessive workers who were released, and the final effect on the state budget will be eliminated due to the future tax payments to the budget from that new small business entities.

The problem of State aid allocation is a part of the national economic sovereignty of Ukraine. At the same time the problem of State aid is connected with such economic problems as state budget balancing, abolition of tax privileges, export capacities of Ukrainian companies, competitiveness of state sector of economy and the whole scope of regional problems. The last means that state aid to the regions with low standards of living or huge unemployment must be also reflected in the alternative entrepreneurship development, but not in the form of state maintenance of huge business or local budget needs. Otherwise, this expensive state aid would be spent by separate oligarchs and lead to empty accounts of the State Treasury and provoke the future tax increase to compensate the tremendous state expenditures in the “aid” form.

The huge state expenditures in the form of joint ventures with the foreign

investment capital must be spent now to the absolutely new gas –field in the region on the border between Poltava and Dnipropetrovsk region where billions of cubic meters of gas lay and can save Ukraine from its dependency on Russian gas as soon as possible. We consider the gas extraction to be the main sphere of investment expectations in Ukraine, because this Poltava-Dnipropetrovsk nature gas-field can provide energy needs of Ukraine for many years ahead and permit to reduce the consumer prices for gas completely. In general, the main aim of new Ukrainian state aid policy must be the increase of social equity and living standards all over the country, the investment increase, the speedy growth of “nano-“ and high-tech technologies, the maintenance of high comparative competitiveness of Ukrainian business in the European and world surroundings.

At the beginning of 2012, the Ukraine’s major investors included: Cyprus (24.9 % of total FDI), Germany (15.0 %), the Netherlands (10.1 %), Russia (7.1 %), Austria (7.1 %), the United Kingdom (5.2 %), France (4.6 %), Sweden (3.6 %) and the US (2.2 %). The largest portion of cumulative investment went to the financial sector – 33.4 % and industry (31 %), in particular the steel industry – 12.5 %, food processing and tobacco – 4%, the chemical industry – 2.8 %, machine-building – 2.5 %, trade and repairs – 10.4 %, and real estate and engineering – 11 %.

**Resume.** Now, in the second quarter of 2014 there are many difficulties, both technical and financial, on the way of efficient investment policy in Ukraine. The fall of macroeconomic indicators needs the great amount of foreign borrowings. The problem of financial uncertainty still influences on the mode of behavior of domestic and foreign investors. Tremendous sums of currency were transferred abroad and left the Ukrainian financial sector due to the unfriendly policy of the foreign owners of some Ukrainian banks. The Ukrainian currency devaluated much more in comparison with its real purchasing power due to the massive speculations on the Interbank currency market. But the technical and even energy potential of Ukraine is really huge and will be obviously realized thanks to the elaborated system of radical political, economic and social reforms that will be introduced in the country.

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## **THE GLOBAL MARKET AIRCRAFT CONSTRUCTION**

*This commentary is the annual MCTF report discussing airline maintenance costs and their trends. We analyzed airline operational data and maintenance cost data from airlines worldwide. 46 airlines participated in the 2012 data collection.*

In 2012, world fleet consisted in 22 939 aircraft (including large turboprops); 50% of them are narrowbody aircraft. Airlines worldwide spent 665 billions of dollars (+14% vs. 2011) to operate, and the Maintenance, repairs and overhaul (MRO) market reached 46,9 billions of dollars (+5,5% vs. 2011) [1].

The 46 maintenance cost task force participating airlines reported a total fleet of 4105 aircraft (18% of the world fleet) for 2012. Boeing aircraft represented the majority (62%), followed by Airbus with 30%. Narrowbody aircraft represented over 57% of the fleet, while wide-body aircraft accounted for 35% of the fleet; the remaining being regional jets and turboprops [5].

Direct maintenance cost was 13,9 billions of dollars. The average maintenance cost was 1014 dollars per flight hour, 2547 dollars per flight cycle and 3,4 milliard dollars per aircraft. Engine maintenance remained the highest cost segment; 41% of direct maintenance cost. 33 airlines employed 38201 mechanics and 20477 of additional administrative and professional staff; on average overhead costs were 21% of total costs for the 33 reporting airlines.

Out of 46 airlines, 23 have been reporting data consistently for the past four years, allowing maintenance cost task force to conduct trend analysis.

In FY2012, they operated 2834 aircraft. Direct maintenance cost for this group of airlines reached 9,3 billions of dollars. The average maintenance cost was 1005 dollars per flight hour, 2520 dollars per flight cycle and 3,26 milliard dollars per aircraft. In this group of airlines, higher increases on the unit costs were observed for the narrowbody aircraft rather than the widebody aircraft that remained practically unchanged.

In FY2012, the world fleet count was 22939 aircraft. 75% of this fleet was manufactured by Boeing or Airbus (Fig 1) [1].

Between 2002 and 2012, airlines added 6274 aircraft to their fleet, broken down as follows: 50% narrow-body single aisle aircraft with more than 100 seats (NB), 26% regional-jets up to 100 seats (RJ), 14% wide-body aircraft with more than one aisle or equivalent freighter (WB) and 10% Turbo-props (TP) (Fig 2) [4]. TPs include only ATR42/72 and Q300/400.

Asia (including Pacific Rim), Europe and North America were the most dynamic regions in terms of fleet size development. In most regions, NB was still the most popular aircraft category. North America is the only region which has reduced the number of NB aircraft in their fleet over the past decade but this trend is slowing down over the 10-year period. RJ remain the most popular addition to the fleet.



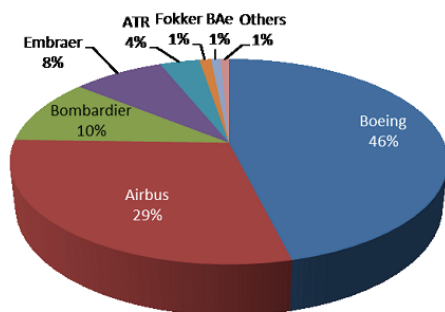


Fig. 1. World fleet by manufacturer (2012)

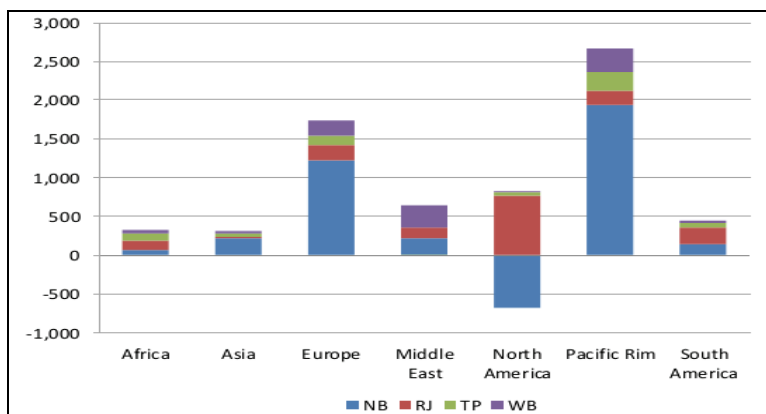


Fig. 2. World fleet evolution by region (2002-2012)

Over the past 10 years, aircraft utilization has increased significantly. The number of annual flight hours per aircraft went up 17,6%, and annual departures up 4,5%. Airlines are doing their best to maximize the utilization of their assets. The average aircraft utilization in 2012 was 7,71 hours per day, showing a 17,7% increase since 2002.

In FY2012, North America, Europe & Pacific Rim represented 82% of world fleet vs 85% in 2002. North America lost ground (33% of world fleet in 2012 vs. 44% in 2002) to the benefit of Pacific Rim that went from 15% to 22%. Europe remained quite stable.

Airline capacity went up 4% in 2012 vs 2011 (+6,3% in 2011 vs 2010). Demand also went up resulting in an increased average passenger load factor (79,1% in 2012 vs 78,1% in 2011).

Aircraft leasing has grown significantly in the past decades. In the 1980s, only 5% of the world fleet was leased. In 2012, it was about 40%, and it is expected to reach 50% in the next decade (Fig 3) [1].

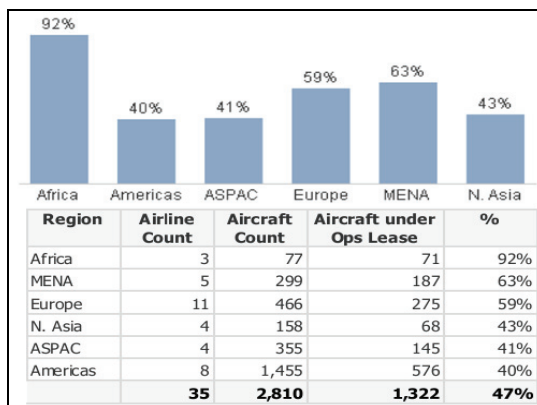


Fig. 3.% of leased aircraft by region 35 airlines - FY2012

While it gives the airline good flexibility in fleet management and improves cash flow, leasing aircraft also comes with many challenges as the lessor expects the lessee to maintain the asset value and to respect strict specifications. This can have a major impact on the airline maintenance costs, both during the lease and when time comes to return the aircraft. This is why maintenance cost task force has decided to collect and analyze data on leased aircraft and maintenance re-serves [2]. 35 airlines (76% of maintenance cost task force airlines) reported aircraft under operating lease for FY2012; 7 of them lease their entire fleet (15%) while 11 own their entire fleet (24%). In total, 1322 aircraft were operated under operating lease (47% of the 45 airlines' fleet and 32% of the total maintenance cost task force fleet) [3]. Maintenance cost task force airlines with small fleet size are the ones that lease most or all their fleet.

The maintenance cost task force fleet grew 18,4% in four years; some of the increase is due to airline mergers. The FY2012 fleet comprised 2834 active aircraft (+1,5% vs. FY2011) and represented 12,4% of world fleet. The manufacturers mix was slightly different from worldwide fleet. All aircraft categories grew except for WB3+: NBs have strengthened their position as the most operated air-craft type (+23% increase in 4 years). As WB3+s retire (-4,8%), they are replaced by WB2s (+18%). Many parts from the retiring aircraft are removed and used as spare parts for the remaining operational aircraft. Installing these used parts (engines, other components) is significantly less expensive and time-saving than sending them to shops for repair [1].

**Conclusions.** The two leading manufacturers Boeing and Airbus were represented with a respective market share of 65% and 31% (vs. 46% vs. 29% for the world fleet), leaving Embraer, Bombardier, Fokker and ATR further than they were in reality, respectively (3% of maintenance cost task force fleet vs. 8% of world fleet; 1% vs. 10%; 0,4% vs. 1%; 0,3% vs. 3,5%).

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## **INTELLIGENT LOGISTICS SYSTEMS**

*This article analyzes the main trends and tendencies of the intellectualization of logistics in the knowledge economy conditions and the prerequisites for the formation intelligent logistics systems.*

The global challenge is to find the right business models for a number of separate activities that when brought together can foster synergies that satisfy the seemingly mutually exclusive objectives of decoupling the growth of freight transport demand from its consequences on traffic and the environment. This can be done by horizontal collaboration between retail, distribution, logistics, traffic management, vehicles and their users whilst exploiting synergies from the vertical integration down-stream to the customer in a more intelligent chain.

The analysis of the scientific literature on the knowledge economy and factors of socio-economic development allows to select three key aspects of intellectualization logistics activity:

- increasing role of immaterial resources, especially intellectual, in the formation of competitive strategy of the company (for example, some logistics providers have no own warehouses, nor its own transport fleet, but possess a wealth of experience of the logistics operations in different countries, a large database of clients and partners to fulfill any customer requirements);

- modification of the product of labor – from the material (services, transportation and storage) to the intellectual, such as inventory management, supply chain management products, optimization of logistic system of the client and the like;

- change in the type of entrepreneurship – from the intellectual labor, characterized by increasing levels of education, spirituality and social orientation. Thus increases level of logistics services provider's corporate social responsibility in the provision of services on the principles of "green" logistics.

In our opinion, the intellectualization of logistics activity will be manifested in the establishment and operation of intelligent logistics systems like complex systems management, coordination and control of tactical and strategic objectives of functioning logistics system (enterprise, supply chain, region), its infrastructure, and also in the process of implementation of the interaction between current system and the external environment.

It should be noted that the definition of intelligent logistics system (ILS) is significantly different from the widely used concept of "Intelligent Transportation System" (ITS). Most authors defines intelligent transport systems as integrated system of modern information and communication technologies and means of automation with transport infrastructure, vehicles and users, which is aimed at improving the safety and efficiency of the transport process, comfort for drivers and users [1-2]. Most often, they are treated as an important component of modern integrated approach to improving the functioning of land transportation systems by

expanding their information infrastructure: automated data collection system status in real time, modeling the direct and indirect operational impact on the formation and change in traffic flows. ILS should be based on the principles of the system and process approaches, as the scientific basis for logistics are streaming processes in economic systems. Information technology evolution creates preconditions for the formation and development of networks that allow the implementation of inter-sectoral and international cooperation, and also it allows the creation of horizontal and vertical partnerships within the supply chain to create customer value.

ITS provide the key to achieving the vision of seamless transport both in passenger and in goods transport markets. For passengers, seamless transport across modes and across countries will better meet their mobility needs by ensuring a wider choice of transport services. Seamless transport will also allow citizens to make better use of the existing infrastructure when travelling and may lead to a shift to more environmentally friendly modes of transport. To reach the goal of seamless transport, at least two problems have to be solved. Firstly, a transport information system has to be developed on a world basis that provides real-time data for trips throughout world, combining up-to-date information from each relevant transport mode source. Secondly, the customer should have easy (one-stop-shop) access to online booking, payment and ticketing services.

The intelligent logistics systems in comparison to ITS, must work in real time in an unified coordinate system and common information space, and thus create the methodological basis for the optimization of logistics solutions and better use of existing logistics infrastructure. However, they should not only include the modules of intelligent transport systems, smart technology for monitoring vehicles and traffic, but also integrated software solutions for interaction enterprises in the supply chain.

In other words, the intellectual enterprises relationship management in the supply chain must provides situational decision supports, automates the search process of control decisions based on the accumulated knowledge of the subject area and provides decision-making under uncertainty. This is new level of development, when the system automatically determines the appearance of inconsistency (contradiction) or reject, recognizes the situation at the site and in the management environment, determines the set of possible solutions, in certain situations implements the control action automatically and monitors its implementation. These systems integrate decision support systems, expert systems, information-analytical systems, forecasting and modeling systems using GIS, electronic, aerospace and telecommunication technologies [2].

The use of these systems and technologies makes possible the use of intelligent technologies within an integrated management system that controls within a single information space as manufacturing and technical facilities as well as socio-economic system. A striking example of the integration of information and technology systems is an intelligent airport, where in an unified engineering-telecommunications-information space processes of video surveillance and environmental control to customer management are automated. Integrated management of the airport include the integration and synchronization of processes, such as air traffic control (takeoff / landing), management of terrestrial services , the

formation of passenger traffic (reservations and ticketing) , the formation of cargo traffic , fleet maintenance , schedule management , logistics management and human resources , financial management , infrastructure management (calculation of lease payments, parking planning schemes), the reconstruction process management (simulation of the objects) , object visualization and control processes, etc.

Great importance for the intellectualization logistic activities is the introduction of electronic document circulation, which promotes the formation of such interaction between enterprises in which they are essentially self-sustaining, self-learning and self-regulatory organization. For the implementation of such properties electronic document management system should include mechanisms of genetic inheritance and classification, tools for knowledge extraction from unstructured information, mechanisms of accumulation and processing of statistical information, in particular information that arises in the process of negotiating the movement of documents or memos. An integrated model of knowledge representation, underlying the intelligent document circulation system, in addition to knowledge about the formation of the structure and templates, as well as the formation of routing schemes of documents should contain linguistic knowledge and domain knowledge.

Using the electronic document circulation in the activities of manufacturing, trade, transport and logistics companies necessitates the formation of trade flows service technology on a "single electronic window" at transport terminals (such as airports, seaports), as well as the diffusion of electronic freight technology in the organization of freight traffic involving different types of transport.

Note that the use of electronic documents is becoming a reality in the business practice. In particular, "Ukrzaliznytsia" uses paperless technologies both in passenger and cargo business. It already establishes e-invoicing for the transportation of goods through several countries.

Technology is still worked through with the CIS countries – in the communication between Ukrainian and Russian domestic stations in August were issued 3642 electronic invoices for 9167 empty own wagons (79.73% of the total number of documents) [3]. Railway workers have calculated that the rejection of paper travel documents for all internal trains should bring savings of about 18 million USD per year.

In Odessa seaport from September of last year began to function the "single electronic window" system for containerized cargo clearance. Unified Information System port community - is an electronic system that combines the Port Authority, its production capacity, stevedoring companies, regulatory authorities and services, agency and freight forwarding companies and other organizations of all forms of property involved in the handling and transportation of goods. Economic effect of implementing the ISPS within the port of Odessa has already exceeded \$ 200 million [4].

In Western Europe, a form of "Single Electronic Window" operates in the ports of Hamburg (Germany), Rotterdam (Netherlands), Antwerp (Belgium), Felixstowe (UK), Le Havre, Marseille (France), Barcelona, Bilbao (Spain), etc. On their basis is based European Association, which aims to develop e-Logistics in all European ports, increase the efficiency of maritime transport, forwarding and logistics activities in the EU.

Another important trend of modern logistics is the clustering. Transition to the cluster type logistics systems means the formation of multi-disciplinary and cross-sectoral complexes in which the unity of the organization is represented in a

variety of material, information and financial flows, diversity of economic relations and economic entities. M.Porter correctly observed that the innovation advantages is stronger within the cluster, as included firms quickly learn about the progress in technology, new products and equipment, new concepts.

In a review of the UNECE identified several major causes of the significant contribution of innovation clusters in the intellectualization of the modern economy.

1. Innovative Clusters represents the concept of "open innovation" in practice [5]. The basic idea of "open innovation": innovations are not isolated entities, and appear in a dynamic environment, where they interact competent organizations and skilled workers, manufacturers and suppliers. In such an environment intense partnerships are formed, universities are actively involved to the exchange of scientific and technological information.

2. Innovation cluster's successes caused by the interaction of three forces (the concept of the "triple spiral") [5]: academic centers (universities), entrepreneurship and venture capital (business), as well as an innovative government policy (government). The University is a source of knowledge and technology, the role of business is to produce, and the government - the guarantor of stable interactions and source of favorable conditions. In this model, innovation is not so much an isolated initiative of some of the parties (eg, state), and derived from this interaction, which increases the effectiveness of the teamwork results.

3. Close cooperation in the economic, social, knowledge-based sectors reduces uncertainty, risk and destabilization caused by innovation. Clusters of interacting companies form an integration environment to reduce transaction costs, increase flexibility, to establish communication links and increase information flows.

The importance of the development of logistics clusters in Ukraine are discussed during the round table meeting of the International Research Project LOG4GREEN, that took place in Odessa port on 17 October 2013. The event participants shared experiences in creating transport and logistics clusters in the industrialized regions of Europe and the world with a view to use it in the development of the Odessa Sea Logistics Cluster. In the discussion on the interaction of science, education, business and government in this context was attended by scientists and practitioners from all six regions involved in the project LOG4GREEN: North Rhine-Westphalia (Germany), Wallonia (Belgium), Normandy (France), Carinthia (Austria ), Istanbul (Turkey) and the Odessa region (Ukraine). Figuratively speaking, the clusters with a long experience shared experiences with clusters in developing regions.

Note also that in the conditions of active using modern information and communication systems, the role of the professional and general competencies of specialists which has the ability to use new technologies for traffic and cargo traffic monitoring, warehouse's ( or transport terminal's) 3D visualization, online stores logistics service extremely increases. Modern logistics business requires highly skilled and educated workers, has not only specific professional knowledge, but also broad outlook, which would allow him to freely navigate the ever-changing environment, to make independent decisions. In this regard, the role of education as a basis for the formation and development of intellectual resources, creating and transferring of new knowledge in the economy increases. Education system inevitably becomes closer to

entrepreneurship, integrated with it, that contributes to more effective sharing of knowledge, the introduction of more advanced scientific methods of production.

Therefore, the higher educational institutions of Ukraine, went over to new standards of higher education in training for logistics, actively introducing new disciplines, new learning technologies, new methods and approaches to develop personal, communicative and professional competence of the future smart entrepreneurs.

**Conclusion.** The performed analysis of the world economy development and the concepts of "new logistics" led to the conclusion that the modern knowledge economy is fundamentally changing the traditional principles, approaches and models of competitive entrepreneurship, the role of logistics as an intelligent value added chains integrator. The intellectualization of logistics activity requires the creation of intellectual logistics systems, that contribute to more active use of modern intellectual, geoinformational, telecommunications, corporate integrated systems and technologies, and will improve the quality of logistics personnel and stimulate the development of logistics provider's intellectual capital.

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## **ANGSTROMMANAGEMENT TECHNOLOGY AND 3D-MODELLING IN OF AIRLINES**

*This article introduces new economic concepts, the author's classification together with the arising therefrom economic laws and properties. The head role of 3D-modelling in Angstrommanagement technology of airlines is defined*

In the Russian nonfiction the term "Nanoeconomics" was first introduced in 1987 by the scientist Kenneth Arrow. The author worked on various interpretations of this concept [1] and on its basis the author's collective determination of nanoeconomics was made and completely new economic concepts were offered.

Nanoeconomics (human economics) - a branch of economic theory which studies the behavior of economic agents in the market and non-market conditions, it is the deep level of study of economic phenomena and is a theory of transactions within the formation of decisions by market participants (collectively, the definition by K. Arrow, G. Simons, P. Lucas).

Angstromeconomics (economics of thought, gift, intuition) - a branch of nanoeconomics which studies the effect of the intellectual, moral and spiritual abilities of economic agents of productive management decision making.

Angstrommanagement (management of thought, gift, intuition) – a profound control of intellectual, moral and spiritual leaders capabilities of economic systems by selecting from a set of conscious and super conscious aspects for effective decision making.

More precisely, Angstrommanagement - science that studies "what" exactly manages the man and "what" does the man manage while making decisions.

To improve the economical and mathematical conceptual apparatus the author has used classification of different types of economics, but not in full compliance with the SI system, but according to the logical interpretation of the author:

$10^{-10}$  – Angstromeconomics: economics of thought, gift and intuition

$10^{-9}$  - Nanoeconomics: economics of privately held company

$10^{-6}$  - Microeconomics: economics of an enterprise

$10^{-3}$  - Minieconomics: corporate economics

$10^{-1}$  – Economics of art, management art

$10^0 = 1$  - System

$10^1$  - Economical good, economical human factor

$10^3$  - Mezeoeconomics: regional (local) economics

$10^6$  - Macroeconomics: the national economics

$10^9$  - Megaeconomics: world economics

$10^{10}$  - Multieconomics: economics of «Freemasons», which govern global economic policy.

From the author's classification some properties and patterns based on disjunction (multiplication, intersection) of the economic categories can logically be noticed:

$10^{10} \times 10^{-10}$  (multieconomics on the basis of thought, gift and intuition) =  $10^6 \times 10^{-6}$  (micro and macroeconomics crossing) =  $10^3 \times 10^{-3}$  (regional and corporate economics crossing) =  $10^0 = 1$  – system;

$10^{10} \times 10^{-1} = 10^9$  (multieconomics creates mega-economics);

$10^{10} \times 10^{-9} = 10^1$  (with the help of enterprise economics multieconomics manages the creation of economical good).

The study these patterns with the help of mathematical logic and its operations can last long. For this article, the original ideas and evidences that is sufficient.

Creation of the Angstrom management technology of airlines lies in ensuring the most effective management decision-taking of airline leaders and safety managers at Mission Control Centres in emergency situations. Nowadays, within the current technological and informational economy, the consistent patterns of Angstrom management technology of airlines creation are closely associated with forecasting and 3D-modelling.

The creation of Angstrom management diagnostic system based on 3D-modelling involves the following steps: identification of Control System, and Effective Decision Making, as the subjects of diagnosis, i.e. creation of the diagnostics (including its type and architecture), the input values of which are the parameters of Effective Decision Making, registered by sensors, and output - the parameters which define the state of Effective Decision Making with the possibility of self-correction in the operational process, the creation of a training sample for 3D-model based on statistical information about the functional parameters of Effective Decisions for all modes of operation and the most probable failure of operating experience (for stated decisions) or according to the results of bench tests (for newly developed or upgraded Effective Decisions).

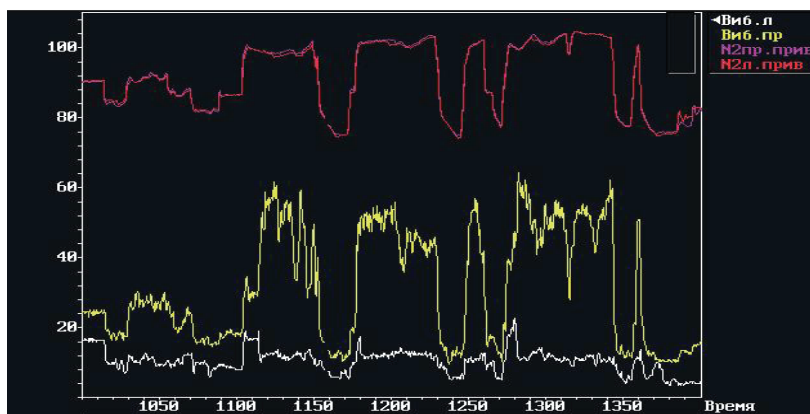


Fig. 1 Signalogram of the following frequencies of the subject revolutions neurons that make effective decision making in extreme conditions (obtained by the author)

The bases of the proposed method in this article are the application of the combined model based on the use of expert systems and unstated logic method, which are realized in the MATLAB 6.5. These methods allow performing system analysis of the electronic database on node technology developed lately.

In spatial form the compels of available in an electronic data node technology can be represented in the form of a surface (Fig. 2), where the grades of patent statistics are marked on the axes (intuition (ideas, knowledge), time, choice, solution) and the vertical axis of ordinates - point technology option.

According to Fig. 2 below there are low perspective technologies for effective decisions making. In the upper area "high technologies" are located, those which implement the most innovative and original solutions. In between these areas there are intermediate technologies.

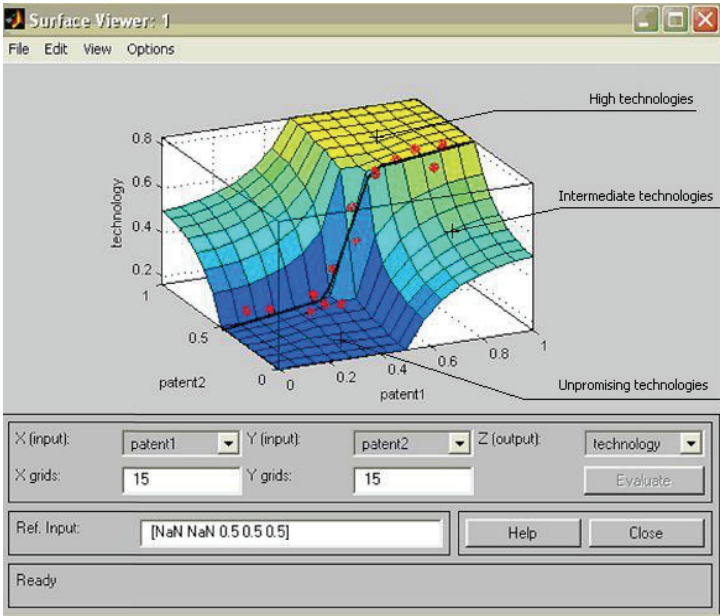


Fig. 2 Theoretical surface for development of unified Angstrommanagement technology making effective management decisions (obtained by the author)

According to the results of this analysis, on the basis of patent statistics can be distinguished a list of the most prospective technologies for new design solutions of effective management decisions making for the new generation, development of a preliminary set of design documentation and design decision Angstrommanagement processes of airlines.

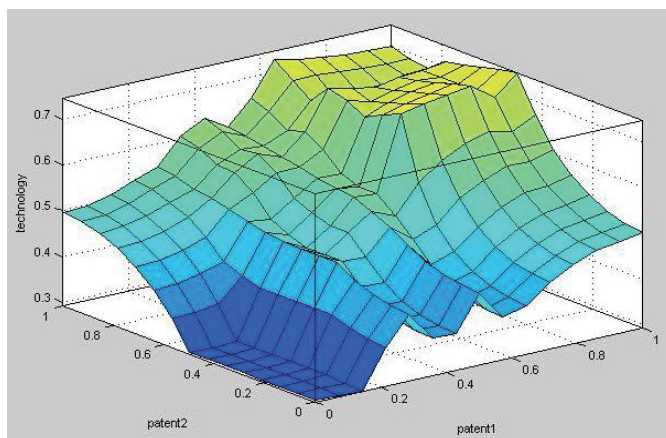


Fig. 3 Surface of the development of unified Angstrommanagement technologies of airlines according to the results of expert evaluation data of patent statistics (obtained by the author)

Angstrommanagement airline solutions based on various technical and technological challenges of innovation in terms of technological software for creation and formulation of problems and solutions for new generations can significantly improve the technical level of airline management and its economic efficiency.

**Conclusions and suggestions.** Evaluation of the effectiveness of management decisions using the author's Angstrommanagement technology is a strong and stable factor of success which results human lives preservation and accidents prevention.

3D-modelling can take an essential part in Angstrommanagement technology of airline if they are used by true professionals. To prevent risks the author suggests the usage of prediction based on the work of not only quantitative but also qualitative information obtained directly from the experts with sophisticated 3D-models.

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## THE AIRLINE DEREGULATION EFFECTS OF TOURISM INDUSTRY IN TURKEY

*Airline deregulation in 1978 first in US and 80s in Europe. Turkey air deregulation is first part in 1980 and second is 2002. After 2002 the air transportation industry is bigger day by day like in US and Europe. Tourism and air transportation industries are linking each other. Airline deregulation effects tourism positively. New airlines established, prices is decrease, new routes open etc. It means that people have more choices to visit. Travel industry is getting important day by day for governments because of specialties. In this study try to explain how airline deregulation effect Turkish tourism industry.*

### 1. Airline Deregulation in Turkey

Air transportation deregulation first in US in 1978 and then Europe in 1990s. after 1980's Turkish government give permission to start up private airlines in Turkey to especially operated Western Europe and Turkey (charter flights). Because to improve travel industry, you need to bring the tourists. Two decades later the industry grow and strength and second part of deregulation give private firm to operate domestic routes independently. After this decision the traffic (domestic and international) grew rapidly. The industry is bigger, new routes opened, new city pairs opened and because of the competition prices discount almost 50% before deregulation.

The airline industry work force grew 3 times, revenue 10 times during 2002-2013. In 2002 domestic flights from 2 center to 26 points to 7 center to 51 points. International routes numbers from 78 to more than 200. The number of airplane rise from 150 to 380 during same period. ([www.shgm.gov.tr](http://www.shgm.gov.tr))

### 2. Tourism Industry in Turkey

In early of 1850's only rich people can visit another countries in the world, but time after time it is became a norm, because of affordable prices. Only 45-50 thousand tourist visited Turkey in 1930's, Turkish Government try to do something to this number increase but 2nd World War stared and tourism almost zero. After World War II, in 1950 the number of tourist in the World around 25 million and the number of tourist in Turkey 30 thousand (2.2 million usd revenue) and Italy 3.5 million, Spain 1 million. ([www.tursab.org.tr](http://www.tursab.org.tr)) After 1980's Turkish Government see that power of tourism and give priority and some monetary support for hotel industry. At the same time of first package of air deregulation.

Tourist allocation by their countries is shown in table x. in 2013 Germany, Russian Fed. And Great Britain is the top three countries. Ukraine is the 10th more than seven hundred thousand tourist visit Turkey in 2013.

Table 1. Allocation by the Countries in Turkey 2012-2013

| <b>Country</b> | <b>2012</b>       | <b>2013</b>       |
|----------------|-------------------|-------------------|
| Germany        | 5.028.745         | 5.041.323         |
| Russian Fed.   | 3.599.925         | 4.269.306         |
| Great Britain  | 2.456.519         | 2.509.357         |
| Bulgaria       | 1.492.073         | 1.582.912         |
| Georgia        | 1.404.882         | 1.769.447         |
| Holland        | 1.273.593         | 1.312.466         |
| Iran           | 1.186.343         | 1.196.801         |
| France         | 1.032.565         | 1.046.010         |
| USA            | 771.837           | 785.971           |
| Italy          | 714.041           | 731.784           |
| Sweden         | 617.811           | 492.373           |
| Ukraine        | 634.663           | 756.187           |
| Greece         | 669.823           | 703.168           |
| Others         | 10.900.012        | 12.712.993        |
| <b>TOTAL</b>   | <b>31.782.832</b> | <b>34.910.098</b> |

Source: <http://www.altid.org.tr/tr/Turizm-Istatistikleri/1557-2013-Ziyaretci-Sayilari.html>

Tourist chose Turkey to vacation because of 3-4 hours of flight time, sea, sun and sand (3S), historical places, cheap and quality service, all inclusive tours, shopping, etc. day by day number of tourist visit Turkey is increase. For foreign visitors in 2013 almost 35 million visitors and 4 million of Turkish stock totally 39 million visitors visit Turkey. Almost 22 million (more than 50%) visit Istanbul and Antalya in 2013. And the tourism revenue is 32, 3 billion dollar and tourism spend per tourist is 825 USD in 2013. 17.5 million visitors prefer package tour in 2013. And the biggest five is TUI Turkey 16.61%, DIANA/THOMAS COOK 8.26%, PEGAS7.46%, TEZ TOUR 6.87% and OTI GROUP 6.82%. (<http://www.aktob.org.tr>)

Figure 1 show that the number of beds in 1980's less than 100 thousand grew almost 1 million beds in 2012. Because of these investments and government subsidiaries Turkish tourism industry bigger day by and now Turkey is in the Top 10 Touristic country in the world.

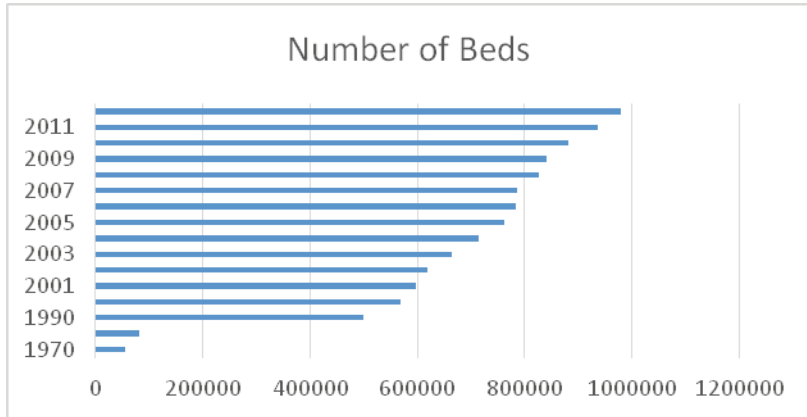


Figure 1. Number of Beds in Turkey 1970-2011

### 3. Effects of Airline deregulation on Turkish Tourism

Airline deregulation effects many industries like tourism industries in Turkey. Some of them is car rental, online shopping (air ticket, tours and hotels) etc. after deregulation the prices discount, and people prefer plane versus bus or their own cars. And some discounts prices like 15 dollars (if you buy 5-6 months before) stimulate demand, people buy these ticket “maybe I can travel? If not, no problem it is just 15”. This discount ticket prices offers by first low cost carries like Pegasus or Anadolujet, but later established carriers bring this kind of marketing activities. This also help to improve the market.

Figure 2 shows the passenger number, domestic and international passenger number separately and number of tourist 2002-2013 in Turkey. The number of tourist and international passenger curve has some similarities. In 2005, 2006, 2008 breaking points are similar. And this show that there is strong relationship with airline passenger number and tourist number.

The figure show that after deregulation in Turkey domestic and international passenger number increase rapidly. Domestic passenger number is around 9 million and international passenger number is around 25 million this numbers are in 2013 76 million and 73 million respectively. It means that during last decade’s 2004-2013 the increase in domestic market more than 4 times, international passenger number 140% and annual average increase is 20% domestic, 10% international passenger number. Total passenger number is grew 34 million to 150 million same period. Number of tourist 15 million to 39 million same period 160 % grew same period.

Air transportation deregulation occur new airlines, new airline business model airline, decrease ticket price, open new routes, create new job opportunities, some airlines go out the market, etc..

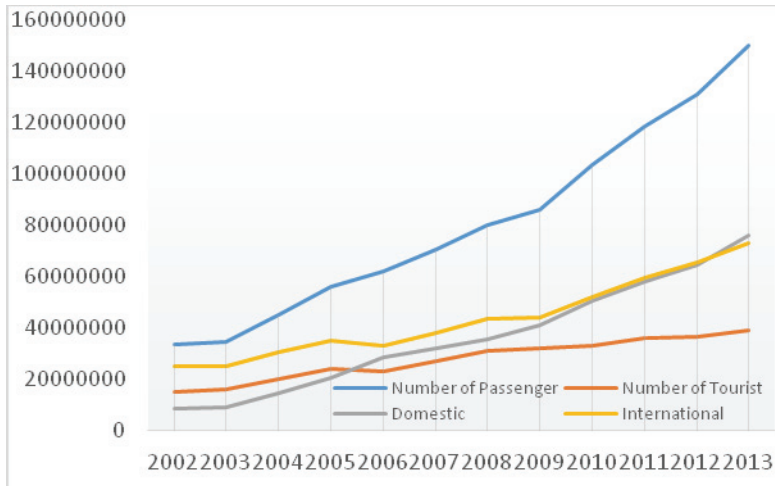


Figure 2. Passenger and Tourist Number 2002-2013 in Turkey  
Source: State airport Autotypy and Tourism Ministry.

After deregulation first package in 1982 only Turkish Airlines operate some domestic and international flights. But after first package new airlines established like Onurair, Flyair etc. to operate charter flights between Western European and Turkey. They do not have rights to operate domestic routes. And also there is limited domestic demand for air travel in Turkey. Private airlines start operate and grew and learn the business.

After second deregulation second package in 2002 new airline business model start operation in Turkey. Low Cost Airlines give new light to the industry. Pegasus Airlines start operations with low price (almost half price of established airlines). It also another engine for the industry to get bigger. Especially LCC's alternatives of individual tourism who do not want tour but prefer low prices. For example Pegasus Airlines give service millions of passenger after deregulation.

Before 2002 the city pair number is just this number increase 120 in 2013. It means that deregulation enlarge the industry. It means increase the work force.

Because of intensive competition some airlines were out of the market like Flyair, Sky Airlines, Saga etc. Deregulation brings opportunity and threats together. If airlines has something wrong it is hard to alive this highly competitive area. If chose wrong city pair, or aircraft type or take some risk like new investments wrong time, the airlines will be out of the game easily.

But it's clear that Turkish government see that airline industry and tourism industry together. If you don't have strong charter airlines, the visitors can go another country. If you don't improve these two industry together, you need to run a marathon with one leg.

Airline deregulation also effect domestic tourism in Turkey. Turkey's transportation system heavily road, train gives limited service and very old system.



The only is road transportation system, it means bus or own car. South to north around 12 hours, east to west around 24 hours by car. Deregulation discount the ticket price and this stimulate demand for air travel. Many airport passenger number increase dramatically (4 times grew in domestic passenger number explain this). For example, in Mardin the number of passenger around 20 thousands in 2013 this number reach 360 thousand and only domestic passengers. The hotels number is for the same period 2-3 from more than 40 in 2013. (www.mardin.gov.tr)

Deregulation also give power to Turkish international tourism, Turkish airlines open new routes between Turkey and others countries. They try to make new markets against competition with others. It means that new tourist for travel industry. For example, Pegasus start operations between Istanbul and Krasnodar, Osh, Omsk, etc. new routes before no direct flight. LCC's get bigger the market while opening new routes and discounted prices.

### Conclusion

Tourism and air transportation linking each other closely. After air transportation deregulation in 2002, domestic and international passenger number increase more than World average in Turkey. Passenger number 50 million to 160 million, tourist number 15 million to 30 million.

After deregulation new airline business model –Low cost carriers- started operations which means that new potential tourists. For example, in 2003 between Ukraine and Turkey there were only 3 city pair (İstanbul-Kiev, Odessa and Simferopol) and one carrier (THY) but in 2013 this add more city pair (Kharkiv, Dnipropetrovks, Donetsk and Lviv) and three (Pegasus, Atlasjet and Onur Air) more carrier.

Airline deregulation effect Turkish domestic and international tourism positively. Domestic passenger number is first time more than international passenger number in 2013 even its almost half in 2002. People can have change to visit another city with bus ten hours or more to same price but travel time is 90% less, just 1-2 hours. It means that new hotels, new souvenirs shops, taxi drivers, restaurants, etc..

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- [www.shgm.gov.tr](http://www.shgm.gov.tr)

## AIR TRANSPORTATION MANAGEMENT EDUCATION COMPARISON IN ANADOLU UNIVERSITY AND NATIONAL AVIATION UNIVERSITY

*Civil aviation is one of the important industry in the World. Civil aviation management education is important because of the needs of qualified work force for the industry. In this study the Air Transport Management (ATM) education examined on the biggest universities in Turkey Anadolu University and Ukraine National Aviation University.*

### 1. Importance of civil aviation education

Civil aviation education support this world one of the most important industry needs. Pilot training, air traffic controller, management, technician, engineer, etc... management is important because almost all airline firms use same planes, same airports, pay almost same fuel and airports. But only good management have reach the profit which airlines needs for their survival. ATM try to give their students.

### 2. Air Transport Management In Turkey

There are 34 universities in Turkey about civil aviation education. 21 of them state 13 of them private universities. These universities 4 years educations programs are pilot raining, air traffic control, air transportation management, technics (plane engineering, space engineering, avionics and airframe and power plant maintenance) and 2 years programs are cabin crew, plane technology, handling, air logistics etc. Even same departments different universities do not give same or similar courses. All universities course program different. Only some courses are same for the Authority of Universities.

Anadolu University is the first and experienced one of all 34 universities about air transport management since 1998 the ATM department is given service. These 34 universities all cannot give education because of some problems but all is open. There are five of them has ATM departments. But course programs are different one from other. No one is similar.

### 3. The Courses of AU and NAU about ATM

AU and NAU ATM Courses given detailed from 1<sup>st</sup> semester to 8<sup>th</sup>. If a student wants to finish AU ATM, it must be take 240 ETC credits. The elective courses can be from another departments or universities.

#### 1<sup>st</sup> Semester

| Course Name and Branches (AU) | Course Name and Branches (NAU)            |
|-------------------------------|---|
| Fundamentals Concepts of Law  | Foreign Language (for Professional Usage) |
| Economics I                   | History of Ukraine                        |

|                                |                                   |
|--------------------------------|-----------------------------------|
| English I                      | Theory of Economics               |
| Introduction to Business       | Physical Training                 |
| Mathematics I                  | Physics                           |
| Introduction to Accounting     | Chemistry                         |
| Introduction to Civil Aviation | Higher Mathematics                |
| Elective Course                | Engineering and Computer Graphics |
|                                | Computer Science and Programming  |
|                                | Introduction to Specialty         |

### 2<sup>nd</sup> Semester

| Course Name and Branches               | Course Name and Branches                  |
|--|---|
| Fundamentals of Information Technology | Foreign Language (for Professional Usage) |
| Economics II                           | Culture Studies                           |
| English II                             | Physical Training                         |
| Mathematics II                         | Higher Mathematics                        |
| Flight Theory                          | Fundamentals of Ecology                   |
| Air Transportation                     | Technical Mechanics                       |
| Meteorology                            | General Course of Transport               |
| Management Statistics                  | Fundamentals of Finances and Accounting   |
| Elective Course                        | Transport Geography                       |
|  | Foreign Language (Special Course)         |
|  | Computer Training                         |

### 3<sup>rd</sup> Semester

| Course Name and Branches                                 | Course Name and Branches  |
|--|---|
| Commercial Law   | Foreign Language (for Professional Usage)                               |
| English III  | Jurisprudence   |
| Management and Organization                              | Philosophy (Philosophy, Religion Studies, Logic, Ethics and Aesthetics) |
| Navigation and Navigation of Aids                        | Physical Training   |
| Flight Operations  | Theory of Probability and Mathematical Statistics                       |
| Airport Operations and Equipment                         | Life Safety   |
| Behavioral Sciences                                      | Fundamentals of Marketing   |
| Atatürk's Principles and History of Turkish Revolution I | Fundamentals of Transportation Processes and Systems Theory             |

|                   |                                   |
|-------------------|-----------------------------------|
| Elective Course 1 | Transport Modes                   |
|                   | Foreign Language (Special Course) |

#### 4<sup>th</sup> Semester

| Course Name and Branches                        | Course Name and Branches  |
|---|---|
| English IV                                      | Foreign Language (for Professional Usage)                               |
| Flight Performance                              | Philosophy (Philosophy, Religion Studies, Logic, Ethics and Aesthetics) |
| Operation and Performance                       | Physical Training   |
| Ground Handling                                 | Fundamentals of Management  |
| Passenger Handling Services                     | Operational Research of Transport Systems                               |
| Dangerous Goods                                 | Transport Law   |
| Aviation Security                               | Fundamentals of Transport Economy                                       |
| Principles and History of Turkish Revolution II | Airport Operation   |
| Turkish Language                                | Financial and Economic Analysis of Aviation Enterprise Activity         |
|   | Information Technology Training   |

#### 5<sup>th</sup> Semester

| Course Name and Branches                   | Course Name and Branches                  |
|--|---|
| Financial Management                       | Sociology                                 |
| Labor Law                                  | Operational Research of Transport Systems |
| Aviation English I                         | Fundamentals of Systems Control Theory    |
| Human Resources Management                 | Fundamentals of Labor Safety              |
| Cost and Management Accounting             | Air Traffic Management                    |
| Marketing Management                       | Air Transport Insurance                   |
| Production Management in Service Companies | Cargo Science                             |
|  | Military Training                         |
|  | Human Resources Management                |

#### 6<sup>th</sup> Semester

| Course Name and Branches       | Course Name and Branches                |
|--------------------------------|---|
| Aviation English II            | Ukrainian Language (According to Major) |
| Management Information Systems | Informational Systems and Technology    |
| Analysis of Financial Reports  | Cargo Transportations                   |
| Airline Management             | Air Transport Tariffs                   |
| Air Traffic Rules and Services | Air Transportation Sales                |
| Organizational Behavior        | Air Passenger Transportations           |
|                                | Technology Training                     |

|  |                   |
|--|-------------------|
|  | Military Training |
|  | Rhetoric          |

#### 7<sup>th</sup> Semester

| Course Name and Branches       | Course Name and Branches           |
|--------------------------------|------------------------------------|
| Advanced English I             | Political Science                  |
| Public Finance                 | Logistics                          |
| Quantitative Methods           | Passenger Transportations          |
| Finance in Aviation Companies  | State Regulation of Transportation |
| Airport Management             | Transportation of Special Cargo    |
| Aviation Safety                | Fundamentals of Travel Industry    |
| Enterprise Resource Management | Military Training                  |
|                                | Quality Control                    |

#### 8<sup>th</sup> Semester

| Course Name and Branches                  | Course Name and Branches   |
|---|--|
| Airline Fleet Planning                    | Psychology   |
| Airline Marketing                         | Interaction of Transport Modes                                   |
| Customer Relations                        | Customs Operations   |
| Aircraft Maintenance Management           | Technical and Economic Research of Transport Systems Development |
| Advanced English II                       | Aviation Safety  |
| Air Law                                   | Foreign Language (Special Course)                                |
| Transportation Policies                   | State Examination  |
| Applications of Civil Aviation Management | European Law   |
|   | Resource Saving Technology in Transport                          |

Table 1. Elective Courses of ATM in AU

| Elective Courses              |                                |
|-------------------------------|--------------------------------|
| Air Cargo                     | Flight Planning and Monitoring |
| Cultural Activities           | Aviation Ethics                |
| Traditional Turkish Art Music | Organizational Communication   |
| General Aviation              | Strategic Management           |
| Community Services            | Logistics Management           |
| CRS Applications              | Project Management             |
| Model Aircraft Construction   | Innovation Management          |

## Conclusion

Both AU and NAU has their own courses up to their country needs. There are 15-20 courses looks similar, but it must be analyzed deeply. These similar courses are aviation safety, foreign language, cargo transportation, maths, economy, transportation law, etc.. In AU, 1 and 2 class courses the obligatory course (by Authority of Universities in Turkey) like Math, Turkish Language, Turkish Revolution etc. 3 and 4 classes is any kind of management courses and Application of Civil Aviation Management a kind of report or finish thesis written by students with advisor professor. One of the major difference between AU and NAU ATM program is elective courses, students from AU chose any elective course up to their interests dance, or music or management or foreign language.

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## **INTER-FIRM INTERACTION OF THE AVIATION ENTERPRISE AS A METHOD TO ENHANCE THE FUNCTIONING OF UKRAINIAN AVIATION COMPLEX**

*This article studied the current level of inter-firm interaction between aviation enterprises, including identifying shapes and characteristics of inter-firm cooperation.*

Air transport industry is influenced by the growing manifestations of systemic crisis. This includes almost all the major components of the aviation industry: aircraft building, air transport and transport infrastructure; aviation high and special education, employment of aviation professionals and graduates of aviation universities. Therefore, urgent problem of the aviation complex of Ukraine is the analysis of cooperative-integration processes in the foreign and domestic aviation sector that will contribute to the restoration of the work of aviation business and open new markets for airlines, MRO and enterprises, as integrated corporate structure type.

Study the problem of improving the functioning and development of the aviation complex involved in such scholars: V.M. Zagorulko, E.M. Sich, O.V. Arefeva, M.V. Novikova, A.V. Shevchenko [4], O.V. Khirs [3].

Today, the question of the analysis of theoretical and methodological approaches to the creation of a mechanism multipolar inter-firm interaction between domestic and foreign aviation enterprises and air transport industries on the organization processes to provide services to transport passengers, repair, maintenance and service of the definition form inter-firm cooperation.

Ukraine has an infrastructure aviation complex includes:

- aviation industry enterprises, air transport infrastructure with extensive technical aviation technology - aircraft plants, the provision of services on the design, repair, maintenance, airworthiness, providing good technical condition and safety of flight;

- airlines have a huge performance experience of passenger and cargo flights, including transatlantic and long-range flights on the foreign and domestic made aircrafts;

- the system of training of aviation personnel, designers and scientists - one of the main components of the Ukrainian aviation complex, which is implemented in Ukraine by huge number of relevant aviation universities , training centers with highly specialized training of aviation personnel by type of aircraft and aviation areas; centers of training , retraining , which covering the entire aviation industry - in aerospace (aircraft and engines design, building of aircraft and engines, helicopters, navigation equipment, and operation).

By regulatory support for Ukrainian aviation sector, the Ukrainian government is taking steps to harmonize Ukrainian aviation legislation based on IAC standards to the European aviation standards by taking in Ukraine as state laws

translated into Ukrainian EASA aviation standards. Thus, in Ukraine already acting Ukrainian analogs of European aviation standards:

- OPS1, Part-M and Part-145 for airlines, continuing of airworthiness organizations and maintenance and repair organizations;
- Part-147 - training centers for training aviation staff involved in maintenance and repair;
- Part-FCL and OPS 1 – training centers for pilots;
- Part-66 by Ukrainian Aviation authority during issuance of licenses for engineers which is in compliance with European licenses;
- participation of higher education system in Bologna Process.

Thus, Ukraine has not only provided personnel and regulatory and legal framework for aviation complex, but also extensive experience in the aviation industry as a post-Soviet Union, domestic and foreign. All these factors make closer Ukrainian aviation complex to international aviation business.

The most pressing issue today – to find the ways of efficient operation of Ukrainian aviation complex in terms of the global crisis and economic disaster, which turned Ukraine.

In practice, the management of modern enterprises is increasingly crucial inter-firm cooperation, integration and cooperative relations, common achievement goals [2]. So it is reasonable to try usage of inter-firm cooperation approaches, elements, methods and experience in communication between Ukrainian aviation complex and international aviation business.

The increasing complexity of industrial systems, and the ever-changing environmental conditions, such as the global world crisis, the ever-increasing fuel prices, political and economic sanctions applied by countries-producers of aviation technology to other countries, which haven't their own developed aircraft building industry, stimulated the development of inter-firm interaction as the most important factor in improving the competitiveness of high-tech enterprises. For domestic enterprises relevance of inter-firm cooperation and finding the optimal form of cooperation is due to the fall in domestic demand and output, lack of investment and working capital, uncertain prospects.

The problem of efficiency of inter-firm interaction can be examined from different perspectives, but more flexible forms aimed at increasing competitiveness in the course of business, without loss of autonomy and independence of partner companies.

In fact, from the manufacture and maintenance of aircraft and components, inter-firm cooperation brings together companies within the economic systems the flexibility and adaptability of a small production with low cost and high productivity of mass production.

With regard to air transport, inter-firm cooperation can open new markets for domestic airlines services by proposing to ACMI scheme or its derivatives to air operators of other countries. Leasing of insured aircraft with crew and complete maintenance support for use on routes of Lessee country which is under economic and political sanctions of aircraft manufacturers (U.S., EU) or have weakly developed their own aviation complex - especially the Middle East countries (Iran, Iraq, Afghanistan, etc..) and Africa. This form of international cooperation of two air



operators gives a lot of advantages:

- the country of the lessee - the opportunity to expand and develop their own air lines by bringing modern aircrafts with high levels of fuel and commercial efficiency;
- the country of the lessor - an opportunity to expand their operations, opening new jobs, more additional income, the establishment of international commercial relations;
- in general for the parties - a form of cooperation enables the formation of long-term cooperation, sharing and exchange of aviation experience and aeronautical techniques.

Also by airlines inter-firm interaction includes activities to expand the route network, optimization of tariff policies to attract more passengers, which is implemented through agreements code sharing, interlining, tariff agreements and the formation of alliances.

Thus, inter-firm cooperation enterprise provides not only reduce costs at all levels of the value chain, but also the conditions for organizational and economic sustainability of interacting business by continuously improving the technological and commercial development in the context of risk and uncertainty, thereby forming a stable organizational economic structure of inter-firm cooperation. The task of the company is to identify the elements and structure that allows for an effective way to achieve positive business results through the use of market, hierarchy or inter-firm co-ordination mechanism. Structural elements of companies inter-firm interaction is shown in Figure 1.

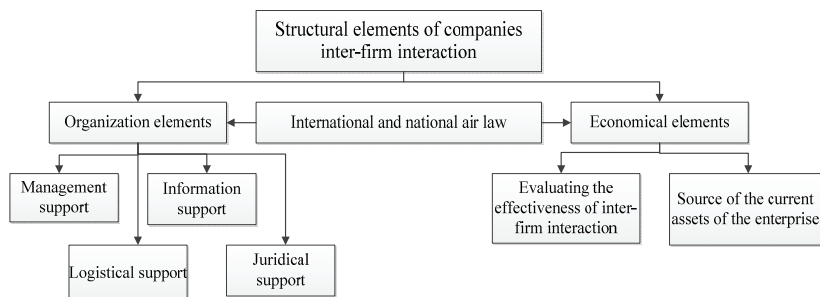


Fig.1 Structural elements of companies inter-firm interaction

The organization of inter-firm interaction between businesses, organizations and corporations having all sorts of contradictions: contradictions between organizations belonging to various corporations, upon them interact, are determined by the difference between the performance criteria (goals) of the organization; contradiction between the organization and the center (board of directors) of a corporation, in which functions of the organization, are to profit distribution (effect) from intercorporate interactions [1].

Thus, the concept of inter-firm interaction mechanism should include the

following components:

- identifying effective forms of inter-firm interaction mechanism of high-tech enterprises;
- evaluation of legislative and legal aspects of the regulation of this interaction, including international law;
- systematization of indicators that evaluate the effectiveness of the strategic partnership;
- development of private and common models improve the efficiency of inter-firm interaction of high-tech enterprises;
- a formal description of the organizational and economic model of inter-firm interaction management, using methods of functional modeling;
- development of method for assessing synergy effects arising from the inter-firm cooperation.

It should be noted that companies in the process of inter-firm interactions can be targeted to achieve a fundamentally different strategic goals. The basis for the establishment of partnerships between companies is to conduct a thorough self-assessment and evaluation of the potential partner. Self-assessment in this scenario case - definition of business purpose of the company, a description of the type of product or service, determining the pricing policy, strategy, distribution, manufacturing capacity, evaluation of legal aspects of the strategy of marketing [2].

**Conclusion.** Inter-firm cooperation offers additional benefits to companies in the acquisition of resources without losing participants own specialization and independence. In areas where the rapidly changing needs, products and markets, contracts may be ineffective, and mergers and acquisitions result in the purchase of unnecessary or unprofitable resources. Partnership allows you to avoid it. Especially effective inter-firm interaction is manifested in the crisis and changing market, economic and political situation.

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## **RESOURCE ALLOCATION IMPROVEMENT IN THE TASKS OF AIRPORT GROUND HANDLING OPERATIONS**

*One suggests a mathematical model of optimal resource allocation by aircraft ground handling company using duality theory.*

Efficient allocation of internal resources of an aircraft ground handling operator is one of the key factors for the civil aviation airports to operate. The task gains a particular significance for major aircraft ground handling companies (AGHC) with a large number of divisions which also have various technological ways to process passengers, cargo and aircraft (A/C) and which are in charge of resources consumption, in particular [1].

Resource allocation should be carried out with consideration for production capabilities and needs of all AGHC divisions which handle the specified airports. The well-developed system of internal prices of resources, which functions within the given system, may serve to this purpose. The Soviet [2, 3] and foreign [4] academic literature a great deal of attention has paid to duality theory and dual estimates in particular. However, the issues of dual estimates applied use have been covered scarcely (excluding few publications [5, 6]).

For the linear problems of AGHC's work optimisation the internal prices can be built on the basis of dual estimates. The main idea to use dual estimates for the efficient allocation of scarce resources between AGHC divisions consists in the following. Assume that an original indicative solution of resource allocation has been drawn on the basis of past experience or some other considerations. This naturally brings up the question on the possibility to improve it. To provide an answer one needs the estimates pointing at optimality or possibility of the original allocation solution. As such estimates dual estimates can be adopted which have been obtained as a result of solving local tasks of optimisation of each subdivision's activities taking into consideration the original resource allocation between them.

Thus, if the estimates for a certain resource differ at least in two divisions, then it is appropriate to reallocate this resource between them. For this purpose the value for the objective function of the division from which the part of resource is being withdrawn can be somewhat worsened and improved for the one to which this resource is being transferred while the cumulative effect would be stronger. To solve the problem on the quantity of resource being reallocated the particular models of the tasks for these two divisions should be joined into a single model with a common target function and common limitations with respect to the homogeneous resources being reallocated. Solving the combined task will provide the best reallocation of scarce resources between the divisions involved. All these estimates for the same name resources for these divisions will become equal between each other, respectively. Afterwards the joint model gets separated into two ones of original type again. The

right parts of the limitations change incidentally in accordance with the obtained resource reallocation, etc. The process continues until the dual estimates become equal for the same name resources in all the divisions. Now, let us consider an AGHC including a number of divisions, each rendering one type of service [7, 8] (A/C fuelling and maintenance; A/C balancing and weight control; manufacturing and delivery on-board power supply; provision of take-offs and landings, passenger terminal services, rest for crews; passengers flight check, meeting and boarding; handling handicapped passengers; handling the unaccompanied minors; handling, storing and loading of cargoes, baggage handling; baggage tracing, aviation operations sales through own air ticket offices; twenty-four-hour control of all processes; ensuring aviation safety and protection of objects; hotel services; provision of special transport to airlines serviced at the airport; cleaning A/C's passenger compartment, galley, toilets, baggage areas; garbage disposal and utilization; complex washing of A/C; crew transportation; flight documentation preparation and delivery on-board, etc.), and the centre providing  $m$  types of resources to the divisions.

Let us introduce the following denotations:  $i$  – resource type index,  $i = 1, \dots, m$ ;  $j$  – AGHC division index,  $j = 1, \dots, n$ ;  $a_i$  – resource quantity;  $\underline{X}_j$  and  $\overline{X}_j$  – the lower and upper margins of an AGHC division's services volume;  $T_j$  – quantity of technological ways to provide a service by AGHC division;  $p_{ij}^t$  – consumption of  $i$  resource per unit of  $j$  service, provided through  $t$  technology;  $x_{jt}$  – the volume of  $j$  service, provided through  $t$  technology (target values), depending on source data availability these can be physical quantities or monetary values.

Assume maximum value of profit as an optimality criterion for each division and AGHC on the whole.

Algorithm to solve the task. At the first stage of solution let us allocate the stock vector  $\vec{a}_i$  between the AGHC divisions in an arbitrary way (e.g. on the basis of an expert's experience). Let the first division be allocated  $a_{i1}$  units of  $i$  resource,  $i = 1, \dots, m$ , and the second one be allocated  $a_{i2}$  and so on. Considering this allocation for each division let us compile a task to determine the optimal solution for service rendering. Thus, for  $j$  division this task has the form as follows: to determine a solution  $\{x_{jt}\}$ , which allows achieving objective function maximum

$$P_j = \sum_{t=1}^{T_j} c_{jt} x_{jt} \quad (1)$$

subject to the following sets of constraints:

$$x_{jt} \geq 0 \quad (2)$$

$$\sum_{t=1}^{T_j} p_{ij}^t x_{jt} \leq a_{ij} \quad (3)$$

$$\overline{X}_j \geq \sum_{t=1}^{T_j} x_{jt} \geq \underline{X}_j, \quad (4)$$

where  $c_{jt}$  is profit obtained by  $j$  division of AGHC for having provided a single service using  $t$  technology.

As a result of solving tasks of (1)-(4) type for each division  $j \in \{1, \dots, n\}$ , beside optimal solution  $\{x_{jt}^*\}$ , we'll obtain the dual estimates vector  $\{\mu_{ij}^o\}$  relevant to the constraints (3), and also the value of objective function  $P_j^o$ .

Let us compare dual estimates of the same name resources, obtained for different divisions. They may prove to be considerably different from each other. This case may occur under non-optimal allocation of the given resource between the divisions. Indeed, if, for example,  $U_{11}^o = 0$ , and  $U_{15}^o = 1$ , then adding a unit of the 1<sup>st</sup> type of resource to the 1<sup>st</sup> division would result in 10 units of additional profit, but withdrawal of the unit of the same resource type from the 5<sup>th</sup> division would bring profit only to 1 unit lower. Therefore it makes sense to withdraw a certain amount of this resource from the 5<sup>th</sup> division and transfer it to the 1<sup>st</sup> one.

Formally, let us do the following. After solving the tasks of (1)-(4) type we select two divisions  $j_1$  and  $j_2$  for which the difference of dual estimates by a certain resource  $i_1$  is maximal, i.e. for which it

$$U_{i_1 j_1}^o - U_{i_1 j_2}^o = \max_i \max_{\substack{1 \leq j' \leq n \\ 1 \leq j'' \leq n}} \left( U_{ij'}^o - U_{ij''}^o \right).$$

For the divisions  $j_1$  and  $j_2$  a "local tasks" is formed to optimally reallocate the resources between them. For this purpose the models of (1)-(4) type are joined for the divisions  $j_1$  and  $j_2$  to make a single one as follows: to determine a solution  $\{x_{j_1 t}^1, x_{j_2 t}^1\}$ , which allows to achieve objective function maximum

$$P_{j_1 j_2} = \sum_{t=1}^{T_{j_1}} c_{j_1 t} x_{j_1 t} + \sum_{t=1}^{T_{j_2}} c_{j_2 t} x_{j_2 t} \quad (5)$$

subject to the following sets of constraints:

$$x_{j_1 t} \geq 0; \quad x_{j_2 t} \geq 0; \quad (6)$$

$$\sum_{t=1}^{T_{j_1}} p_{ij_1}^t x_{j_1 t} + \sum_{t=1}^{T_{j_2}} p_{ij_2}^t x_{j_2 t} \leq a_{ij_1} + a_{ij_2}, \quad i = 1, \dots, m \quad (7)$$

$$\bar{X}_{j_1} \geq \sum_{t=1}^{T_{j_1}} x_{j_1 t} \geq \underline{X}_{j_1} \quad (8)$$

$$\bar{X}_{j_2} \geq \sum_{t=1}^{T_{j_2}} x_{j_2 t} \geq \underline{X}_{j_2} \quad (9)$$

Solving the task (5)-(9) will bring an optimal solution  $\{x_{jt}^1, x_{jt}^1\}$ , new vector of  $\{U_i^1\}$  dual estimates, which corresponds now to the divisions  $j_1$  and  $j_2$ , and also the value of the objective function  $U_{j_1 j_2}^1$ . Whereby  $P_{j_1 j_2}^1 > P_{j_1}^o + P_{j_2}^o$ , i.e. total profit of two divisions became higher than the result of the tasks (1)-(4) for the divisions taken separately. Indeed the inequation  $P_{j_1 j_2}^1 < P_{j_1}^o + P_{j_2}^o$  is impossible since the solution  $\{x_{jt}^o, x_{jt}^o\}$ , obtained from optimal solutions of tasks (1) - (4) for the divisions  $j_1$  and  $j_2$ , is obviously feasible for the task (5) - (9), and the solution  $\{x_{jt}^1, x_{jt}^1\}$  is not only feasible but also an optimal one. Therefore the last inequation is at variance with optimality of the solution  $\{x_{jt}^1, x_{jt}^1\}$ . As a rule, the  $P_{j_1 j_2}^1 = P_{j_1}^o + P_{j_2}^o$  equality is also impossible, since the profit increment of the  $j_1$  division being equal to  $U_{i_1 j_1}^o \Delta_{i_1}$  for at least a rather small quantity of reallocated resource  $\Delta_{i_1}$ , exceeds the "loss" of the  $j_2$  division being equal to  $U_{i_1 j_2}^o \Delta_{i_1}$ . The "local task" being solved, the model (5)-(9) is "separated" again to make two models of (1) - (4) type. Moreover, the right parts of both tasks are formed subject to obtained reallocation of resources. If certain amount of resource remains underused in the event of solving task (5)-(9), when "separated", its remainder can be allocated between these two divisions in an arbitrary way. This is the end of the first stage.

Afterwards two divisions are selected again for which the difference of dual estimates by certain resource is maximal, and the model of the second "local task" is constructed the same way, etc. Should the dual estimates for each type of resource for all the divisions be equal between each other, the process comes to its end.

It should be noted that finiteness of algorithm is not guaranteed; however, when solving practical tasks, one can be restricted to an approximate equality (not an absolute one) of dual estimates. No doubt the number of "local tasks" for each stage of solution will depend on the degree of approximation.

**Summary.** The article describes the possibility to use dual estimates for solving practical tasks of optimal operations of aircraft ground handling company with limited resources.

The mathematical model (1)-(4) is formulated in a standard form. When being implemented for a specific airport one may need to modify it taking into account additional constraint system requirements and when selecting a performance criterion.

The numerical results of solving the task concerned one can obtain through one of the software packages, such as LINDO.

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## **LOW-COST AIRLINES IN UKRAINE: HISTORY AND PERSPECTIVES**

*Basic principles of low-cost airlines, history, problems and perspectives of low-cost flights in Ukraine are discussed*

Basic principles of low-cost airlines:

1. Use of modern and regularly updated fleet of aircraft of the same type (Airbus A320 or Boeing 737), which significantly reduces the cost of crew training and aircraft maintenance, fuel costs, downtime due to breakdowns.

2. Aircraft with usually only one cabin class (economy class), with a less comfortable seats.

3. Selling tickets via the Internet, saving on agency commission payments and reservation systems. Online check-in, the need to print out a boarding pass, otherwise - extra money for registration and ticket at the airport; changing the name, date, destination are charged extra; commission for the purchase of the ticket.

4. Price increases rapidly as the date of departure approaches. Money for the ticket in case if passenger does not appear for flight is not refundable. But some compensation is still provided. Low-cost airline makes a full refund for canceled flight. In case of delay beyond acceptable terms an airline pays the cost of soft drinks, meals, hotel accommodation, ground transfers.

5. Boarding passes have no seats indicated - it stimulates passengers to get onboard faster.

6. Minimum additional equipment, service and in-flight services (meals and drinks are not available for free, there is no video and audio systems, AVOD, ACARS, etc.) that reduces the cost and weight of aircraft and fuel consumption.

7. Strict limits of size and weight of carry-on baggage and checked baggage.

8. Flights, based on point to point principle (direct flights between airports) instead of using intermediate landings in hubs (also with a view to maximizing the use of aircraft and to avoid delays associated with delayed transit of passengers and loss of luggage between flights).

9. High level of aircraft turnover and a large number of aircraft flights per day (in some cases low cost airlines commit six to ten flights per day on the same route, being in the air for 10-12 hours). Distances are usually close - a maximum of three-hour flight, and more often of one or two hours. Aircraft should not be at the airport for more than 30 minutes to unload, prepare for the next flight and upload again.

10. Low-cost airline will operate successfully only where there is significant passenger traffic.

11. Use of regional secondary airports with lower airport charges.

12. Flights are not in a very convenient time for passengers (early morning or late evening), on not most busy days of the week to avoid delays and save on airport charges.

13. Aggressive fuel hedging programs.



14. Low-cost airlines save even on employees who wash their own uniform; in some low-cost airlines copilots refuel planes; flight attendants clean the cabin and register passengers on board.

15. If a flight operated by low-cost airline is not filled to a critical point, the decision to postpone it may be taken.

16. Sale of additional services: extra legroom, opportunity to enter into the salon first and pick a better seat, or to be seated with your family.

17. Passengers who for some reason need more space must purchase additional seat for the full fare price. This applies to very obese people, as well as to those who transport items requiring special attention and which can not be transported under the seat or in the overhead locker.

18. Not every low-cost airline allows animals on board. For example, Germanwings has nothing against animals on board, but only with the right package of documents to them. Wizz Air Ukraine does not carry pets.

19. The age threshold for children's tickets from low-cost airlines often is being raised from 12 to 10 years. Despite the fact that low-cost airlines do not provide a separate space in the cabin for infants up to two years they may charge them a surcharge, apparently in favor of a potential violation of rest other passengers want to have.

20. Insurance, as well as other services is paid by the passenger additionally. Among other things, discounters offer to buy insurance from flight cancellation on which the passenger gets drinks, hot meal, and if the waiting time is significant - hotel is paid.

21. Large low-cost airlines have their own loyalty programs, similar to those of traditional carriers. Accumulated miles can be redeemed for a free ticket or additional services, etc.

Some low-cost airlines indicate all taxes and fees right in the flight price. Europeans mostly prefer to do it at the end of the online booking procedure.

Positive effect of low-cost airlines operation in Ukraine is regional development (flights to secondary airports, development of routes, which never existed, creating new jobs, tourism development, and as a consequence - the construction of hotels, restaurants etc.).

Generally, in the world there are three forms of budget carriers, which are traditionally called low-cost airlines. Low-cost airlines with extremely low production costs; no-frill carriers combining elements of low-cost airlines that do not perform connecting flights and have no additional services; low cost carriers, representing a full-fledged airline with a set of services that performs connecting flights within a limited route network, but offer lower rates than traditional carriers.

The traditional for low-cost airlines business model is changing. Currently, there are four types of it:

- Classic. Includes all the pros and cons: a minimum comfort, severe restrictions on baggage, fees for additional services, the inability to return the ticket, reduced distance between the seats in the cabin, etc. These carriers have the lowest prices.

- High class. Offer its clients for the same relatively low price (sometimes slightly higher than by classic low-cost airlines) a minimum set of amenities: a light snack or a drink in flight, comfortable seats, a small luggage in addition to the carry-on baggage, transit routes and more frequent departures from major airports.

- Super. High-end facilities include in-flight entertainment in the form of TV, Internet, individual monitors, etc. Prices approach the prices of traditional airlines.
- Business. Interesting, but currently undeveloped type of low-cost airlines offering its passengers traveling only in business class in the best possible conditions, but at the lowest possible price, it turns out to be significantly lower than by business class of a traditional carrier.

Low-cost airlines have become one of the major development challenges the traditional air carriers (or former national airlines). Companies such as Air France, Iberia, Lufthansa try to pass their short-haul routes to their subsidiaries.

Many carriers have started to create their own low cost airlines, for example, KLM - Buzz, British Airways - Go, Air India - Air India-Express and United - Ted, but found that it influences their core business. The exceptions are Bmibaby (owned by Bmi), Germanwings (49 % owned by Lufthansa) and Jetstar (owned by Qantas), which successfully operate in parallel with their counterparts with full service.

Low-cost flights started in Ukraine in 2007 with Italian airline Alpi Eagles.

Initial plans of low-cost airline WizzAir Ukraine included only domestic flights (first flight was done in 2008) between Kiev, Lvov, Kharkov, Odessa, Zaporozhye, Simferopol. However, due to low demand all domestic flights were abandoned. Initially flights were carried out from Boryspil airport, but since 2011 – from airport Kiev. The first international flight to London Luton was done in 2008. Airline considered the possibility of creating the similar to Katowice airport in the western part of Ukraine.

To enter the Ukrainian market considered airlines such as EasyJet, Niki, Avianova, Mihin Lanka, SkyEurope.

Flights from Ukrainian airports operate Carpatair, Air Arabia, Flydubai, Wind Jet, Pegasus Airlines, Onur-Air, UTair-Ukraine, AirBaltic.

Air Berlin negotiated in 2009 to start operations in Ukraine, but did not get permits and the number of flights desired. GermanWings said that its flights from Ukraine were unprofitable and BerlinAir refused to enter the Ukrainian market due to the "closed" sky. Arkia, Vueling Airlines, Norwegian Air Shuttle ASA, Air One also stopped their operation in Ukraine.

Representatives of Ryanair (Ireland) in 2012 negotiated with a number of airports in Ukraine but they did not get the discounts for airport charges they wanted. Besides, to enter the Ukrainian market Ryanair would have set up a subsidiary in Ukraine.

Experience shows that in the fight against Ryanair local airlines can get stronger (for example, the Latvian airBaltic), and then begins to phase out Ryanair business and relocate somewhere nearby. The second option - not without the help of the Irish airline local carrier dies (for example, Hungarian Malev), and then at the airport low-cost domination begins.

Resolution on the implementation of international flights - a major problem in the way of foreign carriers on the Ukrainian market. Under current law, a foreign company has no right to carry on domestic flights, while the country has not acceded to the "Open Skies" agreement. Until then flights are carried out on the basis of bilateral agreements. Low-cost airline Hungarian Wizz Air overcame the restrictions on flights by establishing in Ukraine its subsidiary "Wizz Air Ukraine". Discounters

encounter problems with airport infrastructure which is not prepared for the specifics of their work. For example, terminals at Boryspil do not allow simultaneous boarding and disembarkation of passengers, people need to use the shuttle bus, which leads to additional costs and increase the ground time of the aircraft. To meet the 30-35 minutes allotted for preparing for the new flight will be very problematic. An ideal airport for low-cost airlines is Kiev airport, located almost in the center of the city, near the train station and the central bus station.

Stimulating the development of low-cost is dictated not so much by the needs of citizens, as by the need to load new airports.

Aircraft fuel in Ukraine is several times more expensive than in any other country in Europe, and it influences low-cost airlines too.

Interests of low-cost airlines are usually threatened by traditional airlines, such as Ukrainian International Airlines.

Airports in largest cities - Kiev, Dnipropetrovsk, Lviv, Simferopol, Donetsk, Zaporozhye, Kharkov, Odessa and Ivano -Frankivsk – are designed for Boeing - 737 and A-320, which are aircraft most often used by low cost airlines.

Nevertheless, the International Air Transport Association predicts short existence of low-cost airlines because of fuel prices.

But the main problem for low-cost airlines operation is that Ukraine is not a member of the "Open Skies". Entrance of foreign airlines into the Ukrainian market (as well as domestic companies in Western markets) is governed by intergovernmental agreements. In order to increase number of passengers it is required to cancel visas for Ukrainians to Europe. Furthermore, appealing to low-cost airlines would be to use Ukrainian airports as transit on the way from the East to the West.

**Conclusions.** The main problems for low-cost airlines in Ukraine are absence of "Open Sky" agreement, visa regime with EU, high airport charges, high fuel price, low demand for regional air services etc.

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## **LEGAL, ORGANIZATIONAL AND ECONOMIC ASPECTS OF CLASSIFICATION OF ENTERPRISES INTEGRATION**

*On the basis of classification criteria definition systematization of enterprises  
integration are fulfilled accounting the world tendenses and Ukrainian law  
spesifications.*

In recent years, the global spread merge processes, absorption of enterprises, creating temporary association of companies. Such integration processes taking into account global trends and characteristics of the domestic legal space require in-depth study of the theoretical and methodological aspects of their implementation.

However, many aspects of this problem remain insufficiently disclosed and justified. In addition, the processes of the business combination in Ukraine are characterized by their features and differ significantly from the Western European, American and Russian practices. Last calls for coordination and harmonization of legal, organizational and economic, as well as methodological components of the choice of species, forms and methods of enterprise integration with current realities and trends.

For resolve the issue of choosing the most suitable form of business combination , aimed at integration, necessary to systematize their species by determining the appropriate classification criteria or classification criteria.

From a legal point of view, an association of enterprises - is one type of the legal structure of the business. Created association of enterprises except legal has economic and organizational features that distinguish it from other forms of business.

First, enterprises are consolidated into a union based on common interests, as combined industrial, scientific, technical, business association members , there is a corresponding centralization of management, coordination functions, and so that is its organizational trait.

*Second*, the economic interests of the association as a basis of combining determined by the founders in the contract or statute as the goal, task and function of the association. Unity of economic interests as a basis for association represents its economic sign.

Major economic and legal characteristics of the business combination as follows: union created and registered as a business entity operates under the memorandum of association or articles of association; owns property that is legally separated from the property association members, and has its own consolidated (shared members) balances, settlement and other bank accounts, seal with its name, and is a legal entity.

Current Ukrainian legislation provides for the formation of different types of business combinations. In the current economic conditions, the most common are the following types of business associations of enterprises: association, corporation, consortium, concern, industrial and financial group (IFG), the holding company, trust, cartel, syndicate, pool, conglomerate, an alliance of transnational corporations (TNCs), transnational alliance (TNA), techno park.

Due to the presence of many species of associations of enterprises with their detailed study there is a need for a certain systematization by determining appropriate classification criteria or classification criteria.

The results of the study of legal, organizational and economic aspects of the creation and activities of domestic, foreign and international associations of enterprises allowed to identify the main criteria for their classification. It should include: procedures for establishment, operation period, territorial restrictions, the nature of the integration of participants communication association, the presence of specialization of enterprises - members of the association, the legal basis for the establishment and activities.

Implementation of the classification of enterprise associations on the basis of the proposed criteria allows an informed choice form of integration of enterprises, taking into account the peculiarities of global trends.

Table 1 presented the classification of associations of enterprises, depending on the selected criteria.

*Table 1*

Classification of enterprises integration

| Criteria for classification of associations | Groups associations of enterprises   | Characteristic features of the group of associations of enterprises  | Types of associations  |
|---|--------------------------------------|--|--|
| 1   | 2                                    | 3  | 4  |
| Based on the order of base                  | Business associations of enterprises | Created at the initiative of enterprises, regardless of their type, which Volunteering combined their business activities. | Association, corporation, consortium, concern, conglomerate, cartel, pool, alliance, syndicate, holding, IFG.                            |
|   | State, municipal or utility          | Created by the decision of public authorities: the CMU, ministries and local authorities                                   | Corporation, concern, IFG, holding trust   |
| On the basis of its term                    | On an indefinite period              | Operate constantly, until the self-destruct, or in connection with the bankruptcy  | Association, corporation, concern, IFG, conglomerate, holding the cartel, pool, trust, syndicate, alliance TNC TNA.                      |
| 1   | 2                                    | 3  | 4  |
|   | temporary                            | Effect for the period established by the founders  | Consortium, cartel, IFG.   |
| On a territorial basis                      | National                             | Founders, location and operation confined to the territory of one country  | Association, corporation, consortium, concern, IFG, holding, cartel, syndicate, conglomerate, cartel, pool, trust, alliance, Technopark. |
|   | Transnational                        | Its founders include domestic and foreign legal entities.  | Consortium, concern, conglomerate, holding, pool, IFG, TNK, TNA.   |
| Based on the                                | statutory                            | Established and operate  | Consortium, concern,   |

|   |                               |  |   |
|---|-------------------------------|--|---|
| legal framework for the establishment and operation                                     |                               | under a charter  | corporation, trust, association, holding, conglomerate.                     |
|   | contractual                   | Act on the basis of an agreement between the parties   | Cartel, pool, syndicate, IFG, alliance, Technopark.                         |
| Based on the nature of integration ties association members                             | Horizontal                    | integrated enterprises producing homogeneous products and apply these technologies   | Association, a cartel pool, trust, syndicate, alliance                      |
|   | Vertical                      | Integrated enterprise engaging sequence stage production of the finished product,  | Corporation, IFG, TNK   |
|   | Horizontal - vertical         | combined with the presence of a production company or a functional relationship between the parties, including the company can meet with similar specialization. | Concern, holding, consortium.   |
|   | conglomerate                  | combined enterprise different industry sector, technologically unrelated   | Conglomerate, holding.  |
| Based on the availability of specialization of enterprises - members of the association | specialized associations      | Characteristic feature is the relationship of production or functional (including financial) between the founders  | Concern, trust, IFG, association, corporation, consortium, TNK, Technopark. |
|   | Financially integrated Unions | Characteristic feature is the connection between enterprises - participants only in finance and management   | Conglomerate, holding.  |
|   | Integrated in sales           | Basis for the establishment of such associations - use of resources, distribution channels, production capacities of participants.                               | Cartel, syndicate, pool, alliances.   |

**Conclusions and directions for further research.** The results of the study of legal, organizational and economic aspects of the creation and activities of domestic, foreign and international associations of enterprises allowed to identify the main criteria for their classification. These include: the order of the base, the period of operation, territorial restrictions, the nature of communication integration association members, the presence of specialization of enterprises - members of the association, the legal basis for the establishment and activities. For example, based on the nature of the integration relationship association members can be distinguished group of horizontal, vertical, horizontal-vertical and conglomerate associations. Based on the availability of specialization of enterprises - founders of

the association can be distinguished specialized associations, associations in the field of integrated marketing and integrated financial association.

Implementation of the classification of enterprise associations on the basis of the proposed criteria to justify the choice of form allows the integration of enterprises, taking into account features of global trends and domestic legal framework.

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## **MECHANISMS of GLOBAL MARKETS AEROSPACE**

*The main differences of global markets, their specification and mechanism of development are identified. The basic object of global markets, global goods which are different from the products of traditional industries is analyzed. The specifics of global markets of aerospace technology and mechanism of global markets of this technology are outlined.*

It was investigated, that in conditions of globalization international markets are developing intensively, turning into the global markets. There are points of view exist, which characterize the markets as global ones. So, the global markets are those markets, which embrace internal, national and international markets [1]. Market, as totality of sellers and buyers, is an institution of economic system that is determined by availability of same market infrastructure, competitive rivalry on the one hand by offer and on the other hand by demand and unification request.

It was analyzed, that existed classification of goods according to traditional manufacturing divides into traditional ones (produced on handicraft enterprises) and global (of goods at any place in the world). This way, global markets are formed by production and offer of goods with global characteristics. First of all the FMCG that have not individual characteristics are considered as such goods. For example, a lamp manufacture in Italy foresees that orderer can come at Italian family enterprise and make an individual order, and complexity of order doesn't matter. This manufacturing we can name "the approach of individual risks", when a producer of manufactures an exclusive and very expensive goods. Originally American Corporations get profits from unification of goods (frequently of FMCG), the offer of this good in all countries in the world. So, a COCA-COLA brand is well-known in all over the world and even remote places. And the producer gets superprofits from manufacturing of a single product and from selling it in different countries and continents.

It was determined, that the machine-building production is the production of global character and it requires specialization with followed by cooperation. It happens because it's difficult for one country to produce all spectrum of details and spareparts. Let's take a famous spareparts auto industry specialization where a company-producer orders some auto-parts from different enterprises abroad. So, an assembled Japan car is a product of international specialization and cooperation.

It was revealed, that aerospace industry is a branch as well. Certainly a positive aspect is that a country can have close technological cycle of creation and producing of aerotechnics. This is an international competitive advantage of high level. However, it is necessary to take into consideration aerospace branch as a difficult machine-building branch and that is very important to understand possibility of international partners. So, Ukrainian producers of near-main air-liner use conditions of international specialization and cooperation, include into manufacturing of finished air-liner such parts as [3]:



– Russia – some elements of piloting and navigation systems, radio parts, hydraulic;

– Kazakhstan – fire-fighting equipment;

– Azerbaijan – items of household equipment;

– Germany and France – parts of electrical equipment;

– Switzerland – seats;

– The USA – provider of GPS and TCAS.

Surely, the corporation can extend with the bond of necessary to use high technologies and to move to air-liners producing according to fifth technological structure [2]. We can emphasize here that existence and diffusion of fifth structure have borders (limited by 2015). This structure was based on development of microelectronic, information technology, communication means and new types of energy (such as atomic, sun, wind). A movement to new technological structure will be realized simultaneously. The global economy sets new challenges in front to the world and Ukrainian society. Answers to this challenges must be given by the next sixth structure, that will continue according to prognosis of scientists' forecasts from 2015 to 2050. It is characterized of development of bio-, nano-, info- and cognitive technology. Moreover the following directions will be developed. These directions [3] are:

– Designing of energy;

– The new nature (high technology);

– Laser technology;

– Compact and effective energy, rejection of hydrocarbon decentralized “smart” energy networks;

– Technologies to close the previous field (funds, - energy, - labour preservation);

– New forms of transports (carrying capacity, speed, range, low cost), combined transport systems;

– Production of construction materials with predetermined properties;

– New Medicine (improvement and health renovating);

– Designing of the future and its management;

– Hydrogen and alternative energy;

– Membrane and quantum technology;

– Micromechanics;

– Production of composite materials.

Aerospace technologies can develop corresponding to requirements of the future sixth technological structure. Global markets of aerospace productions must develop in this direction. So, it is necessary to develop new innovative directions for corresponding to this new structure demands, especially nanotechnology. Ukrainian Leading University, for aerospace branch, that prepares specialists, National Aviation University develops different directions for technical, information and cognitive specialists. Activation of very new knowledge in the air-liner building sphere of, using theirs on aero-route improves intellectual techniques. Necessary for a work in sixth structure competences must form a new system of specialist preparation.

So, it was investigated that competitive-information approach is a mechanism of global market development of aerospace equipment. Competition in this branch is very intensive. And it influences on activation of technological specialization with the following cooperating actions. In the sphere of air-liners production Ukraine is specialized on manufacturing of air-liners for regional and medium line for 70-100 passengers. Competitors for our country in this market are Embraer, Bombardier, Boeng, Airbus, Sukhoi Superjet 100. Ukraine is getting involved to global markets of aero equipment with entrance to markets of South America, Africa, Australia.

Information part of mechanism of global market development of aerospace equipment foresees the access and diffusion of information about bio-, nano-, info- and cognitive technologies in different segments of production, exploitation and ensuring of aerospace equipment. Information part depends on efficient training of engineers, designers, pilots, stewardess, economists, marketologists, and PR specialists.

It was outlined that for aerospace industry as typical feature, which influences mechanism of corresponding global market development is the global individualization. Thus every single air-liners production has absolutely individual characteristics and its production is similar to manufacturing of a lamp to order in Italy. This production is global and as a guide to individual consumer. So, every air-liner is a special product that is made according to requirements of individual customer. Global individualization is displayed as global demand on objects of little aviation or lightweight devices (LWD). In this sphere Ukraine has one niche when four producers make lightweight double devices, gliders, moto hang-gliders, rescue parachutes, accessories for flights. This market is also globalised, highly competitive and informative.

**Conclusions.** As a result of research we have made those conclusions: knowledge-intensive segment (including aerospace industry) of the global market is very profitable and highly competitive; as a mechanism of aerospace equipment development market is competitive and informative one.

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## **INFLUENCE OF THE MARKETING ENVIRONMENT DEMOGRAPHIC FACTOR ON THE DEVELOPMENT OF THE UKRAINIAN HIGHER EDUCATION MARKET**

*Lecturers of the higher education institutions are worried about cutting of the number of students that stipulated studying the Higher Education System of Ukraine from the point of view of marketing. The article contains results of the analysis of marketing environment factors that greatly influence the mentioned market and condition the increase or decrease of the demand.*

Integration, democratization, information process in the society is an important driving force and tool for the development of modern educational systems.

The existing legislation of Ukraine regarding education regulates social relations in the educational sphere. Constitution of Ukraine is a core of the legislative base. The Law of Ukraine "On Education" together with other legislative enactments governs issues of higher education functioning.

The higher education structure covers both the educational level that includes incomplete higher education, higher education and complete higher education, and educational-qualification level that includes junior specialist, bachelor, master.

Lecturers in the universities are worried about decrease of the number of students that causes the educational load cutting. We offer to make a look on the Higher Education System of Ukraine from the point of view of the marketing, i.e. to study it as a market that is regulated with the commodity-money relations of its participants.

The offered product is a service, that is formed in accordance with the National Higher Education System of Ukraine. The higher education institutions make the marketing offer, i.e. they are the sellers of the service ensuring it with proper level of the quality, corresponding price, systems of promotion and distribution. University entrants and students are the consumers of the service.

Since 2008/2009 educational year (e.y.) Ukrainian higher education market is characterized by the negative growth rate. The average annual cutting rate for the period since 2009/2010 e.y. to 2013/2014 e.y. is approximately 10%, that is appreciable enough for the most of market participants, higher education institutions.

Our analysis of the market is limited by the data regarding the number of the higher education institutions of the III-IV accreditation levels that give the education-qualification level of bachelor. Taking this into consideration and according to the made market segmentation it was defined that the youth 17-18 years old that has got completed secondary education is the target consumer segment for getting bachelor level service. Based on the results of the Ukrainian higher education marketing research in the segment of bachelor level the main development trend and factors that can complicate or favour its development were determined.

The Ukrainian higher education market belongs to the structure of monopolistic competition that is characterized by significant number of market

players and great number of consumers, for our case entrants and students.

Due to the official statistics data for 2013/2014 e.y. the number of higher education institutions of the III-IV accreditation levels was 325 in different regions of Ukraine, including 68,8% state universities and 31,2% - private. Higher education institutions of the III-IV accreditation levels are concentrated in Kiev and south-eastern part of Ukraine.

The main market players are determined due to rating created on the estimation of the educational institutions by students, employers and higher education system experts. Among 325 market participants only 19 placed TOP 7. The National Technical University “Kiev Polytechnical Institute” take the first place, Kiev National University named after T. Shevchenko – the second and Kiev National Economic University named after V. Het'man – the third.

The great number of the higher education institutions forms the competition of high level at the market. During the period since 1990/1991 e.y. to 2007/2008 e.y. the number of higher education institutions has twice enlarged mainly due to the appearing the great number of private universities. During the same period along with the great growth of the number of higher education institutions the number of students has significantly (up to 269%!) increased.

Since 2008/2009 e.y. there is the annual cutting number of students. The average annual cutting rate is almost 5% and since 2009/2010 e.y. there is the bit decrease of the higher institutions with the cutting rate at 1%, thus higher education institutions perceive some “unloading” because since 2010/2011 educational year the offer of the higher education significantly exceeds the demand as shown on the drawing 1.

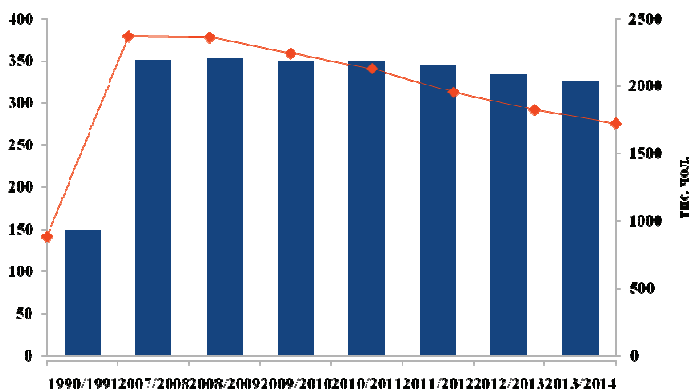


Fig. 1. Number of the higher education institutions of the III-IV accreditation levels vs. number of students

The influence of the demographic factor of the external marketing environment is considered as the most significant as far as the number of entrants directly depends on the number of citizens of Ukraine 17-18 years old.

To determine the development trend of the Ukrainian market under research let's estimate the share of existing higher education service consumers, e.g. those who has entered the higher education institutions of the III-IV accreditation levels, to the market capacity, e.g. the number of citizens of Ukraine 17-18 years old. This share is approximately 30%.

We used the official statistics data on demographic situation in Ukraine for assessment of the market capacity in the average-term perspective.

Based on this assessment we offer two scenarios of the possible average-term development of the Ukrainian higher education market: 1) under the condition of retention of the existing level of demand on the service on behalf of potential consumers; 2) with the application of the linear trend function<sup>3</sup> (drawing. 2).

Determined curves (draw. 2) can shift under the influence of the legislative and economic factors of the marketing environment creating optimistic and pessimistic scenarios of the higher education market development.

It is known that the permanent discussions on cutting the volume of the government order are held. Today the new Cabinet of Ministers of Ukraine has taken the decision to save this volume for the higher education institutions. Ministries of Finance and Economy will provide the market with the necessary amount of the state money. However, there will be the new approach to distribution of the government order volume among higher education institutions: in the first place the government order will be given those institutions which ensure the high quality level for the service, e.g. guarantee the preparation for students in the best way and have higher rating among the market participants.

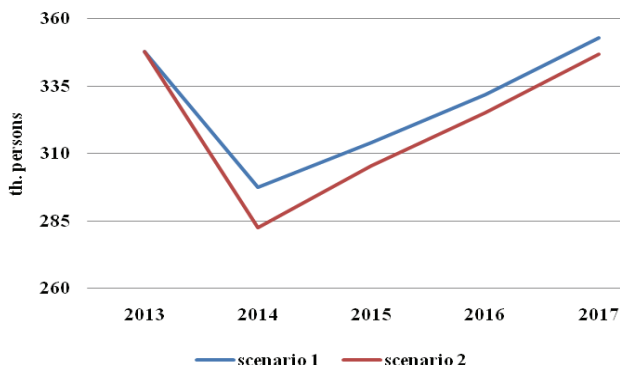


Fig. 2. Ukrainian higher education market development tendency

For today the negative influence of the legislative factor on the higher education market has been leveled due to proper decision making. The implementation of new government order scheme can cause the decrease of the number of majorities in those higher education institutions of not high rating level.

The marketing environment economic factor particularly indices that characterized the general state of the economic development of the country, and the

level of real incomes of population as well, greatly influences the higher education market. With cutting the volume of government order for the highly educated specialists the obtaining education on contract base gains more importance. That requires the certain level of the incomes of population. Besides, unsatisfactory state of the economic development of the country assumes the reduction of workplaces at the labour market and complicates the job placement of graduating students.

Economic factor of the external marketing environment makes the evident influence on the Ukrainian higher education market development. The value of study in the higher education institution is of the great part of expenses for a family budget. The reduction of the real incomes of the population, high level of inflation, increase of the level of unemployment will lead to the development of the higher education market due to the pessimistic scenario.

The part of consumers switch over to consumption of both the other form of the service - extra-mural or distance, and the service given by the higher education institutions of other countries, particularly European, is a result of the general unsatisfactory state of the economic development of the country.

**Conclusion.** The higher education market decrease is a subject of anxiety for many higher education institutions. If to study higher education system of Ukraine from the point of view of marketing it's possible to define the factors of the marketing environment which influence its development, and whether the change of the negative trend is available. Due to the increase of the population since 2015 the number of consumers of the higher education service will grow under the condition of retention of the existing level of demand that is 30% of the number of citizens of Ukraine 17-18 years old. According to the second scenario the Ukrainian higher education market is characterized by the falling down in 2014 as well, and starting growth in 2015, so the same tendency as under the first scenario. Hereby after the significant 14,5% decrease in 2014/2015 e.y., the Ukrainian higher education market shows the positive development tendency since 2015/2016 educational year. Under the influence of the legislative and economic factors of the marketing environment the Ukrainian higher education market can develop due to either optimistic or pessimistic scenario depending on the influence vector.

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## **INFLUENCE OF GLOBALIZATION PROCESSES ON THE AIRLINE INDUSTRY OF UKRAINE**

*The prospects of globalization processes in airline industry at the current period and the benefits of international collaborations in aviation market were analyzed in the materials.*

The current situation of the Ukraine's airline industry is characterized by the low level of competition high fares compared with many European airlines. Air transportation between Ukraine and other countries are governed by bilateral international agreements, which are determined of airline routes and the numbers of flights on both sides. Optimization of airspace management is possible due to globalization processes taking place in the global aviation for the past decades, such as the implementation of Open skies policy.

The policy of Open skies is an international concept, aimed at liberalizing the rules and regulations of the international airline industry for the free market creation. Open skies will allow airlines get free access to regional and international routes. Consumer benefits is reducing the cost of services, improving the quality of service because competition will increase. There were five attempts to legalize Open-skies agreement from December 2007. Ukraine will intend to sign a Open skies with the European Union at the early June 2014 that will open the national market for international airline companies said the chairman of the State Aviation Service of Ukraine Denis Antonjuk [1].

However, there is a risk of displacement of domestic market participants by more competitive foreign companies, so it seems important to consider the various aspects of the joint activities of airlines as part of the international cooperation.

The purpose of these materials is to analyze the influence of globalization on the activity of airline industry and its parts and the ways to improve the effectiveness of integration processes management.

Let's analyze the experience of the airlines cooperation in the international markets. Airlines alliances on international markets over the past decade acquire the status one of the main trend of the airline industry. Many customers today, particularly those traveling on business, demand a seamless service on international markets from anywhere to anywhere. However, nowadays no airline is able to provide effective consumer service only by itself. In order to meet customer demands at an efficient cost, airlines have had to seek commercial partners to help them provide the network and service coverage required. Passengers have always been able to arrange an itinerary on two or more airlines, through the interlining mechanism managed by IATA (International Air Transport Association) [2], However, this arms-length cooperation did not allow the integration and efficiencies that were possible.

Northwest Airlines (USA) and KLM (Denmark) were the early innovators internationally, although domestic cooperation between regional and hub carriers had been commonplace. Today there are three major alliances: the biggest is Star

Alliance, followed by SkyTeam and oneworld, are providing over 80% of capacity across the Atlantic and Pacific and just fewer than 80% between Europe and Asia.

Despite the obvious benefits of international cooperation there are questions related to the regulation of antimonopoly legislation. Immunity from legal claims is possible by joining to Open skies agreement directed to liberalization rules and regulation frameworks of international commercial aviation. Situation analysis can be considered from two ways; the first is based on cooperation to provide services to smaller airports because traffic volume between the small towns is small. The increase of traffic volume under such conditions is possible by using low fares, reducing costs, the way preferred by low-cost carriers (LCC). To provide regular services in this case, companies are searching for opportunities for cooperation. Second view related to the problems of air traffic management is directed to using the hubs in high density traffic conditions. The overloaded airports require optimal traffic management and a higher level of integration between carriers [3]. Types of cooperation between airline carriers in order from low to high level are shown in Figure 1.

Interline agreements between airlines facilitate travel for passengers who require flights with more than one airline to reach their final destination. The term relates to the ability of one carrier to sell a journey, or part of a journey, on the services of another carrier, together with the procedures for settlement of the revenue owed to the carrying airline.

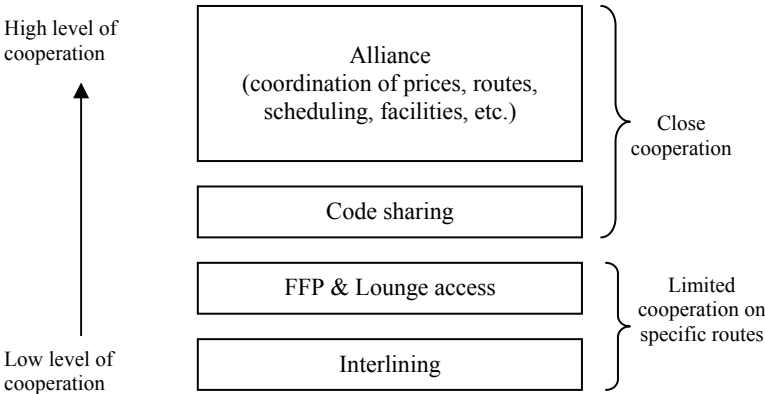


Fig. 1 Types of airline cooperation

Interline agreements allow air passengers to travel across the networks of multiple airlines with the convenience of a single reservation and the confidence that their itinerary includes appropriate connection times. The agreement allows each airline to accept the other's ticket and covers baggage transfers and liability.

Benefits of companies are the opportunity to offer a highly competitive joint fare that attracts customers to their particular route. Passengers benefit from interline agreements from a cost and convenience standpoint. Many small and medium-sized cities feature air service but often only offer flights to a larger hub airport where a



connecting flight takes the passengers to their final destination. Fares between the regional airport and the hub airport are often high, but an interline ticket to the final destination is normally considerably cheaper than the sum of the two local fares. Another added benefit for passengers is that airlines automatically transfer baggage at the connecting airport. Interline agreements also cover irregular operations where customers may be transferred to other airlines at no cost.

A frequent-flyer program (FFP) is a loyalty program offered by many airlines. Typically, airline customers enrolled in the program accumulate frequent-flyer miles (kilometers) corresponding to the distance flown on that airline or its partners. There are other ways to accumulate miles: in recent years, more miles were awarded for using co-branded credit and debit cards than for air travel. Acquired miles can be redeemed for air travel, other goods or services, or for increased benefits, such as travel class upgrades, airport lounge access, or priority bookings.

Code sharing agreement allows sharing one plane by a few companies at a certain route. Flight is performed by one company, while others may sell tickets in this airplane for its price and use its own code and flight number. Code sharing agreement actually represents a deeper level of collaboration that combines the benefits of interlining agreement with allows to sell tickets under its own name. Codes sharing significantly reduce the costs of transportation and keep a tight flight schedule with the benefits of joint loyalty program as well as a selection of transfer convenient options in hub airports.

Airline alliance is an agreement between two or more airlines to cooperate on a substantial level. Alliances provide a network of connectivity and convenience for international passengers and international packages. Airline alliances create substantial opportunities for generating economic benefits. Several of these economic benefits are described in greater detail below:

1. Lower fares for interlining passengers. One major consumer benefit that arises when alliance airlines is gained by 'interline' passengers flying behind and beyond international hub airports to and from smaller cities, who need to fly on two alliance airlines to complete their trip. There seems to be widespread recognition of the benefits to the interline component of international travel.

2. Lower fares resulting from economies of traffic density. Perhaps one of the most fundamental potential benefits from closer cooperation and integration arises from economies of density. This type of economy of scale is a key feature of airline network models. Feeder routes and services delivering connecting traffic can increase the traffic density on a city-pair, allowing airlines to operate larger, more efficient aircraft and to spread end point fixed costs over a larger number of passengers.

3. Passengers can more easily compare fares in an itinerary. The list of non-price benefits of airline alliances is substantial, and largely undisputed. Recent trends toward product differentiation place special importance on these elements of competition.

The internet and related technological advancements in the distribution of airfares led to near complete price transparency and placed low fare search tools in the hands of both travel agents and consumers. It is widely believed this led to a commoditization of air transportation in which shoppers rated price above all other factors in choosing an airline.

4. Airlines can offer passengers a much wider range of schedules. Cooperation between alliance carriers can also improve schedules with increased route frequency, separating otherwise simultaneous departures to offer greater choice, and coordinating arrivals and departures to shorten connecting times. One of the features of competing airlines, and other services, is a clustering of services around times of peak demand.

5. The passenger experience benefits from more seamless service and similar products. As alliances build brand equity in the alliance itself, airlines have an increased incentive to harmonize and improve customer service standards. Joint venture participants thus have an incentive to integrate their operations to provide a true 'online' quality experience throughout the processes of ticketing, seat selection, airport lounges, gate location for connecting services, on board amenities and service quality, baggage policies and problem resolution, frequent flyer plans and refunds and exchanges.

**Conclusions.** Due to the Government's efforts to attract Ukraine airline industry to the European integration process under the Open skies agreement there are questions of competitiveness of domestic companies. Open skies will attract to the Ukrainian market new international players who are used to working in highly competitive international markets. Membership in major international alliances will allow survive domestic airlines positions in the market. In addition to analyzing advantages, companies will have joined the alliance will increase the air traffic volume and upgrading the international hub airport Boryspil. In order to increase interest in the partnership alliances Ukrainian companies have to develop programs aimed to improving service and approach to current international standards. However, the biggest benefits of joining to Open skies will receive passengers.

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## **EUROPEAN INTEGRATION OF UKRAINE AND PARTICIPATION OF INTERNATIONAL ORGANIZATIONS IN REFORMING THE NATIONAL AGRICULTURAL SECTOR**

*The main directions of reforming the agricultural and agro-industrial complex of Ukraine in context of European integration are determined. The basic international technical assistance projects in the agricultural sector of Ukraine are analyzed.*

Ukraine faced the problem of reforming the state's economy, including the agricultural sector, after independence in 1991. With significant potential in agriculture, Ukraine began to build relationships with many international organizations, including European ones, to ensure effective cooperation and achieve strategic goals.

At the first stage, which lasted from 1991 to 1995, appropriate contacts with EU countries and major international organizations were established. In particular, the EU and other international organizations began to send its experts and specialists in Ukraine, which together with national experts studied the possibility of adapting Ukrainian economy to generally accepted European standards. In Ukraine, the transformation process aimed at overcoming the country's economic isolation from international markets began in that period.

The development of relations between Ukraine and the EU began immediately after Ukraine gained independence in 1991. Legal basis of EU-Ukraine relations was based on the Partnership and Cooperation Agreement between Ukraine and the EU (PCA). Ukraine has become the preferred partner for the EU in the framework of the European Neighbourhood Policy (ENP) and Eastern Partnership. Parallel Ukraine has developed good relations and signed a number of bilateral agreements on cooperation with some European countries. For example, the Protocol between the governments of Ukraine and Germany on cooperation and training of specialists and executive staff in economics and management; Framework Agreement between Ukraine and Germany on consultation and cooperation; Dutch-Ukrainian Intergovernmental Memorandum of Understanding; Framework Agreement between the governments of Ukraine and Italy were signed in 1992. The Memorandum of Understanding between Ukraine and the United Kingdom was signed in 1993. The Global Initiative of the European Commission to Ukraine started in 1994.

In this difficult period of economic transformation beginning the EU has provided consistent support for Ukraine in matters of its early entry into the WTO, as well as access to the EU generalized system of preferences based on the recognition of Ukraine as in transition. Obtaining financial and technical assistance for the restructuring of the national agriculture by our country was very important consequence of consistent cooperation and Ukraine's accession to some European integration programs.

International technical assistance is provided to Ukraine for free and irrevocable basis of donor countries and international organizations since 1992 in

almost all sectors of the economy, including agriculture. Cooperation in this area takes place from 15 countries, the European Union and more than 20 international organizations. Largest donors to Ukraine today are the United States and countries of the European Union, among which are Germany, the Netherlands, Sweden, Switzerland, Denmark. International organizations such as the UN, World Bank, EBRD, OECD play in this process an important role.

To improve the efficiency of reforming the Ukrainian agricultural sector and rural areas European Neighbourhood Programme for Agriculture and Rural Development (ENPARD) concept can be used. ENPARD is a policy initiative that is part of the EU's commitment to inclusive growth and stability in its Neighbourhood, recognizing the importance of agriculture in terms of food security, sustainable production and rural employment. ENPARD contributes to the gradual convergence with EU requirements and was designed to accelerate EU integration. Conventionally, all directions of reforming agriculture and agribusiness Ukraine can be divided into four groups:

*Direction 1: Promoting economic growth and improving living conditions in rural areas.* It includes developing forecasts of agricultural production, processing and consumption of animal products, the development of breeding base for livestock development programs to improve living conditions in rural areas.

*Direction 2: Food safety and food security.* This direction includes the implementation of regulatory policies to ensure sustainable and stable development of the livestock sector, further harmonization of Ukrainian legislation and standards with EU standards.

*Direction 3: Development of rural infrastructure.* It includes encouraging the cooperation of farmers, development of farmers' associations, the spread of non-traditional methods of agriculture and non-agricultural businesses, development of rural territories, forms and methods of farming by studying the best practices neighbors – EU countries.

*Direction 4: Public administration and capacity development of civil society.* It includes capacity building of governmental and non-governmental partners, supporting the expansion of services and public-private partnerships.

Fifty-seven International technical assistance projects, aimed at developing agriculture and rural areas, were designed over the past 10 years in Ukraine (see tab. 1).

Moreover, the annual dynamics of international technical assistance projects in Ukraine is growing. It is well known, that the preparation for accession and membership in EU will have especially important implications for agriculture and agricultural policy in Ukraine. Even today, many decisions in the agricultural policy of Ukraine are adopted in view of the current practices in the EU, in particular, the introduction of quotas for sugar and grain intervention. Nevertheless, many of these measures were extremely inefficient and too expensive.

Table 1

The main international technical assistance projects in agriculture of Ukraine

| Donor                          | Market Infrastructure | Safety and quality of food | Development of rural areas | Land reform | Consultations and training | Rural Lending and Risk Management | Institutional strengthening and policy |
|--------------------------------|-----------------------|----------------------------|----------------------------|-------------|----------------------------|-----------------------------------|--|
| EU Tacis (including EU Tempus) | 1                     | 2                          | 1                          | -           | 2                          | 2                                 | 2                                      |
| European bilateral agreements  | 1                     | -                          | 1                          | 2           | 3                          | 2                                 | 1                                      |
| World Bank/Banks               | 3                     | 1                          | 1                          | 1           | -                          | 1                                 | 1                                      |
| UN (FAO and UNDP)              | -                     | 1                          | -                          | -           | -                          | -                                 | 3                                      |
| USA (USAID)                    | 3                     | 1                          | -                          | 1           | -                          | 2                                 | 3                                      |
| Canada (CIDA)                  | 2                     | 1                          | 2                          | -           | 2                          | 2                                 | 2                                      |
| Other                          | -                     | -                          | -                          | 2           | -                          | -                                 | -                                      |
| TOTAL                          | 10                    | 6                          | 5                          | 8           | 7                          | 9                                 | 12                                     |

More dangerous is the fact that Ukrainian officials are often unaware of changes taking place in the EU Common Agricultural Policy (CAP). Today the main trend of the CAP is striving acquiring competitive advantages in the international arena without export subsidy reduction commitments, leading to distortions in the development of some rural areas, in the protection of the environment and adversely affect food security in general. Although difficult to predict, it is likely that on the date of Ukraine's accession to the EU, the CAP will be characterized by much lower subsidies that mostly belong to the 'green box' of the WTO. Export subsidies will be not available, the mechanism of cross liability will be tougher, financing of rural development, environmental protection and food security will decrease [1].

Nowadays activities of the EU institutions in Ukraine is aimed at improving the quality and safety of food and agricultural products in order to strengthen the institutional capacity to implement agricultural policies and the harmonization of Ukrainian legislation with the EU legislation in the context of Ukraine's integration to the EU. An example of the successful implementation of cooperation is the project "Implementation of Ukraine's Commitments under WTO and ENP Frameworks in the Rural Sector (Sector Wide Approach) SWAP-RURAL». It aims to facilitate the implementation of Ukraine's commitments under changes in the agricultural sector, taken by Ukraine when it was entering the WTO [2].

Database of international technical assistance, which have been implemented in Ukrainian agriculture and rural development in the past 10 years was created within this project. This database is designed to provide information about the Ministry of Agrarian Policy and Food of Ukraine (MAPFU) activities under the technical assistance and best practice models, and supporting the Ministry in the effective management sector. Simultaneously, this framework will be useful in the design of future donor programs supporting the development of the agricultural sector and rural areas, enhancing the efficiency of the implementation and coordination of projects.

The database contains information about the various projects implemented in agriculture sector, their performance and results, including descriptions of donor programs, individual project reports, scientific works, materials on key measures, analysis of sector and sub-sector, media materials, references to the relevant laws and regulatory legal acts and so on. The database is managed by MAPFU. Donors of the Ministry, international financial institutions and the projects themselves regularly update information. Currently, access to the database is provided by MAPFU on request.

Another successful example of cooperation is the work with the Swiss Cooperation Office. The Swiss Cooperation Office operates on behalf of two governmental organizations - the Swiss Agency for Development and Cooperation (SDC), which is a part of the Swiss Ministry of Foreign Affairs, and the State Secretariat for Economic Affairs (SECO), which is a part of the Swiss Federal Department for Economic Affairs.

Mission and main objectives of the Swiss Cooperation Office:

- 1) Observation, monitoring and reporting on the implementation of projects and programs;
- 2) Analyzing the situation and development in sectors, where cooperation and analysis of crosscutting themes implementation are carried out;
- 3) Conducting strategic dialogue with key partner organizations of Ukrainian Government;
- 4) Active participation in the coordination and harmonization of donor activities;
- 5) Implementation of representative activities and work with the public;
- 6) Supporting projects implemented by agencies SDC and SECO;
- 7) Supporting national and international experts and visits of official delegations.

Switzerland continues to support the development of organic agriculture in Ukraine, which has extended from 2003 through the introduction of two Swiss-Ukrainian technical assistance projects "Certification of Organic Agriculture and Organic Market Development in Ukraine" (2005-2011) and "Sustainable Development of Agriculture in Ukraine" (2003-2010).

New technical assistance project "Development of the Organic Market in Ukraine", which was fully consistent with government priorities, strategies of Swiss Cooperation with Ukraine, the demand of the part of consumers and was the logical continuation of the previous Swiss-Ukrainian project "Certification of Organic Agriculture and Organic Market Development in Ukraine" was adopted in spring 2012. An external evaluation confirmed the high importance and positive impact of the previous project on the development of the organic sector in Ukraine.

The Research Institute of Organic Agriculture (FiBL, Switzerland) in collaboration with members of the organic sector in Ukraine and partnership with the Ministry of Agrarian Policy and Food of Ukraine implements approved project «Development of the Organic Market in Ukraine» (2012-2016). The Swiss Confederation through the SECO funds the project.

To strengthen cooperation with its partners in agriculture, the European Commission has begun to develop a common approach to support the sector through the European Neighbourhood Programme for Agriculture and Rural Development

ENPARD. It is expected that ENPARD helps partner countries to work more effectively in foreign markets, to take full advantage of the Agreement on a Deep and Comprehensive Free Trade Area (DCFTA) to encourage the development of agriculture in the country and facilitate the implementation of long-term strategies for the development of the agricultural sector and rural areas [3].

ENPARD is a real opportunity for the further modernization of agriculture and rural development in Ukraine. In addition to financing agreements, ENPARD will ensure the dissemination of models and practices applied in countries that have recently joined the EU.

Therefore, Ukraine should take the following steps to reform the national agriculture and European integration:

- 1) recognition of the development of agriculture and rural areas as the major direction of cooperation between Ukraine and the EU;
- 2) conducting negotiations with the EC Delegation in Ukraine about further participation of the country under the program ENPARD;
- 3) involvement in the development of sectoral programs within ENPARD NGOs whose activities focus on the development of agriculture and rural areas.

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## **REQUIREMENTS TO PILOTS AND AIR TRAFFIC CONTROLLERS' PROFICIENCY IN AERONAUTICAL COMMUNICATION**

*The article outlines main requirements to pilots' proficiency in aeronautical communication. The most frequently reported air-ground communication problems and their consequences for safety are analyzed. The importance of both ICAO phraseologies and plain language for safe radiotelephony communications is revealed.*

Aviation is a fast developing branch of international transportation. Safety experts are constantly seeking to identify means of improving safety in order to reduce accident rates. With mechanical failures featuring less prominently in aircraft accidents, more attention has been focused in recent years on human factors that contribute to accidents. Communication is one human element that is receiving renewed attention.

Among the most frequently reported air-ground communication problems aviation experts state the following: loss of communication, readback/hearback error, communication equipment problems, hearback error, no pilot readback. The linguistic and psychological factors contributing to air-ground communication problems are as follows: content of message inaccurate/incomplete, pilot/controller distraction, pilot expectation, pilot/controller workload, garbled message, language problems, untimely transmission, controller/pilot non-standard phraseology, ambiguous phraseology, partial readback, controller/pilot accent/non-native, long message, controller/pilot high speech rate.

The research "Air-Ground Communication Safety Study: Causes and Recommendations", made by Eurocontrol, showed that 64 % of communication problem occurrences have some safety consequences. They may result in a prolonged loss of communication, altitude deviation, loss of separation, wrong aircraft accepted clearance, instruction issued to wrong aircraft, heading / track deviation, runway transgression and some others [1].

The International Civil Aviation Organisation's (ICAO), taking note of several accidents and incidents where the language proficiency of pilot and air traffic controller (ATCOs) were causal or contributory factors, formulated Assembly Resolution A32-16 in which the ICAO Council was urged to direct the Air Navigation Commission to consider, with a high level of priority, the matter of English language proficiency. Although English has always been the official language of aviation, the new and strengthened requirements state that every pilot flying internationally and every air traffic control officer (ATCO) managing international traffic must demonstrate a minimum 'operational' level of proficiency



in English language. For the benefit of aviation safety, a truly global industry has adopted a truly global language.

In order to support States' efforts to comply with the strengthened provisions for language proficiency, the development and publication of guidance material compiling comprehensive information on a range of aspects related to language proficiency training and testing were seen as necessary. In order to conform to ICAO Language Proficiency Requirements, pilots, ATCOs and all others who use English in radiotelephony (RTF) communication on international routes must be at ICAO English Language Level 4 (Operational) or above. This must be confirmed by successful completion of an airline industry approved test. Those who are assessed at ICAO Level 4 must be re-tested every three years. Those who fail may not be licensed to operate on international routes.

According to ICAO Language Proficiency RATING SCALE Pilots, Air Traffic Controllers and all others who use English in RTF communication on international routes must demonstrate the following abilities and speech competences (ICAO Level 4):

**PRONUNCIATION** (Assumes a dialect and/or accent intelligible to the aeronautical communication): Pronunciation, stress, rhythm, and intonation are influenced by the first language or regional variation but only sometimes interfere with ease of understanding.

**STRUCTURE** (Relevant grammatical structures and sentence patterns are determined by language functions appropriate to the task): Basic grammatical structures and sentence patterns are used creatively and are usually well controlled. Errors may occur, particularly in unusual or unexpected circumstances, but rarely interfere with meaning.

**VOCABULARY**: Vocabulary range and accuracy are usually sufficient to communicate effectively on common, concrete, and work-related topics. Can often paraphrase successfully when lacking vocabulary in unusual or unexpected circumstances.

**FLUENCY**: Produces stretches of language at an appropriate tempo. There may be occasional loss of fluency on transition from rehearsed or formulaic speech to spontaneous interaction, but this does not prevent effective communication. Can make limited use of discourse markers or connectors. Fillers are not distracting.

**COMPREHENSION**: Comprehension is mostly accurate on common, concrete, and work-related topics when the accent or variety used is sufficiently intelligible for an international community of users. When the speaker is confronted with a linguistic or situational complication or an unexpected turn of events, comprehension may be slower or require clarification strategies.

**INTERACTIONS**: Responses are usually immediate, appropriate, and informative. Initiates and maintains exchanges even when dealing with an unexpected turn of events. Deals adequately with apparent misunderstandings by checking, confirming, or clarifying [2].

'Aviation English' in its broadest sense covers language use in a wide variety of aviation-related contexts, from maintenance to cabin crew, customs to security, dispatchers to pilots and ATCOs. The ICAO language proficiency requirements specifically address ground-air communications between ATCOs and

pilots.

Both ICAO phraseologies and plain language are required for safe radiotelephony communications. The need for clear and unambiguous communication between pilots and ATCOs is vital in assisting the safe and expeditious operation of aircraft. It is important, therefore, that due regard is given to the use of standard words and phrases and that all involved ensure that they maintain the highest professional standards when using radiotelephony phrases. This is especially important when operating within busy sectors with congested frequencies where any time wasted with verbosity and nonstandard, ambiguous phrases could lead to flight safety incidents.

Of the many factors involved in the process of communication, *phraseology* is perhaps the most important, because it enables us to communicate quickly and effectively despite differences in language and reduces the opportunity for misunderstanding. Phraseology is designed to be: ‘as clear and concise as possible and designed to avoid possible confusion by those persons using a language other than one of their national languages’ [4]. Phraseology has evolved over time and has been carefully developed to provide maximum clarity and brevity in communications while ensuring that phrases are unambiguous.

*Standard phraseology* reduces the risk that a message will be misunderstood and aids the read-back/hear-back process so that any error is quickly detected. Ambiguous or non-standard phraseology is a frequent causal or contributory factor in aircraft accidents and incidents. International standards of phraseology are laid down in ICAO Annex 10 Volume II Chapter 5 [3] and in ICAO Doc 9432 – Manual of Radiotelephony [7]. Many national authorities also publish radiotelephony manuals which amplify ICAO provisions, and in some cases modify them to suit local conditions. Failure to use standard phraseology can lead to misunderstanding and breakdown of the communication process.

*Non-standard phraseology*, which is sometimes adopted unilaterally by national or local air traffic services in an attempt to alleviate problems and is introduced after careful consideration to address a particular problem, can make a positive contribution to flight safety; however, this must be balanced with the possibility of confusion for pilots or ATCOs not familiar with the phraseology used.

Although standardized ICAO phraseologies [6] have been developed to cover many circumstances (essentially routine events, but also including some predictable emergencies or non-routine events), no set of phraseologies can fully describe all possible circumstances and responses. RTF users should be prepared to use *plain language* when necessary following the principle of keeping phrases clear and concise.

Plain English proficiency is the ability to communicate in non-routine and emergency situations during flight – for example, when a passenger suffers a medical problem on board. It is crucial that pilots can convey these sorts of messages clearly and effectively and that they are received and understood by air traffic control so the appropriate actions can be taken. Therefore, plain English in aeronautical communications needs to be clear, unambiguous, free of colloquialisms, slang and idiomatic speech, and accessible to the international community of users [5].

The ICAO Language Proficiency Requirements are about oral communication. The holistic descriptors in Annex 1 state that: “Proficient speakers shall: a) **communicate** effectively in voice-only (telephone/radiotelephone) and in face-to-face situations; b) **communicate** on common, concrete and work-related topics with accuracy and clarity; c) use appropriate **communicative strategies** to exchange messages and to recognize and resolve misunderstandings (e.g. to check, confirm or clarify information) in a general or work-related context” The primary objective of any aviation English training curriculum must be to build and enhance these communicative skills and strategies.

### Conclusion

Aviation English is taught ultimately for safety, in the context of aviation communications, for safe and efficient radiotelephony communications. Flight crews and air traffic controllers need to acquire phraseologies as part of the professional language, but aviation language training should not be limited to phraseologies only. This is the language required to deal effectively with all the non-standard, abnormal or emergency situations which pilots and controllers encounter and for which standardized phraseology is insufficient. Any valid aviation English training must contain activities that are designed to address all six language skill areas specified in the ICAO Rating Scale and holistic descriptors: pronunciation, structure, vocabulary, fluency, comprehension and interactions. Training objectives and activities should always be relevant to real-life operational requirements, with the main focus on speaking, listening and interactive skills. Although grammar, syntax, vocabulary and reading underlie oral communications, the primary objective of aviation English training is voice-only communication.

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## **RECURSIVE MODELS OF PSYCHODYNAMICS IN THE FRAMEWORK OF SUBJECTIVE ENTROPY OF PREFERENCES PARADIGM**

*Theses of this report are dedicated to scientific explanation of a phenomenon of making controlling decisions in the so-called active systems. The proposed functionals allow modeling dynamical processes with "memory". The approach is applicable to quasi closed systems for information, which are able to reduce their own entropy, being closed for energy and matter.*

In the framework of subjective analysis [1-3] it was revealed that optimal control in active systems is carried on at keeping some laws of subjective conservatism [4, 5]. During the process of the optimal operational control, in the sense of the subjective entropy paradigm, some values have their magnitudes being invariant.

The concept of the subjective entropy maximum principle is happened to be a fruitful one in many applications [6-12] starting from flight safety and effective operation problems and ending in the scientific areas of light and shadow economy, psychology, and artificial intelligence.

Let us consider a few aspects of psychodynamics and continue the researches with the use of a special recursive procedure [13].

Depending upon the initial data for an individual's subjective preferences functions:

$$\pi_1^{(0)}; \quad \pi_2^{(0)} = 1 - \pi_1^{(0)}; \quad (1)$$

the straight lines for the  $\alpha$  -  $\beta$  system equilibrium state in the parametrical  $\alpha$  -  $\beta$  coordinate plane are turning around the points with the coordinates  $(0,1)$ ;  $(0,0)$ ;  $(0,-1)$ . It is shown in fig. 1. These straight lines illustrate the relation between the cognitive parameters of  $\alpha$  and  $\beta$  when their combination preserves the subjective entropy of the individual's preferences approximately at the initial level.

A compiled in a special view functional of the postulated in subjective analysis [1-3] form is [13]:

$$\Phi_{\pi}^{(t+1, t)} = - \sum_{i=1}^N \pi_i^{(t+1)} \ln \pi_i^{(t+1)} + \varepsilon^{(t+1)} \left( \pi_i^{(t+1)}, F_i^{(t+1)} \right) + \gamma \left( \sum_{i=1}^N \pi_i^{(t+1)} - 1 \right), \quad (2)$$

where  $t$  – discrete moment of time;  $-\sum_{i=1}^N \pi_i^{(t+1)} \ln \pi_i^{(t+1)}$  – subjective entropy of an individual's preferences  $\pi_i^{(t+1)}$ , where  $N$  – number of alternatives;  $\varepsilon^{(t+1)} \left( \pi_i^{(t+1)}, F_i^{(t+1)} \right)$  – cognitive function of the preferences and subjective

effectiveness function  $F_i^{(t+1)}$ ;  $\gamma$  – endogenous parameter of the individual's psych  
for the normalizing condition  $\sum_{i=1}^N \pi_i^{(t+1)} = 1$ .

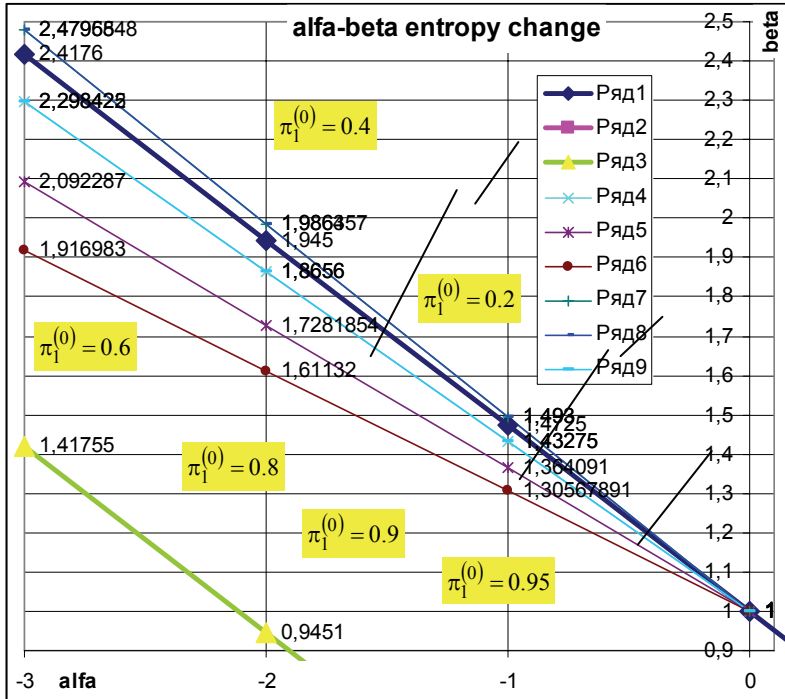


Fig. 1. Turning of the straight border lines of the areas at the change of the initial conditions in the preferences distributions by the alternatives

For the cognitive function we propose expression

$$\varepsilon^{(t+1)}(\pi_i^{(t+1)}, F_i^{(t+1)}) = \sum_{i=1}^N \pi_i^{(t+1)} F_i^{(t+1)}. \quad (3)$$

The subjective effectiveness function is

$$F_i^{(t+1)}(\pi_i^{(t)}) = \alpha \pi_i^{(t)} + \beta \ln \pi_i^{(t)}, \quad (4)$$

where  $\alpha$  and  $\beta$  – endogenous parameters as the Lagrange uncertain multipliers for the corresponding functions, given in the view of the individual's preferences functions and natural logarithms of the functions at the previous moment in time  $t$ , related to the two corresponding alternatives.

Using the necessary conditions for the extremum existence of functional (2) in the view of the system

$$\frac{\partial \Phi_{\pi}^{(t+1)}}{\partial \pi_i^{(t+1)}} = 0, \quad (5)$$

it yields the sought solution:

$$\pi_i^{(t+1)} = \frac{\left(\pi_i^{(t)}\right)^{\beta} e^{\alpha \pi_i^{(t)}}}{\sum_{j=1}^N \left(\pi_j^{(t)}\right)^{\beta} e^{\alpha \pi_j^{(t)}}} \quad (6)$$

– the distribution of the preferences functions in the canonical view as a recursive model of the preferences dynamics. The dynamical peculiarities of the active system uncertainty, in such a case, are modeled with the help of subjective entropy, which, also, in its turn, becomes a discrete time moments dependent value.

As for the parameters  $\alpha$  and  $\beta$ , the numerical simulation shows up some areas in the  $\alpha$  -  $\beta$  coordinate plane where the corresponding subjective entropy has a tendency to grow, that is the system active element's uncertainty increases in the course of time. However, for some other combinations of the parameters  $\alpha$  and  $\beta$ , we observe the opposite effect.

From the obtained diagram shown in fig. 1 one can see a fragment of the area between the border straight lines, the endless stripe in fact. If the  $\alpha$  and  $\beta$  parameters get into this area, that is they are in the inside of the contour bordered with the lines, the entropy of the active system individual preferences of the alternatives, thus, the system active element's uncertainty, will increase in the course of time. The row 3 portrays the maximal values of subjective entropy of individual preferences.

The areas outside the border lines represent the areas of the system tendency to certainty in the course of time, because, when getting into the outside areas for  $\alpha$  and  $\beta$  parameters, the system subjective entropy will decrease in the course of time. The border lines themselves represent the parameters of  $\alpha$  and  $\beta$  quasi equilibrium combinations. These values are noted down in the diagram (see fig. 1) [13].

Numerical simulation for the recursive procedure with two and three steps backwards we get

$$\Phi_{\pi}^{(t+2, t+1, t)} = -\sum_{i=1}^N \pi_i^{(t+2)} \ln \pi_i^{(t+2)} + \varepsilon^{(t+2)} \left( \pi_i^{(t+2)}, F_i^{(t+2)} \right) + \gamma \sum_{i=1}^N \pi_i^{(t+2)}. \quad (7)$$

$$\varepsilon^{(t+2)} \left( \pi_i^{(t+2)}, F_i^{(t+2)} \right) = \sum_{i=1}^N \pi_i^{(t+2)} F_i^{(t+2)}. \quad (8)$$

$$F_i^{(t+2)} \left( \pi_i^{(t+1)}, \pi_i^{(t)} \right) = \alpha \pi_i^{(t+1)} + \beta \ln \pi_i^{(t+1)} + \gamma \pi_i^{(t)} + \delta \ln \pi_i^{(t)}. \quad (9)$$

$$\pi_i^{(t+2)} = \frac{\left(\pi_i^{(t+1)}\right)^{\beta} \left(\pi_i^{(t)}\right)^{\delta} e^{\alpha \pi_i^{(t+1)} + \gamma \pi_i^{(t)}}}{\sum_{j=1}^N \left(\pi_j^{(t+1)}\right)^{\beta} \left(\pi_j^{(t)}\right)^{\delta} e^{\alpha \pi_j^{(t+1)} + \gamma \pi_j^{(t)}}}. \quad (10)$$

$$\Phi_{\pi}^{(t+3, t+2, t+1, t)} = - \sum_{i=1}^N \pi_i^{(t+3)} \ln \pi_i^{(t+3)} + \varepsilon^{(t+3)} \left( \pi_i^{(t+3)}, F_i^{(t+3)} \right) + \tilde{\gamma} \sum_{i=1}^N \pi_i^{(t+3)}. \quad (11)$$

$$\varepsilon^{(t+3)} \left( \pi_i^{(t+3)}, F_i^{(t+3)} \right) = \sum_{i=1}^N \pi_i^{(t+3)} F_i^{(t+3)}. \quad (12)$$

$$\begin{aligned} & F_i^{(t+3)} \left( \pi_i^{(t+2)}, \pi_i^{(t+1)}, \pi_i^{(t)} \right) = \\ & = \alpha \pi_i^{(t+2)} + \beta \ln \pi_i^{(t+2)} + \gamma \pi_i^{(t+1)} + \delta \ln \pi_i^{(t+1)} + \eta \pi_i^{(t)} + \lambda \ln \pi_i^{(t)}. \end{aligned} \quad (13)$$

$$\pi_i^{(t+3)} = \frac{\left( \pi_i^{(t+2)} \right)^{\beta} \left( \pi_i^{(t+1)} \right)^{\delta} \left( \pi_i^{(t)} \right)^{\lambda} e^{\alpha \pi_i^{(t+2)} + \gamma \pi_i^{(t+1)} + \eta \pi_i^{(t)}}}{\sum_{j=1}^N \left( \pi_j^{(t+2)} \right)^{\beta} \left( \pi_j^{(t+1)} \right)^{\delta} \left( \pi_j^{(t)} \right)^{\lambda} e^{\alpha \pi_j^{(t+2)} + \gamma \pi_j^{(t+1)} + \eta \pi_j^{(t)}}}. \quad (14)$$

Thus, we have got the models with the “memory” for “yesterday”, “the day before yesterday”, and “the day before-before yesterday”. Also, there is a possibility for combinations with the models of the “memory”. It is a way to solve the problems of forecasting the preferences distributions in the future based on the information stored in our memory and investigate the influence of old information upon today.

At the values of

$$\begin{aligned} N = 2; \quad \pi_1^{(0)} = 0.7; \quad \pi_2^{(0)} = 0.3; \quad \alpha = 0.3; \quad \beta = 0.765; \quad \gamma = 0.105; \\ \delta = 0.306; \quad \eta = 0.047; \quad \lambda = 0.309; \quad t = 0 \dots 25; \end{aligned} \quad (15)$$

the results of calculation experiments by the scheme (1-15) are shown in fig. 2-4.

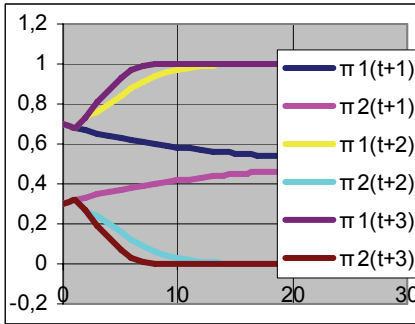


Fig. 2. Preferences

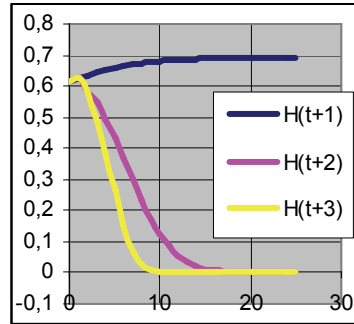


Fig. 3. Entropies

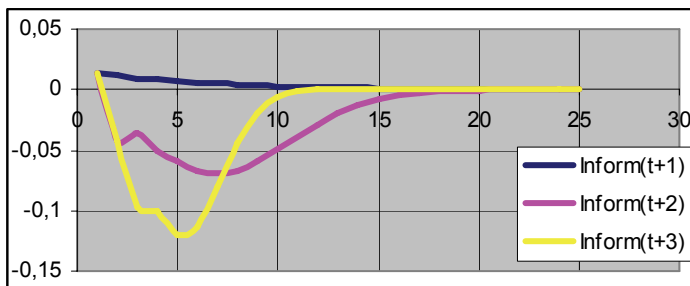


Fig. 4. Informations

### Conclusion

Thus, we discovered a class of systems which being quasi closed are able to decrease their own entropy. Active systems are such systems and they are reckoned to be quasi closed because the cognitive parameters  $\alpha$  and  $\beta$  are considered to be the endogenous factors of psych.

Active system may be closed for matter and energy but produce or consume information intrinsically in an internal way. Cognitive attitude to the “memory” is the resource.

The methods (1-15) give us a possibility to model the influence of near and distant history upon present and future.

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## **ATC RISK LEVEL ESTIMATION OF DISTANCES BETWEEN AIRCRAFT DURING FLIGHT LEVEL RULES VIOLATIONS**

*Safety level increase in the civil aviation is mainly impossible without paying proper attention to the human factor components. First line operators directly executing safety functions, and it is critically important that their own opinion about danger was taken into account during regulatory documents development. This is especially urgent within implementation of new automated air traffic control systems and new flight norms and rules development.*

The goal of current research is to find ATC risk level estimation of distances between aircraft during flight level rules violations. For providing maximal comfort during the polling there were seven risk levels proposed basing on the Millers “magic” number [1, 2, 3]. Since decision taking is executed by ATC personally being under influence of stress and emotions its attitude to the flight levels norms violation is stated to be urgent and important task.

For stated problem solution the research was carried out including polling of ATC students (132 person with experience of traffic control training process) of 4-th and 5-th grade from National aviation university (Kiev, Ukraine) and Kirovograd flight academy (Kirovograd, Ukraine) and processing of received data. Respondents were proposed to estimate risk of flight level norm distance (8 km.) violations for aircraft by assigning every distance one of seven risk levels (very high risk, high risk, risk above the average, usual risk, risk below the average, low risk, very low risk).

There were assigned risk levels to the distances using recommendations of fuzzy sets and linguistic variables theory [5, 6]:

$$T^M(Risk) = \overset{VHR}{very\ high\ risk} + \overset{HR}{high\ risk} + \overset{RAA}{risk\ above\ the\ average} + \overset{UR}{usual\ risk} + \\ + \overset{RBA}{risk\ below\ the\ average} + \overset{LR}{low\ risk} + \overset{VLR}{very\ low\ risk}$$

That allowed firstly to implement expert information gather in “point on the scale” form and secondly to use so called “supplementary matrix” [7] to build membership functions that led to data normalization. Figure 1 presents the initial values membership functions.

According to defined transition points, distances were found that represents risk levels according to the respondents opinions. In order to compare polling results with ICAO proposed five levels of risk two pairs of functions were united as shown in figure 2.

$$T^M(Risk) = \underset{RBA}{\overset{C}{critical}} + \underset{M}{\overset{RAA}{risk\ above\ the\ average}} + \underset{UR}{usual\ risk} + \underset{RBA}{risk\ below\ the\ average} + \underset{M}{min\ or}$$

Since all membership functions intersection point are above value of 0.5 we may state that all respondents clearly understands the difference between proposed risk levels.

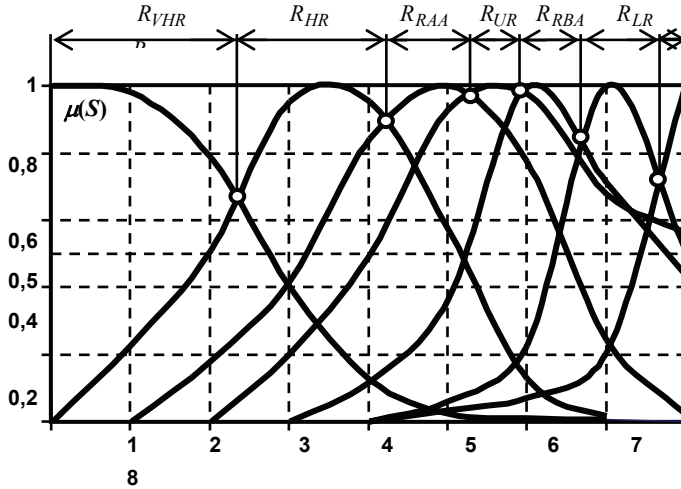


Figure 1. Initial membership functions.

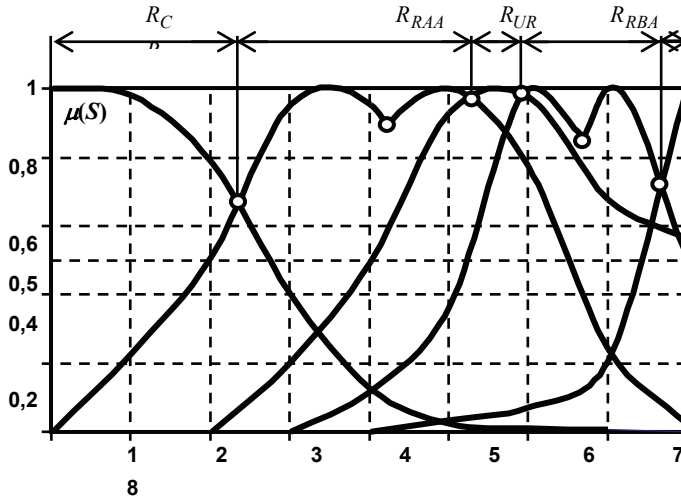


Figure 2. United membership functions.

## Conclusion

Research results allows us to state that ATC understands difference between risk levels both for original and ICAO-wise variant. Also it is obvious that change from seven risk levels down to five risk levels doesn't involve any critical changes in general parameters of the presented risk levels rows.

Next step in the research process should be modeling of corresponding conditions on the simulator and transition from used seven risk layers to the five proposed by ICAO.

Taking into account that there are three different types of distance norms during flights (lateral, longitudinal and vertical) important further researches should concern combined membership functions in case of multiple hazards in the flight with development of sole function.

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## **PROFESSIONAL COMPETENCE AS A REQUIRED COMPONENT OF PROFESSIONAL ETHICS OF A FUTURE INTERPRETER IN THE AREA OF AVIATION**

*In Ukraine, the significance of translation was realized only in the middle of the XX century, but many questions about the individual components of an interpreter and his professional competence were left unattended. The objective of our research is to determine the concept of proficiency of a future interpreter as a required component of his professional ethics.*

Logic of research requires determining elements (components) of professional ethics of a future interpreter. Professional ethics is a number of rules and regulations forming the attitude of an expert on the basis of moral values, taking into account the characteristics of one's professional activity and specific situation; moral laws and principles of professional attitude of a specialist and his compliance with the code of honor. General ethics considers moral values of specialists and professional ethics deals with the activities in specific circumstances. Thus, we can state that there is a dialectical unity between general ethics and professional ethics, because professional ethics specifies the position of general ethics in a particular occupation.

The subject of ethics is a combination of moral principles and values that determine the system of rules and principles regulating a particular occupation. Translation activity is the occupation that has to comply with certain ethical rules and regulations in order to attain the goals in the area of social relations.

Analysis of references (I. Alekseeva, I. Zymnya, I. Korunets, O. Kretova, L. Latyshev, E. Porshneva, I. Haleeva, K. Herding-Salas, P. Newmark et al.) confirms that the Ethics of an interpreter is based on moral principles, ethical standards of professional attitude, requirements to professional competence, etiquette and familiarity with the technical support of translation.

According to the point of view of O. Kretova, professional competence is usually understood as natural conditions for the implementation of certain activities, including psychological motivation. [1] Professional competence is defined as a combination of psychological characteristics of an individual, which influences the effectiveness of the development of a specific labor activity and its performance. Firstly, professional competence is considered as a combination of capabilities and characteristics of an individual in order to determine his competence to a particular activity (activities). Secondly, professional competence is as a combination of acquired professional skills, knowledge and capabilities, as well as psychological, physiological and other qualities and characteristics that ensure effective performance of professional tasks [2, p. 6]. It is necessary to emphasize the motivational aspect of one's professional activity indicated by the motivational

value criterion of professional ethics of an interpreter, which is based on the hierarchy of professional interests and developed professional motivations. Among the qualities that determine the professional competence of an interpreter, it is important to distinguish speech reactivity, attention, mental stability, communicability and intelligence.

Speech activity is an ability to perceive another's speech and generate their own, which is considered to be natural characteristics of an individual. It is important for people who are characterized by excessive nervous speech reactivity to control the ability to speak intensively. Some people, however, are not able to develop the fluency of their speech, which suggests that such persons are not advisable to become interpreters, especially simultaneous interpreters.

An interpreter's memory must be flexible, in other words, it should allow one to absorb a large amount of information, and quickly forget unnecessary things. Long-term memory should contain a significant amount of active vocabulary of both a native and foreign language. Random access memory should be characterized by the ability to memorize for a while a much larger number of units than the memory of an ordinary person. We conclude that an interpreter ought to train his memory, because this is the objective of his entire professional activity.

Speaking of attention, we mean stability, distribution, volume and the ability to concentrate. Complex objects require active thinking, which causes long-term focus on them, and depends on the strength of nervous processes of a specialist interested in his effective professional activity. Stable attention, first of all, is to be an inherent feature of a simultaneous interpreter, whose objective is to accurately and logically reflect all the necessary details of information, usually by applying compression. Attention is one's mental ability to perceive simultaneously a number of objects or their components. Concentration of attention is the ability to focus on multiple objects at once. This feature of attention is associated with simultaneous effective implementation (combining) of two or more different types of activities (some activities). The ability to concentrate is very important for an interpreter in order to develop his skills to effectively translate amounts of words, phrases and sentences. This process can be compared to a transition from one operation or activity to another. Many experts in translation determine mental stability as the first factor among the qualities of professional competence. High speech activity, long talking, holding attention, frequent concentration, need to transmit people's thoughts and vision and control of one's own can cause mental overload. To avoid this, one should improve one's own mental and moral qualities.

Communicability is an inherent feature of each person. While performing one's professional activities, the level of one's communicability can increase or be limited. An interpreter should foster the contact process between the parties for which he translates.

Another important element is the intelligence of an interpreter. We do not mean encyclopedic erudition, but relevant education, variety of interests, active self-training and a continuous process of self-improvement.

Among personal traits that significantly influence the professional competence of an interpreter, we should distinguish the following ones: self-confidence, integrity, initiative, responsibility, punctuality. Confidence is usually

found in certain types of activities in which an interpreter checks the adequacy of his capabilities to fulfill tasks required. This fact should be taken into account in the training of future interpreters in the area of aviation, because self-confidence is important for the development of certain skills, and for the formation of all aspects of the personality of an individual and, consequently, his emotions.

Responsibility is defined as an important moral quality characterized by an appropriate attitude, a high sense of duty, high requirements to one's behavior and the behavior of others. A responsible interpreter completely understands his duties, demands on the quality of his work, and the tendency to fulfill orders promptly and accurately. Responsibility includes ingenuity and creativity.

Creativity is an ability that is determined as constant pursuit of independent actions and an active life-style of an individual. Creativity develops flexible thinking and one's ability to solve problems in situations that pertain to one's professional activity, in particular, to find the way out of conflicts with colleagues or customers and conflicts between communicants during negotiations. Creativity is related to the following professional qualities: efficiency, reliability, enthusiasm.

Adherence to principles is one of the qualities of one's self-reliance, which is highly appreciated in society and in relationships between people, because it allows one to confide in a person. Adherence to principles is associated with reliability that is considered to be professional quality and competence of an interpreter, taking into account his high moral requirements and his role as a primary source of information for an unknown recipient.

Accuracy is a character trait that is expressed in the ability to punctually (accurately, clearly, carefully) fulfill the tasks under conditions of a particular activity. Accuracy is connected with responsibility and patience.

According to some researchers (M. Prozorova, A. Shiryaev, V. Komissarov, U. Kautz, H. Risku), each kind of translation requires certain psychological characteristics of a specialist. For example, to successfully perform the translation, a specialist needs prudence and diligence, executive discipline, accuracy, patience, concentration, observation, reliable long-term memory. Consecutive translation requires concentration of an interpreter, effective logical and verbal memory, high level of his analytical skills, high self-control ability, and high sense of responsibility. Simultaneous interpretation requires qualities such as effective short-term memory, concentration, predictive ability, reaction time, ability to focus, clear diction, mental stability, and good physical shape.

Therefore, we have attempted to describe the individual psychological characteristics of an interpreter, which influence the efficiency of his professional activity. It is necessary to emphasize physiological characteristics of an interpreter (such as clarity of diction, health, etc.).

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## **THE ROLE AND FUNCTION OF SIGN LANGUAGE IN AVIATION**

*The article presents a detailed analysis of the role and function of sign language in all spheres of human life and in aviation in particular. The authors explore the content and the amount of information transferred by means of non-verbal forms of communication.*

Today, it can be argued that the life of modern man is communication. Everyday communication and interaction at the professional level expand and blur the boundaries between people, nations, countries. In all spheres of activity the issues of interaction in the professional sphere are examined and updated, and countering non-verbal communication in the framework of a number of professions "man-machine".

Communication is close cooperation between the verbal and non-verbal components that complement and reinforce each other. The lack of attention to non-verbal means not only can disorient the interlocutor, and even encourage his refusal from the previous intentions, if it is wrong to perceive his facial expressions, gestures, behavior in typical situations or recklessly (ignoring the ethnic peculiarities of non-verbal communication) behave yourself. In many countries these issues are paying rightly great attention. If verbal communication information is transmitted through language and, accordingly, participants act in a certain way at each other, then the non-verbal interaction is much more complicated, uses much more components. Nonverbal communication mainly accompany and complement the language in its own way reflecting the sense of the made or received. According to scientists, about 60-80% of the information transmitted in direct communication non-verbal means that are different sensor systems: seeing, hearing, tactile sensations, etc.

The pace of development of international cooperation require graduates of military universities timely input into the sphere of their action, providing opportunities for professional self-realization and the sooner it comes the moment when the graduates can apply their knowledge and skills in terms of international partnership and real activity, the more chances they have to achieve their professional skills. The techniques, methods, tools, training should be aimed first of all at the formation of the internal structure absorbed activity, psychological mechanisms of its regulation. Initial theoretical premise of this approach is the concept of psychological image as psychological mechanism of regulation of action developed by the Russian aviation psychology (V.A. Ponomarenko, K.K. Platonov, B.N. Goldstein)[5; 6].

The way of activity of the future specialists of the aviation industry is

formed on three levels of psychological reflection: language-millennia, imaginary and sensual-subject (P.A. Korchemny, D.V. Gander) [7].

Organizing role in forming the image plays a cultural-speech (verbal-logical, conceptual) level. Joining in a way, sensual data somehow interpreted, are comprehended in terms of performance targets.

One of the most specific features of sensory and perceptual level of reflection of aviation experts is that according to this level of the processes (of sensation and perception) occurs in unusual conditions compared to usual earth. In this regard, the formation of the image, and the levels of professional development of specialists of the aviation industry should take place with a change of levels of mental reflection and regulation of the actions from the language-thinking through clearly-shaped to sensual-subject.

When teaching communication is of special importance optical-kinetic system of signs (facial expressions, pantomime), a pair of linguistic (system vocalizations, i.e. voice quality, range, tone, etc) and extralinguistic (coughing, crying, laughing, and so on) of the system of signs (signs copies, signs-signs, signs – signals, signs-symbols etc).

Extralinguistic aspects of communication cover the order-related sphere, within which develops language: olfactory – impact on communication odors of the body, cosmetics (Despite the significant changes of the function of smell person in the process of its evolution, smells also significantly affect the perception and transmission of information in communication. Talking with someone who is "sharp" spirits, the interlocutor instinctively tries to move away from it, and thus the information you want to pass this person); chroninc – the influence of the factor of time to communicate (waiting, call duration etc).

Ukrainian teacher Zyazyun I.A. notes that a significant role in the communication process are: mimicry – expression, dynamics (velocity, expressiveness) of their changes; pantomimic – posture, gait and gestures; kinetics and communicative significant movement (image gestures, images, attitudes); informative eye contact (direction, frequency, duration); tecesica – touching, patting, shaking hands; averbal steps – body movements, rubbing hands, manipulate objects, shuffling fingers [2, P. 58-59].

In nonverbal business communication casion funds ("body language") are the most popular and important. They may be unconscious (emotional state of the person or conscious (acquired, used intelligently signals certain parts of the body). The communication is accompanied by gestures, which are carriers of various types of information, expressing a positive or negative attitude to the interlocutor, the theme of the conversation, confidence or uncertainty, trust or distrust, sympathy or antipathy, equality or domination, openness or closeness etc.

Gestures that contribute to a deeper understanding told, called illustrators. For example, spreading out his hands interlocutor says, "That is big" or, on the contrary, taking his hands: "Tiny". Gestures, which help to regulate relations, are called the regulators. They indicate the direction, reduce or increase the distance communication. Saying, "come here", they point where to go. When during a dialogue try symbolic play expressed the essence, use gestures-emblems. For example, raised up the index and middle fingers (conditionally letter V) symbolize

victory. In difficult situations, people resorted to sign adapters that testify of internal unrest. This unconscious fixed reaction (twitching, scratching, stroking and so on).

Using the gestures in aviation is a very complicated question, because the traditional gestures in aviation, unlike many other professions, in general, does not bear the stamp of symbolism and is used to develop muscle memory action in the management of the aircraft by flight stage and useful reduction of time of fellowship crew members between themselves during the flight.

For many criteria gestures in aviation are subdivided: a) *belonging to the genera aviation*: gestures pilots (fighter, bomber, attack aviation); gestures helicopter pilots; b) *time of application of gestures*: gestures in flight (for communication between crew members); gestures during a training flight (debriefing); c) *according to the elements of flight*: exclusively related to flying; associated with other activities in flight (for example, maintenance of the radio); d) *complexity of the action*: means or offer to perform one action; mean or offer to perform one or more actions; e) *complexity of performance*: gestures with one hand; gestures with two hands; gestures involving the trunk (and legs).

For example, look at the body language of the pilots. In flight gestures are used by pilots of aircraft rarely, through a common rapidity of action and lack of time to body. On aircraft bombers, and when piloting a couple, a group in the presence of eye contact, use the following gestures – symbols: 1) pat on the throat – please check the density of attraction laringophone or evidence of their failure; 2) scroll forefinger hands ear – witness of the hard of hearing or not hearing.

Gestures of helicopter pilots in flight: the numbers of digits 1 (2, 3, 4) is the requirement to perform 1 (2, 3, 4) the reversal of the preliminary report to the head of operations; palm movement up (down) – call to dial (decrease) altitude; a gesture switching on (off), that accompanies radio order of switching on (off) the system unit.

Gestures of communication of technical staff with pilots, drivers equipment provision mainly related to the verification of the hydraulic system, controls aircraft: – display of the index finger – "Let the flaps in the take-off position"; – showing two fingers (English letter "V") – "Let the flaps in the landing position; – showing fist – "Take the flaps"; – centrifugal movement in both hands before him in the vertical plane, a bend in the elbows fixed along the body – "Let off the brake flaps"; – movement fist of the right hand in front of a forward-backward, left-right – "Check the control of the plane", etc.

Therefore, at each of these levels of mental reflection is mastering the methods of action through education in memory of standards-images regulatory operations. According to the stages of the formation of the image of the flight should apply appropriate educational impact, allowing to apply technical means of training and control of training.

## Conclusion

Non-verbal forms of communication are gestures, facial expressions, posture of the people as a manifestation of their condition, feelings, attitudes. The ability to read these dumb signals helps to understand the truthfulness or untruthfulness of the information presented in verbal form. Knowledge of forms of non-verbal

communication is essential in both individual and group business communication.

The above performance level formation images of the professional activity of the future specialists of the aviation industry has allowed: to form a high professional orientation and professional interest of future aviators; maximum use of intersubject communications disciplines of professional and practical training and other theoretical disciplines; to provide a link between theoretical knowledge and practical application during execution of combat missions (anti-terrorist operations, peacekeeping missions); involved in the training all the senses; to promote the accident-free operation of aviation equipment.

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## **LEXICAL WAYS OF AVIATION TERMINOLOGY RENDERING**

*The article deals with lexical ways of rendering aviation terms. English aviation terminological units and their Ukrainian equivalents have been analyzed. The most common lexical ways of rendering aviation terminology into Ukrainian have been described.*

Aviation is an extremely important branch of transportation. Nowadays it is rapidly developing in many countries. This branch sets an interest for linguists as well. Due to globalization and international integration it is vitally important to overcome language barriers. The article is devoted to the analysis of aviation terms, indentifying their meaning and translation peculiarities.

English aviation terminology is a terminological system prone to some classification rules. At present it is intensively extending and keeping up to date as the aviation field is actively developing.

The topic is of interest because of studies lack in rendering aviation lexical units into Ukrainian. Moreover, the modern approach to terminology translation when not only a form of the original but the essence of the message is rendered raises the problem.

The aim of the article is to define the notion “term system”, to analyze aviation terms in English and their equivalents in Ukrainian for the reason of indentifying lexical ways of aviation terms rendering.

The article results can be used to solve practical problems connected with English-Ukrainian translation namely aviation terminology translation. Besides the article can be useful at aviation terminology translation classes and translation for special purposes classes.

The interaction and interdependence of the terms prove that the aviation terminology is a terminological system. The terminology systemacity is grounded in the works of O. Gerd [1], B. Golovin [2], V. Leychik [6], D. Lotte [7], O. Reformatskyi [9], A. Superanska [10] and others.

The notion essence describes the most important characteristics of the real object. This essence is denoted by a term. So, it is considered that the system of interdependent notions is reflected in a language as a system of interrelated signs-terms. The system is called terminological.

V. Leychik claims that “a term system appears as a result of random set terminology sorting” [6, p. 21]. That is any assembly of nominal units in some science field is transformed into an organized structure having a defined and fixed relation within the system.

While developing special knowledge the need for denoting phenomena, objects, special human activity notions arises. It causes the appearing of special names, the most informative language units on the level of words – **terms** [4, p. 14].

Most linguists state that termhood is one of main style characteristics of

scientific style, an informative key of science language lexis.

V. Danilenko believes that “a term is a word (or a word combination) of special field usage denoting a special notion” [3, p. 12].

A basis of every term is a realia definition. Due to this fact terms are exact and short characteristics of a subject or a phenomenon. Every field of expertise has its own terms which comprise a terminological system of the science.

In the article we use V. Karaban’s definition. He believes that a term is a language sign representing a notion of a special professional branch of science or engineering. The scientist claims that scientific terms comprise a considerable part of scientific texts [5, p. 54].

Narrow-specialized and common terms are an important characteristic of all terminological systems. Common terms are understandable not only for professionals while narrow-specialized terms representing a definite science are recognizable mostly by the specialists of the field.

Terminological lexis provides the most exact, accurate and short expression of the subject essence and correct understanding of its sense.

We may conclude that terms have main semantic loading in the language for special purposes. They also take a prominent place among other general and functional words. Most of the technical terms are beyond a literary language and are recognizable by the field specialists only.

Terms’ translation is an exact rendering of an authentic lexical unit by means of the other language providing the sense and style are saved. To render an authentic notion in full it is necessary not only to find adequate terms and equivalent lexical units in the target language but also choose necessary grammatical forms and stylistic factors.

On the other hand we should agree with the idea that in the process of the literary translation there is more creativity than in the translation of the special language. The matter is that masterpiece peculiarities come to the fore in the source language while the exact rendering of information is vital in technical translation.

Terminology translation is done in different ways namely by means of language transformations: lexical, lexical and semantic, and lexical and grammatical ones. Translator’s task is to choose a right way of translation in the process of rendering to give the term meaning as accurately as possible. Let’s consider the lexical ways of terms’ translation.

One of the easiest ways of translation is **transcoding**. Transcoding is a letter by letter or a morphem by morphem rendering of a source lexical unit by means of the target language alphabet. This translation way is an exception in the technical translation practice: *airport* – аеропорт; *gate* – ве́рті; *terminal* – термінал [10].

While using transliteration we should keep in mind “false friends”. Transliteration translation of “false friends” causes a rough distortion of the meaning.

Translation of the terms is possible by the **description of the meaning**. Such way of translation is used in the translation of newly-coined author’s terms-neologisms which are used in the inverted commas. For example, *radar signature enhancer* – засіб збільшення радіолокаційної ефективної поверхні розсіювання ЛА; *traffic in sight* – спостере́гаю борт (означає, що пілот прийняв інформацію диспетчера і

візуально спостерігає той рух, про який повідомив диспетчер); *rising runway* – зображення ЗПС, яке піднімається (індукується тільки коли вказівник курсового радіомаяка знаходиться в полі зору. Піднімається в напрямі символа літака, коли висота відносно рівня землі менше 200 футів) [10].

Terms can be rendered by one more lexical means of translation – **loan translation** – rendering of a sound structure of a lexical unit when components of a word (morphem) or a phrase (lexical item) are translated by appropriate elements of the target language. This way of translation is used only for complex terms by their structure. For example: *takeoff clearance* – дозвіл на зліт; *landing roll* – пробіг при посадці; *air traffic management* – організація повітряного руху; *fuel system* – паливна система [10].

In case of an exact equivalent absence for a term or when loan translation, transliteration or descriptive translation are not suitable it is possible to use other ways of translation which we didn't consider in the article.

### Conclusion

The task of a translator working with aviation texts is to be aware of this field peculiarities, to know the terms and the notions characteristic of this branch, to avoid “false” terms, synonymous usage of terminological units or to use a term having more of the inner form and covering the most important signs of the denotation, explaining the notion essence and thereby being characterized by the greatest number of differential signs, not to shorten terms on your own will, to avoid choosing foreign words in case there are lexical units in mother tongue having the same meaning, to fill terminological gaps with internationalisms, to use standardized terms in the target language. In case of a newly-coined term a translator should find an equivalent using reference materials or consulting a specialist in the field. In some cases it is possible to translate a term by descriptive, loan translation or transcription.

Further studies can be conducted in lexical and semantic or lexical and grammatical ways of aviation terminology rendering.

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## **ENGLISH-LANGUAGE TRAINING OF FUTURE AVIATION SPECIALISTS AND ITS INFLUENCE ON FLIGHT SAFETY**

*The article addresses the English-language training of future aviation specialists in accordance with the requirements stated in the Resolution A 32-16 of ICAO Council. Taking into account the specificity of Aviation English the authors consider it advisable the use of personality-centered, competence-based and communicative approaches while studying vocabulary, terminology and R/T phraseology. The successful combination of these approaches in practice appear to be interactive lessons with the use of project method, creating communicative situations and resolving problematic questions in the process of debate and talks.*

The importance of ICAO Operational Level 4 achievement in aviation English by pilots, controllers and the workers of other aeronautical services is highly actual nowadays. Statistics says that despite efforts for the increased flight safety there is no decrease in aviation accidents. Three out of four accidents happen as a result of functioning unreliability of a person engaged in the process. Misunderstanding of the situation, wrong decision-making and dangerous acts as a consequence have been the main causes of accidents. This is the burning problem for all the aviation specialists in the process of English-language training at higher schools and after graduation as far as failure to reach the necessary qualification rate and its consequences influence all the participants of aviation market.

The decision of enhancing standards in aviation English training for aeronautical specialists was adopted in 1998 at the 32<sup>nd</sup> ICAO Assembly. The Assembly adopted the Resolution (A 32-16) in which ICAO Council was delegated to assume emergency measures concerning the enhancement of aeronautical specialists training in work-related aviation English. 9835 Document of ICAO "Guidelines for Aviation English Training Programmes" represents the necessity of teaching methods and ways revision. Under the Document the emphasis in the training process should be shifted towards personality-centered, competency-building and communicative approach [1]. We consider the best combination of these approaches the structure of classes in the interactive mode. Application of such a method transfers the function of the teacher from teaching to cooperative, directing one.

According to statistics not all the students enter higher schools with the appropriate level of English and the task of a teacher is to motivate them for developing the importance of English learning that will provide success in the professional sphere and safety for all the participants of air traffic in future.

Implementation of guidelines for Aviation English Training Programmes adopted by International Civil Aviation Organization (circ. 323 AN/185) specifies for the teacher of higher school a set of tasks aimed at the achievement of particular objectives, content and language criteria, use environment and specific work-related characteristics including pilot – air traffic controller communication, specific set of

vocabulary, expressions and functions, communicative awareness, ability of correct acquiring audio and visual information [2]. That particular features of aviation English awareness influence safety of passengers, aeronautical personal and the whole flight safety.

English-speaking training in aviation is intended to implement educational technologies facilitating the development of communicative, personal, informational, social, cognitive and self-studying types of competency. The main components of such subject competencies are interactive learning through the interaction with the teacher, curricular material and other students and active learning through the imitation of communicative situations and deep insight in the simulated real-life situation [3].

The method described is called project method. It is the important component of productive education system that represents non-conventional way of educational processes structure by the use of active actions (planning, forecasting activity, analysis, synthesis) intended to realize personality-centered approach. Project method suggests the solution of a learning problem via the use of diverse methods and means of learning and integration of knowledge and skills in different areas of science and technology [4]. Application of project method requires from students the use of new knowledge based on acquired material, trains the skills of self-decision and team work, resolving disputes, finding, compiling and applying new pieces of information from different sources, use of information technologies for performing particular tasks, developing critical thinking and self-developing drive, forming of willingness and ability for self-studying.

Use of project method for aviation specialists training is appropriate, because by virtue of its didactic nature it allows to solve problems of various students' abilities, skills to construct their knowledge independently and apply them in practice to address the cognitive and practical tasks, navigate the information space, analyze information as far as at different types of activity (cognitive, experimental or applied one) students use a set of all these intellectual skills [5].

The main objective of a tutor in teaching aviation specialists a foreign language is to form communicative competency, which involves not only practical knowledge of professional foreign language, but also the ability to work with printed information, video, listening that means the critical thinking skills mastering [6].

So, it is about a specific organization of training process and learning activity of students that could facilitate and accelerate the knowledge mastering by students, step up the process of assimilation of acquired knowledge and taught techniques of self-study training materials and information that would help to form the communication and information competencies. To achieve the objectives of modern education system the global pedagogy has taken the course to students' personality-centered approach.

Along with such methods as training in collaboration, discussion, problem-oriented tasks project method explicitly reflects the basic principles of personality-centered approach based on the principles of humanistic psychology and education. By its very nature project method implies the need to differentiate learning orientation on the individual student's needs, capabilities, based on the principles of cooperation and active involvement of students into different kinds of activity.

Using of project method in foreign language learning enables students to use it as a means of knowledge, a way of expressing their thoughts, perceptions and understand the views of others. This is the most effective way to put the students' attention on solving problems in cross-language environment by means of a foreign language.

It is effective to use the principles of personality-centered approach in radio communication language teaching as well, which is the integral part of aviation English, knowledge of which is closely connected to the observance of flight safety. Language of radio communication, when compared to general English, has minor differences in pronunciation and intonation, significant differences in grammatical structures and includes specific requirements for rate of speech. ICAO puts two requirements to the language of radio communication: brevity and single meaning. As for functional style language of radio communication is strictly structured, saturated with numerals and terminology. The basis of radio communication is the language of dialogue.

Training of conversational speech in aviation English by the use of deductive and inductive methods is provided with its specifics. In the deductive method of conversational speech teaching it is recommended to begin with a full sample dialogue taken as a structural and intonation standard for the construction of specific dialogues. Dialogue sample represents a complex of several dialogical unities. These samples can be systematic dialogues, in which the main phrase can be complemented by the statement of the place, time, conditional sentences, etc. Training of this type of a dialogue traditionally starts with listening, learning by heart, then there is a variation of its lexical content, testing components and finally dialogue in itself. The acquisition of this kind of dialogue goes top-down – from the intonation syntactic blocks to their elements. This method leads to automation of elements in the relationship in which they are used in the whole dialogue [7].

The inductive method of conversational speech training aims to shift from mastering some of the dialogue elements to self-interpretation of this dialogue in a specific linguistic situation. This method is initially intended to imply interaction that is the basis of conversational speech, and develop the skills and abilities of communication. By the inductive method of conversational speech learning preparation for radio communication dialogue includes improving psychological mechanisms of dialogical speech, the skills of linguistic material use, which is typical for radio communication, mastering the ability to interact with counterparts in terms of internal and external speech situation.

However, the knowledge and skills of communication are formed on the basis of certain linguistic material that is typical for specific kind of profession. Therefore, techniques of radio communication vocabulary acquiring should be the part of conversational speech training.

## **Conclusion**

Aviation English training of aeronautical specialists should be an integral part of qualitative functioning and providing safety for all the participants of air traffic. Considering the peculiarities of aviation English the emphasis in the training process should be shifted towards personality-centered, competency-building and communicative approach. The combination of these approaches in the process of

training English for specific purposes we consider it to be successful to implement interactive methods that include project method, conversational speech, solving problematic issues through discussion and negotiation. In this way it is possible to achieve the main goal of high-quality training of aviation specialists, that is, communicative competence, which in turn, minimizes and eliminates the possibility of misunderstanding in the professional field that can lead to accidents and interference into well-organized work of aviation services.

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## **BASIC PRINCIPLES OF TEACHING AVIATION ENGLISH TO PILOTS AND AIR TRAFFIC CONTROLLERS**

*The article outlines basic principles of teaching Aviation English to pilots and air traffic controllers. Content-based Aviation English curricula for ab-initio students and active operational professionals in aviation are analyzed.*

The ICAO Language Proficiency Requirements apply to achieving and maintaining proficiency in all languages used in radiotelephony communications. However, English is the language most widely used by the global aviation community, and also the one language which is obligatory to provide. Thus, improving levels of spoken English is the aviation community's main focus currently.

The "Air-Ground Communication Safety Study: Causes and Recommendations", made by Eurocontrol, indicates that 64 % of all instances of communication problems have had some air safety consequences. These consequences include: prolonged loss of communication; altitude deviation; loss of separation; wrong aircraft provided clearance, instruction issued to wrong aircraft; heading / track deviation; runway transgressions, and some others [1].

Language training in aviation has specific objectives; the content, criteria of proficiency, conditions of use and professional and personal stakes distinguish the instruction goals from the teaching of language for other areas of human activity. These specific objectives are:

- The language is designed to ensure unambiguous pilot-controller communication;
- The language used employs a very specific set of vocabulary, expressions and functions;
- Operational efficiency, rather than linguistic correctness, is the ultimate criterion by which proficiency is assessed;
- Communication is predominantly oral and most often with no visual contact;
- The question of communication may not only impact the safety of the travelling public, but also potentially have considerable economic repercussions on all individuals involved in the aviation industry, directly through testing and training costs and indirectly by its effect on staffing [4].

The introduction of the ICAO Language Proficiency Requirements in 2003 and the subsequent steps to assist their implementation have significantly altered the environment in which aviation English training is carried out. Previously, the training was an optional and irregular activity on the periphery of professional training, entirely dependent on available funds. Now, aviation English training is in

the process of becoming a subject driven by specific objectives: attaining and maintaining the language proficiency defined as ICAO Operational Level 4.

The ICAO Language Proficiency Requirements (Annex 1 ‘Holistic descriptors’ [3], and Doc 9835 [5]) address language used in radio communications. But ‘Aviation English’ in its broadest sense covers language use in a wide variety of aviation-related contexts, from maintenance to cabin crew, customs to security, dispatchers to pilots and ATCOs. Therefore Cir 323, ‘Guidelines for Aviation English Training Programmes’ (2009) states the following provisions for Aviation English training: “Aviation English training must adopt an essentially communicative approach to language learning with the main focus on speaking, listening and interactive skills. Although grammar, syntax, vocabulary and reading underlie oral communications, the primary objective of Aviation English training is voice-only communication; ...[and, it] must contain activities that are designed to address all six language skill areas specified in the ICAO Rating Scale and holistic descriptors: pronunciation, structure, vocabulary, fluency, comprehension and interactions” [4].

Experts in Aviation English training (H. Emery, J. Kennedy, O. Moskovkina) differentiate principles of language teaching for aviation:

- Appropriate content-based language training is a more efficient, motivating and cost-effective form of Aviation English training;
- The content used for language acquisition should be relevant to the population being trained;
- Training should have a communicative focus (communicative approach to language learning). The goal is successful communication, rather than pure grammatical correctness. The training should use learner-centered classrooms rather than teacher-centered; much student conversation practice and relatively less teacher lecture; minimal error correction of errors which do not affect comprehension, and; materials which attract learners’ attention.

Pilots and ATCOs are the two integral partners in the radiotelephonic exchange. However, the partners differ in their concerns, areas of specialized knowledge, and the variety of situations to which they are directly exposed. Thus, it is preferable to use different courseware for each group. It is more appropriate for Aviation English training designed for pilots to explore a wider range of operational situations, communication registers and interlocutors because pilots are also required to interact with crew members and describe in-flight conditions in greater detail. On the other hand, the language used in airspace management and interaction with emergency services could be more developed when training controllers.

More important than the distinction between pilots and controllers as language learners is the distinction between active operational professionals and *ab initio* cadets or ATC trainees. In the case of *ab initio* students, there will be a great deal of technical or operational subject matter that cannot be taken for granted, while the resolution of an in-flight emergency or a navaid malfunction are topics that are relevant and motivating for experienced professionals.

A special content-based Aviation English curriculum for *ab initio* students who do not meet ICAO Operational Level 4 language proficiency should be designed. It is generally accepted that the closer the content matter of a course is to

the actual situations, activities, functions and subjects encountered in the students' professional life, the more effective and motivating this courseware will be. Professional relevance is a combination of two factors: content and function. Content may include subjects such as approach, delays, bad weather conditions, sick passengers, a hydraulic failure and runway incursions. No less relevant for aviation professionals are the specific language functions required to deal with these situations, such as describing, requesting, clarifying and confirming.

By using materials and other resources commonly used during the flight training process, qualified language staff can, with input from the flight training department, develop a content-based Aviation English program, which incorporates standard radiotelephony practice, but includes all other linguistic aspects of flight training as well.

It is effective to use computer facilities for students' listening and viewing aviation CDs, DVDs and other computer based training. These materials can also function to enhance students listening comprehension and vocabulary skills in accordance with two of the ICAO holistic descriptors. By using a blended learning approach, with computer based training and classroom activities that are designed based on language functions, events, domains and tasks association with flight training, students may make good progress in comprehension and communication.

When designing a curriculum for Aviation English for *ab initio* training it is important to include activities from many different flight training tasks. A. C. Albritton indicates that designing a curriculum with mostly ATC communication practices will surely help the student pilot feel more confident in handling standard radio calls. However, the student pilot will still have little instruction and practice with: debriefing the flight instructor; requesting a weather briefing; speaking to a dispatcher; reporting a technical problem; receiving non-standard clearance by an air traffic controller; or any of the other tasks related to training [2].

Therefore, a large variety of commonly used resources should be utilized to ensure that the student has had a broader exposure to Aviation English. This can include resources such as flight training manuals, checklists, aeronautical charts, aviation pictures in addition to activities such as total physical response, chair-flying, simulations based on actual instructor / student, dispatcher / student and mechanic / student interactions, interactions with a weather briefer, ATC communications, role-playing, attending safety seminars, etc. These resources and activities can all be extremely valuable language learning tools when introduced in a language learning scenario.

The primary objective of Aviation English training curricula for both *ab initio* students and active operational professionals must be to build and enhance communicative skills and strategies of the trainees. Aviation English trainers should be able to use communicative approach methods to language learning that support their students in the most effective way to reach and sustain the required level of communicative proficiency. Among the examples of a consistently communicative approach to language training we can mention: interactive listening comprehension exercises which also elicit oral responses from learners; classroom information exchange and role-play activities in pairs; practice of vocabulary and grammar

(structure) through oral use rather than reading and writing exercises; using graphical (scopes, instrument panels and charts) and numerical data (tables and displays) to elicit speech production to mirror pilots' and controllers' working environments and situation management, and; group problem resolution activities to develop interactivity and fluency skills.

Another essential component of curricula for *ab initio* students and active operational professionals is autonomous learning or self-study. Trainees often need quite extensive listening practice to improve their comprehension of particular situations in the professional context. The training process should be supplied with a large bank of aviation materials, particularly audio materials, and while some of these materials are used in class as a lead-in to a particular activity, it is generally the case that students need to maximize the time they spend listening to English. By promoting and implementing a self-study program centered on listening, we are able to free up significant classroom hours for speaking.

Content-based Aviation English curriculum for active operational professionals can be especially beneficial if it is safety focused: it enhances the value of required language learning time by pairing language lessons with important safety content. Other important benefits include: safety awareness; providing high-interest topics in the language lessons, and; increasing learner motivation. Finally, motivation is a key factor in language-learning success – people naturally pay more attention to topics in which they have an inherent interest. Thus incorporation of these specific attributes into Aviation English curriculum will yield positive impacts in progress for the students, and the providing training programs [6].

## **Conclusion**

The basic provisions for effective Aviation English training can be summarized as follows: Aviation English training and testing are ultimately about safety; Aviation English training has very specific characteristics which set it apart from general English teaching and even English for specific purposes in other fields. Training should have a predominantly communicative focus. Appropriate content-based language training is a more efficient, motivating and cost-effective form of aviation English training. The content used for language acquisition should be relevant to the population being trained. Student motivation and commitment are essential to successful training outcomes and motivation and commitment will be efficiently and correctly maintained in this learning environment.

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## **HUMAN FACTOR IN AVIATION DOCUMENTATION TRANSLATION: GRAMMATICAL TRANSFORMATIONS IN USE**

*The report zeroes in on how human factor influences translation of aviation documents and how grammatical transformations help to achieve adequate translation. Some of the issues addressed in the class training of aviation translation specialists are dealt with in the article.*

Over the independence years, Ukrainian translation studies have been addressing a variety of issues and offering a number of solutions aimed at facilitating and supplying practicing translators with advice. Yet, when it actually comes to practice, translators have little time to analyze the texts they are translating, since, as a rule, a customer sets tight deadlines, and following some scholar's theoretical steps turns into a waste of time. Nevertheless, we should not disregard scholarly attempts completely, because they become the ground for teaching and training future translators. Once the latter get the skill, they can successfully use the knowledge for providing quality translation for the customer. The article thus addresses the issue of adequate and faulty grammatical transformations applied by translators while translating aviation documentation.

As no good machine translation can match the one provided by a human, human factor becomes of paramount importance for bringing the information encoded into the source text accurately. Because the Ukrainian and English languages belong to different groups of languages, grammatical transformations are applied by the nature of things and human factor steps in inevitably.

Grammatical transformation is understood in Translation Studies as the change of grammatical properties of a word, word-combination or sentence during translation. The most common grammatical transformations are permutation, replacement, addition, omission and complex transformations.

When the word order of the original sentence is changed, the permutation is in use. However, the permutation is rarely used alone. It is often accompanied by replacement of parts of speech, parts of sentences etc. E.g.: *Undercarriage must be applied to land the airplane.* – *Щоб посадити літак, необхідно застосувати uaci.* As we can see, the infinitive construction uncommon in the Ukrainian language was substituted by the subordinate clause of purpose. The word order was also reversed, and the verbal modal predicate was substituted by impersonal modality. Yet, despite the changes applied, the target sentence is perfectly grammatical and renders the sense of the original equivalently.

It was noted that mistakes in translation generally occurred when the original sentences were extended with participial, infinitive and gerundial constructions or long homogeneous elements. In addition, longer subject groups lead to wrong understanding of predicative elements and losses in translation. For instance, students were given the following sentence for translation: *It is a very serious*

*problem to address the bearing strength of a pavement intended for aircraft of apron (ramp) mass greater than 5700kg shall be made available using the aircraft classification number – pavement classification number (ACN-PCN) method by reporting all of the necessary information.* One of the translations offered shows that the permutation and replacement lead to a faulty translation: *Проблема, над якою потрібно дуже серйозно працювати це – розрахунок несучій здатності штучного покриття, призначеного для повітряних судів з масою на пероні (стоянці) більш 5700 кг, яка визначається по методу класифікаційне число повітряного судна – класифікаційне число покриття (ACN-PCN) з наданням всіх необхідних даних* [we provide the sentence without any change. – S.Sh.]. Apart from obvious agreement and punctuation problems, we see that the original sentence consists of two clauses: *it is a very serious problem to address and the bearing strength ...shall be made available using ...* If the first clause presented no difficulty in translation, the modality of the second one was lost. The change of the original word order also led to the shift in the theme and rheme intended. In fact, syntactical analysis of the sentence may have led to a better rendering of the intended meaning.

Replacement is a grammatical transformation affecting original word forms within a word group, clause, sentence or even groups of sentences. Replacement is closely connected with the lexical equivalence, especially when the translator deals with set phrases, as in *Transportation Committee shall discuss those points of aviation documentation in greater detail.* – *Транспортний Комітет розгляне ці положення з авіаційної документації докладніше.* A set expression *in greater detail* was replaced in translation with the equivalent word *докладніше*. Human factor interferes when the students try to translate word-for-word those elements unfamiliar to them, or fail to find the correct equivalent of a complex grammatical construction or polysemantic word. *If such other means are used, the carrier shall, if so requested by the consignor, deliver to the consignor a cargo receipt permitting identification of the consignment and access to the information contained in the record preserved by such other means.* – *У випадку використання таких інших засобів перевізник на вимогу вантажовідправника видає вантажовідправнику квитанцію на вантаж, яка дозволяє ідентифікувати відправлений вантаж та отримати доступ до даних, що зберігаються такими іншими засобами.* We see that the word-for-word translation of the phrase *such other means* led to a clumsy translation.

Sometimes for the purpose of achieving adequate translation, addition of words, word combinations or parts of sentences is needed. This happens when a grammatical construction has no direct equivalent and therefore requires a change in the form. This transformation is also closely connected with rendering of correct lexical meaning with no single-word direct equivalent. For example, *The mutual effect introduces a complex changing the whole system of aviation security.* – *Перехресний вплив призводить до появи комплексних поправок до усієї системи безпеки авіації.* Here, the addition of the element *до появи* is motivated by the lexical meaning of the word *introduce*.

However, the students often overuse addition, which leads to unnecessary wordiness. This seems to result from the lack of knowledge of the target language or the attempt to provide word-for-word translation in case the student does not

completely understand the sense of the text. For instance, *Thank for the reporting with the pavement classification number (PCN) we see that an aircraft with an aircraft classification number (ACN) equal or less than the reported PCN can operate on the pavement subject to any limitation on the tire pressure, or aircraft all-up mass for specified aircraft type(s).* – Завдяки повідомленню класифікаційного числа покриття (PCN) ми бачимо, що повітряні судна з класифікаційним числом повітряного судна (ACN), рівним представленому (PCN) або менш, можна використовувати це покриття з урахуванням будь-яких обмежень на тиск в пневматиці або повну польотну масу вказаного типу повітряного судна. Again, apart from the wrong translation of several words, the student fails to find the subject-predicate group in the original, which leads to misunderstanding and wrong interpretation of the sense. The translation thus lacks language accuracy.

Omission is another grammatical transformation through the use of which an original element is removed in translation. For example, *Airport security maintenance is a very difficult problem to tackle.* – Підтримання безпеки аеропорту – це дуже складна проблема. The translator omitted the verb *to tackle* in translation which did not lead to any change in understanding the meaning and deducing what was omitted.

Still, the students tend to omit elements which they do not understand. They usually explain it saying that the meaning of the sentence is understood; however, when pointed to the fact that the elements give additional details, which at times make a great difference, only shrug their shoulders. Attention to detail is something that students should be reminded of constantly since in real life situation these mistakes may lead to miscommunication and even service liability.

Complex transformations are a combination of several grammatical transformations mentioned above and are the most common types. For example, *In designing these helicopter I relied heavily on previous research.* – При розробці цього гелікоптера ми широко використовували попередні дослідження. We may notice that the translator replaced first person singular with first person plural which is more common in the Ukrainian official language. In addition, singular form of the uncountable noun *research* was replaced by a plural Ukrainian *дослідження*. And finally, the transposition of English V+Adv to a Ukrainian Adv+V is also traced in the translation. These complex changes lead to natural and smooth Ukrainian sentence that in no way affects the sense of the original.

Sometimes the misuse of one of the transformations may lead to the change in the sense of the sentence. Mind the translation by a student: *The clear mathematical calculations culture is necessary in the calculations of the actual runway length that is provided for a primary runway should be adequate to meet the operational requirements of the aeroplanes for which the runway is intended and should be not less than the longest length determined by applying the corrections for local conditions to the operations and performance characteristics of the relevant aeroplanes.* – Чіткі математичні розрахунки необхідні для обчислення допоміжної довжини ЗПС, яку слід визначати таким же чином, як і довжину основних ЗПС, за винятком того, що вона повинна бути достатньою для тих літаків, яким необхідна ця допоміжна ЗПС на додаток до іншої або іншим

*ЗПС, з тим щоб коефіцієнт використання ЗПС був рівний щонайменше.* We see that the last part of the sentence presented the greatest difficulty for the student and lead to a faulty translation. When asked why she omitted some part of the underlined fragment, the student said she wanted to at least approach the sense she understood rather than present an equivalent translation. Also the student did not re-read the sentence before submitting it. This case shows the importance of both syntactical analysis and the need to return to the translation after it was done for checking it for possible mistakes and common sense.

Unfortunately, the instructor often faces the lack of motivation in students trained for aviation translation to do a thorough search and analysis before doing a translation. What is more, Google Translate often becomes a tool for dealing with texts for home translation, since it requires no effort on part of the students. Therefore, a question of professionalism of future translators is left open.

### Conclusion

All in all, grammatical transformations described above are only effective when the norm of the target language is followed and the sense is faithfully rendered. Mistakes often come as the result of slavish translation or lack of knowledge or understanding of the meaning, grammatical structure and / or style requirements. To avoid human factor in translation, early in their training students should be pointed out such faults, and analysis of sentence structure should become a standard practice before the actual translation.

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## PROFESSIONAL ETHICS OF AN AVIATION INDUSTRY TRANSLATOR

*The present article addresses the role of a translator and his professional ethics as the aviation industry is one of the most heavily regulated in the world. From flight safety and avionic engineering, to airport security and flight data analysis, the global nature of the aviation sector means that translation and international communication is common.*

The aviation industry aspects like: airline advertisement, Internet promotion campaigns, e ticketing, airline magazines provided on board for customers, audio-visual-printed instructions given to the customers on board, crew training, aircraft drawings, cabin training, freight, entertainment, websites and various aviation business documents need translation of information from one language to the desired target language. The Aviation industry always has been a multinational type of industry and hence aviation translation has been in existence almost from the times when international airlines services were introduced in the global market.

There is a high requirement for technically specific translations in this industrial sector and it also requires efficient strategies and solutions for the translation process.

For modern translators, there also has to be a corpus or body of ethical or moral principles which apply daily to the work of translation.

If a significant number of private moral or ethical values were not transposed into public affairs, then that particular nation would soon slip into decline. Those nations which have had important and meritorious principles of ethical conduct have always attracted attention and support.

In modern times, professional groupings take unto themselves a code of conduct which they call 'ethics'. It is not that they have invented the principles of the code, but rather they have taken many, but at times not all, of the principles and applied them to their profession. Hence, we talk, for example, of 'translator's ethics' or the 'ethics' of a specific industry or sphere translator. At the worst, such ethics are an external system of rules and regulations for which some members of that profession may have little regard. If that happens, it is not the fault of the system or of the principles, but rather of the individual who may have less sensitivity for the values which the principles offer.

Nowadays, the translator very often uses his professionalism to 'type over' an electronic text, or using optical character recognition (OCR) software will extract a text for processing with ease from a document. The translator is using another set of skills, but the underlying ethical principles must still apply.

The principles of ethics governing a translator's work are applications of the great moral principles, based not on the quicksand of relativism, but solidly founded on the absolute foundation of what is good in itself, to the avoidance of what is wrong, for the pure, simple and unadulterated reason, that good is right, and that bad is wrong.

A professional translator or interpreter does not simply translate words from one language into another. His duty is to interpret and connect ideas from one culture to another. Faithfully conveying ideas requires translators and interpreters to express appropriate intonation and inflection and to properly transmit the concepts and inferences of the speaker to the listener (interpreter) or the writer to the reader (translator). Typically, translators render in one direction while interpreters alternate between two languages.

Professional translators and interpreters need comprehensive mastery of grammar, syntax and vocabulary of both the source and target languages, and in-depth understanding of cultural norms. Additionally, extensive diverse general knowledge increases the translator's or interpreter's understanding and skill. The American Translators Association (ATA) suggests successful interpreter and translators be "avid readers of a wide variety of material" and participate in ongoing discussion, training and educational opportunities.

This is about people, not texts – a translator ethics seeks to embrace the intercultural identity of the translatory subject, in its full array of possible actions [1].

He introduces a strong principle of interculturality and describes it as follows: translators in any industry or sphere tend to be intercultural in the sense that they mostly work in the intersections woven between two or more cultures, rather than wholly within any single primary culture. This is, of course, no more than a working hypothesis, a model, a set of questions that arise from observations. Nothing guarantees that all translators belong entirely to an intercultural space, just as no one can affirm that all translators work as messengers sent by Single cultures. As a working hypothesis, the principle of interculturality demands empirical testing; it presupposes socio-historical research that should eventually be able to provide a whole gamut of better grounded models.

It is required that certified interpreters and translators in the aviation industry should operate within their scope of practice. That means they should not offer advice, express personal opinions or other services to their clients. Effective, professional interpreters and translators maintain cultural sensitivity, respect and a professional demeanor, including dressing appropriately for the situation so as not to be a distraction. The translator should defer to the client's instructions.

As well as interpreters and translators in other industries and spheres, aviation industry translator/interpreter should disclose any perceived lack of objectivity or conflict of interest, including personal relationship with one party or the other. Providing services for acquaintances or family members may violate the individual's right to privacy. A translator may experience unresolved textual difficulties that create conflict, including unclear source text, unconfirmed terminology or a personal bias that he must disclose to his client.

A faithful interpretation or translation conveys the message the speaker or writer intends. A thorough rendering of the source language message considers linguistic variations, tone and the spirit of the message without omitting or altering statements or adding unsolicited explanations. A transliteration (literal word-for-word translation), however, may not convey the message or make sense, particularly in the use of idioms. In that case, substitute an appropriate, equivalent cultural idiom to maintain the spirit of the message.

Aviation industry translators should act in accordance with Language Interpreter and Translator Code of Professional Conduct, which emphasizes the following regulations:

1) Confidentiality;

An interpreter or translator must not divulge any information obtained during the performance of his services, including access to documentation or reports. He should not disclose, discuss or offer opinions on any information accessed through the course of work unless required to by law. Furthermore, he must not use information obtained in the course of his work for personal, professional or financial advantage.

2) Impartiality;

A translator or interpreter should remain neutral, unbiased and impartial with regard to either party's gender, disability, race, ethnicity or national origin, age, educational level, socioeconomic status, religious or political beliefs. She should refrain from offering unsolicited comments or recommendations except to assist communication.

3) Accuracy;

Interpreters/translators shall always thoroughly and faithfully render the source language message, omitting or adding nothing, giving consideration to linguistic variations in both source and target languages, conserving the tone and spirit of the source language message.

4) Cultural Sensitivity – Courtesy;

Interpreters/translators shall be culturally competent, sensitive, and respectful of the individual(s) they serve.

5) Disclosure;

Interpreters/translators shall not publicly discuss, report, or offer an opinion concerning matters in which they are or have been engaged, even when that information is not privileged by law to be confidential.

6) Proficiency;

Interpreters/translators shall meet the minimum proficiency standard set by DSHS by passing the required certification examination or screening evaluation.

7) Compensation;

The fee schedule agreed to between the contracted language service providers and the department shall be the maximum compensation accepted. Interpreters/translators shall not accept additional money, compensation, or favor for services reimbursed by the department. Interpreters/translators shall not use for private or others gain or advantage, the department's time, facilities, equipment, or supplies, nor shall they use or attempt to use their position to secure privileges or exemptions.

8) Nondiscrimination;

Interpreters/translators shall always be neutral, impartial, and unbiased. Interpreters/translators shall not discriminate on the basis of gender, disability, race, color, national origin, age, socioeconomic or educational status, or religious or political beliefs.

9) Self-evaluation;

Interpreters/translators shall accurately and completely represent their certifications, training, and experience.

10) Professional Demeanor.

Interpreters and translators shall be punctual, prepared, and dressed in a manner appropriate and not distracting for the situation.

11) Scope of Practice;

Interpreters/translators shall not counsel, refer, give advice, or express



personal opinions to individuals for whom they are interpreting/translating, or engage in any other activities that may be construed to constitute a service other than interpreting/translating. Interpreters are prohibited from having unsupervised access to clients, including but not limited to phoning clients directly unless requested by DSHS staff.

12) Reporting Obstacles to Practice;

Interpreters/translators shall assess at all times their ability to interpret/translate. Should interpreters/translators have any reservations about their competency, they must immediately notify the parties and offer to withdraw without threat of retaliation. Interpreter/translator may remain until more appropriate interpreters/translators can be secured.

13) Ethical Violations;

Interpreters/translators shall immediately withdraw from encounters they perceive as violations of this Code. Any violation of the Code of Professional Conduct may cause termination of the contract.

14) Professional Development;

Interpreters/translators shall develop their skills and knowledge through professional training, continuing education, and interaction with colleagues and specialists in related fields.

## **Conclusion**

This concludes our overview of ethics, translation and communication in aviation. We could only touch on some of the relevant issues here, partly due to reasons of space, partly because still so little is known in this field. We believe that, this review will make it possible to study more objectively and rigorously these linguistic approaches, which are highly relevant for the study of communication within aviation industry. Communication processes in aviation is a subject worth studying in detail: it poses serious challenges for theoretical notions and forces researchers to considerable refinements of their theories. And sometimes it can save lives.

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## AVIATION TERMINOLOGY FORMATION AS A FACTOR OF SAFETY

*We consider such defect of terms as the presence of several terminal elements. On the one hand, the formal longitude of terms is inconvenient in of communicative acts, on the other hand, the danger of such terms is that terminal elements may be ambiguous, which leads to semantic errors.*

Professional Communication is one of the areas of professional activity of aviation specialist being component of his professional credibility. According to statistics, about 80 percent of aviation incidents on international flights are somehow related with the imperfect interaction of air traffic controller and pilot. The International Civil Aviation Organization (ICAO) underlines this in a number of documents. In particular, the document "Guidance on the introduction of the ICAO requirements for language compliance" refers to the fact that one of the main causes of air accidents in recent years is the human factor, therefore, it is necessary to pay more attention to the quality of communication [4, p.4].

In the aviation sector is taken into account not only semantic component of professional communication, but all that is called overtones (according to the researchers, the most informative in the aviation communication is not verbal, but prosodic nonverbal means of communication – a change of pace, rhythm, pitch, tone, etc.) [5, p.86].

The main result of communicative acts in aviation, not least depends of the quality of the verbal code – a language that serves a form of transfer of information about an objective reality. Requirements to the quality of language are particularly enhanced when the employee falls into nonstandard, atypical conditions.

In communicative acts aviation workers industry use the language of professional communication, or technical language that, by definition, a German linguist L. Hoffman, is "... the set of all linguistic means used to specifically outlined communicative sphere in order to achieve understanding between experts in a particular field" [1, p.3].

Content of professional language of specialist of aviation sector consists of *general vocabulary, specific terminology, professional jargonisms*<sup>1</sup> (that is semi-formal lexical items which are outside the literary norm, but simplify the language of professional communication, and provide the necessary imagery and emotion for the speech). In addition to the lexical items, in the professional language they are used nominae, that are generic names of specific realities, for example, aircraft is a term, common name of a set of aircraft, but specific brands of aircraft are nominae eg nominae is title: Mirage – 2000, Tu-154, YAK-40, AN-24, AN-225 "Mriya"

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<sup>1</sup> We agree with those researchers (Borisova LT, Don J. L., Pokrovsky O. et al.), who do not allocate jargon into a separate group

Antonov An-124 "Ruslan" and others.

Terms are considered as the normative part of the professional vocabulary. In accordance with the leading in modern terminology onomasiological approach, the terms are considered in the light of their functioning in the language. This, onomasiological, approach connects the nomination theory (which occupies a central place in modern linguistic studies) with problems of communication and doing research of terminological processes to be communicative directed.

There is a standard set of requirements for the "ideal" terms formulated in the works of the founders of the terminology – E. Vyuster, D. Lotte and others. One of them is correlated to the principles upon which the rules of the phraseology of the crew during the flight are based – "... the number of words in a radio communication sessions and their duration should be (if possible) the minimum" [5, p.87-88].

Thus, in the aviation field, work which is often associated with a limit and lack of time, work under stress, an important factor in the linguistic interaction between participants of the communicative process is such factors as the number of words in the message sessions and their duration.

The *subject* of our study is the term-field "aviation security", *purpose* – to describe the terms of the appointed term-field in terms of their formal structure, to identify issues and to suggest possible ways to remove of these flaws.

After analyzing 400 terminological units of term-field "aviation security", we found that 75 of them are mono-structural, 325 (81,25%) are composed of two (175; 43,75%), three (99; 24,75%), four (35; 8,75%) and more terminal elements<sup>2</sup> (16; 4%). Consequently, the vast majority of lexical units (325 – 81.25%) is composed of two or more terminal elements. In the studied group we found quite a few terms, formal structure of which consists of four or more words: *package of aviation electronic equipment (hardware)*, *system of air traffic control*, *measuring of nondestructive testing*, *to pilot without the use of external benchmarks*, *an indicator of the angle of the flight path*, *test to obtain a certificate of airworthiness*, *turbulence in the inner layers of the free atmosphere*, *anxiety due to a bomb threat*, *a service of air traffic flow* and more. Structure of the of the some, individual, aviation terms contains even nine terminal elements: *layout with three jet engines and two rotor*; *information obtained as a result of review of the aircraft that crashed*.

The presence of many terminal elements is one of defects of terms, because it is broken the language economy, and thus the saving of mindset. Researchers claim that if the speaker operates the more often with the specific notion, then the greater burden of communicative acts becomes the multi-element. E. Vyuster wrote on this subject: "The complexity and the length of drawn terms generates significant inconvenience, and in future the replacement of compound words by simple, or throwing unnecessary elements of these words, for scientific terminology is extremely... desirable" [3, p.61].

In view of this requirement of communicative acts brevity is of particular importance and it overshadows the requirement of semantic precision. Thus taking unwieldy term in acts of communication, the speaker subconsciously begins to look

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<sup>2</sup> As a terminal element we understand the term or word that has independent significance and is part of the composite term

for possible shorter substitutes for long title, and consequently it is formed professionalisms (desantura – landing an army to serve in desanturi; dezuha – misinformation), abbreviations and ellipses.

Abbreviation is often used to construct the short terms. Abbreviation is the method of constructing of new words not from the whole, but from a truncated bases or "truncated segments of words that are synonymous with the phrase, a base component which can be an integer, non-truncated word": *aviadyspetcher*, *aviakompaniya*, *aviameteosluzhba*.

In the such area of operation as scientific texts of Aviation Safety they occur most frequently the initial abbreviations, which are used as a self-contained lexical units (*ICAO – International Civil Aviation Organization*, *KDP – traffic control tower*, *LA – aircraft*, *ATC – Air Traffic Control*) as well as the parts of the multicomponent terms: *aircraft performance PCs*, *PC parking lot*, *metrological support IPC peak amplitude AE*.

Taking into account that the assembly of several bases (words) in a semantically fused unit allows to characterize the concept and the reality on several grounds, and that compound words have the ability to "express two (or even three) ideas in one word" and contain "a greater degree of specificity of concepts" [7, p. 109], abbreviations can be seen as something positive. On the other hand, an abbreviation method is fraught with great danger, it often causes confusion and technical errors. It should be used under the condition of compliance extent of linguistic sense and terminological taste. In particular, we have to remember that the reduction does not become meaningful. For example, the reduction of *aero* from *airplane* leads to ambiguity, because it means the relation of something to the air (gas).

In the terminology of aviation safety it is observed reduction of terms by means of transfer of characteristics from the part to the whole and from the whole into parts: *brake with electrohydraulic drive – electrohydraulic brake*, *crankshaft bearing – bearing knee*.

One way to obtain the terms brevity is the ellipsis, by which, in linguistic terminology, it is understood omission in the combined term of one or more elements.

For aviation terminology system typical is the context ellipsis, that is the omission of words, whose meaning can be easily installed from the context. One of the most commonly used types of ellipsis is the omission of re-used component, that expresses the attributive sign, – the replacement of specific term by generic. For example, where it is established that it is about *internal combustion engine*, then in the continued use of this species it is replaced by the term generic term *engine*. As an example of ellipsis can can serve the paired terms such as *airworthiness standards – standards of use*, *the average speed of the trajectory – the average speed*, and others.

Defect of multiple element terms lies not only in their formal longitude, but also in that terminal elements can be poly-semical, for example, deformation is: – 1. Relative magnitude of relative displacement of points during the deformation or a result deformation; 2. Linear or angular components of the tensor of deformation; 3. Same as the deformed state [2, p.30].

Thus, the formal structure of a significant number of aviation terms needs further improvement. Bulky narrative structures formed from 5 terminal elements (or more) call narrow aircraft concept and they have a limited scope of application. n importance these poly-structural units are close to their definitions, which contradicts the purpose of the term. We believe that such formations should be eliminated from the terminological system, by means of replacing them by semantically adequate, but formally simpler terms.

Further improvement of the formal level is an important aspect of modeling of the aviation safety terminological system, with account of cultural tradition, continuity of linguistic forms, and, simultaneously, entering aviation the terminological system of Ukrainian language into the scientific context of the world science.

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## **EVOLUTION OF HUMAN FACTORS IN AVIATION: HISTORY AND DEFINITIONS**

*The article describes how the evolution of the concept “human factors” took place in historical retrospective. The paper highlights the specifics of the concept, its activation in the process of social transformation and the importance for the dynamics of social development.*

Aircraft accidents are infrequent, highly visible, and often involve massive loss of life, resulting in exhaustive investigation into causal factors, public reports, and remedial action. Research by the National Aeronautics and Space Administration into aviation accidents has found that 70% involve human error. [12; 14]. The aforementioned numbers refer to certified personnel of commercial aviation. Taking into account aviation of general use, technical service, management of aircraft, infrastructure of transport complex proportion of human factor will be more than 90% [4].

Accident records show a flattening of the safety curve since the early Seventies: instead of new kinds of accident, similar safety deficiencies have become recurrent features in accident reports. Human behavior and performance are cited as causal factors in the majority of aircraft accidents. If the accident rate is to be decreased, human factors must be better understood and the knowledge more broadly applied. This suggests the need to review traditional accident prevention strategies, focused almost exclusively on the action or inaction's of front-line operational personnel. Therefore, human factors became the object of deep research [1; 2; 3; 5; 6; 7; 8].

Human factors involves gathering information about human abilities, limitations, and other characteristics and applying it to tools, machines, systems, tasks, jobs, and environments to produce safe, comfortable, and effective human use. In aviation, human factors is dedicated to better understanding how humans can most safely and efficiently be integrated with the technology. Human factors is a large and complex subject and a full or detailed coverage of the topic is beyond the scope of this article. The objective of this paper is to give a layman's general explanation of the history, development and application of Human Factors, particularly as it relates to safety investigations of aircraft accidents and incidents.

The practice of applied human factors was clearly being practiced in aviation some 50 years before it was given a title. The investigation of accidents and catastrophes caused by human began in the XIX century in the railway industry. In the early years of aviation, it could reasonably be said that, more often than not, the aircraft killed the pilot. That is, the aircraft were intrinsically unforgiving and, relative to their modern counterparts, mechanically unsafe. [13] However, with the birth of aviation the understanding of role of personal qualities of the pilot during the flight rose. Since it was known very early on in aviation history that the pilot

«failed» significantly more often than the plane did, most aircraft accidents were classified as «pilot error» and often the explanation went little further than that. The use of the term «pilot error» provides a simple, but often misleading explanation of a complex accident sequence.

Some would have us believe that human error and «pilot» error are synonymous. Yet, simply writing off aviation accidents merely to pilot error is an overly simplistic, if not naive, approach to accident causation. After all, it is well established that accidents cannot be attributed to a single cause, or in most instances, even a single individual [11].

In 1910 G. Musterberg introduced the term «personal factor», meaning human mistakes made during the management of aircraft. N. Zhukovskiy same year pointed out that pilot's personal characteristics were directly connected with his professional security. Eight years later it was proposed to consider personal factor during the analysis of aircraft accidents. Later S. Gellershtein in the 1930-s provided a definition to personal factor as complex of inborn and acquired physical and psychical qualities of personality, which can be connected with reasons of genesis, character of development and results of aircraft accident. [4].

The term «human factors» was used informally in literature in British Royal Air Force accident investigation reports in the 1940s, (ATSB Human Factors training material) it was not until 1957 that it was first formally used to describe the modern practice [10]. The term was used to refer to the application of scientific knowledge, concepts, models, and theories derived mainly from human science disciplines such as psychology, physiology, medicine, anthropometrics and others. The knowledge was applied to improving the efficiency of operation and the reduction of human error leading to aircraft accidents.

While views do vary, the term «human factors» has become the generally accepted term within the aviation community, and many consider ergonomics to be a narrower field of study associated with equipment design and construction to better interact with the abilities and limitations of the operators, to be a subset of the broader discipline of human factors. Essentially, the objective of human factors is to optimize the relationship between the human operator, technology and the environment.

E. Edwards defined human factors (ergonomics) in the following words: «Human factors (or ergonomics) may be defined as the technology concerned to optimize the relationship between people and their activities by the systematic application of the human sciences, integrated within a framework of system engineering»[10; p 9].

J. M. Christensen, D.A Topmiller and R. T. Gill, define human factors as follows: «Human factors is an eclectic field encompassing disciplines such as psychology, engineering, ergonomics, anthropometry and psychophysiology. Specifically, human factors is that branch of science and technology that includes what is known and theorized about human behavioral, cognitive, and biological characteristics that can be validly applied to specification, design, evaluation, operation, maintenance of products, jobs tasks, and systems to enhance safe, effective, and satisfying use by individuals, groups and organizations». [9].

While aviation had been born of civilian initiatives, it was not until the

beginning of World War I that aircraft started to be seen as a product with a real role to play rather than just as a novelty item. Prior to WWI the focus of aviation psychology was on the aviator himself, but the war shifted the focus onto the aircraft, in particular, the design of controls and displays, the effects of altitude and environmental factors on the pilot. Military requirements rapidly developed the role of aircraft as a military vehicle. In the early days of WWI aircraft were used as battle field observation platforms, but quickly became weapons of war when they were used to drop bombs and shoot down enemy aircraft. Military commanders quickly became interested in trying to reduce the number of aircraft and aircrew that they were losing as a result of their pilots «individual deficiencies». It could be claimed that these realizations gave birth to the practice of human factors in accident investigation.

It was recognized very early in the development of aviation that not all humans were as capable as each other when it came to successfully and repeatedly flying an aircraft, therefore based on many different criteria, selection processes became a more important and scientific process than ever. However, it was also recognized that even having selected the candidates with what was felt to be the necessary qualities they still make errors which lead to accidents and incidents. Many of those occurrences were attributed to a lack of training and so pilot training became a focus of limiting human performance variability, particularly as the aircraft became bigger, faster and more complicated.

While human factors continued to develop in the areas of ergonomics, pilot selection and training, it became clearer that human error and accidents in aviation were related to such processes as pilot judgment, cognition and sensory perception. While these processes all have a physiological base, they are all psychological processes. As such, human factors started to draw heavily on what is now commonly called «aviation psychology».

After World War I, the construction and operation of aircraft again became a major civilian interest. The early twenties also saw the introduction of the first civilian airlines and air mail services. During this period, human factors or ergonomics continued to develop, although as yet not formally given a separate title.

To reduce danger, and to help operators to select pilots that were better suited to instrument flying, an American, Edwin Albert Link, built the Link Trainer which today is generally recognized as the forerunner to model flight simulators which are used in training by most if not all airlines and military aviation groups throughout the world. Another significant development was in the civilian sector, where the effects of illumination on worker productivity were examined. This led to the identification of the Hawthorne Effect, which suggested that motivational factors could significantly influence human performance.

Prior to World War II, the focus was «designing the human to fit the machine» (i.e., trial and error), instead of designing machines to fit the human. With the advent of the Second World War, and armed with the knowledge of aircraft losses during the First World War, and recognizing that during the 1920s and 30s aircraft and aircraft operations had changed significantly, both the British and the Americans started to invest heavily in applying human factors knowledge to aviation operations. These efforts now not only drew on practitioners such as pilots and



engineers, but also increasingly on academic specialist from Universities.

The scope of human factors expanded rapidly, applying knowledge and techniques to better pilot selection in the form of better and more stringent medical and psychological standards. New psychometric measures were developed and devices such as flight simulators were developed and used. Research was undertaken into spatial disorientation, fatigue and pilot information processing abilities etc. However, these developments continued to focus on individual pilots. These developments while providing a wealth of new information tended to reinforce the concept of individual 'pilot error' as being the only real explanation for all accidents that did not involve a mechanical failure of the aircraft.

The two decades following the end of World War II saw the continuation of military-sponsored research, driven in large part, by the Cold War. At the end of WW2, academic research into human factors continued in a civilian context and expanded into many Universities throughout the world.

In the mid 1970s, the focus of human factors in research, investigation and line operations started to expand to consider broader human factor issues. The initial research looked at how aircraft captains allocate tasks between crew members and how crew members responded to each other. This research showed that there were many errors that occurred because of poor crew coordination. The origin of these issues could involve personality, cultural biases, communications skills and many other factors that influence the way groups of people interact with each other and how they go about managing and solving problems.

The development of CRM training initially focused on the flight crew, but it was soon realized that while communications and good resource management was critical to the cockpit, the problems between the flight crew and the other members of the crew could be just as critical. As a result Cockpit Resource Management evolved into «Crew Resource Management».

CRM as developed by Professor Robert Helmreich, at the University of Texas, is now practiced by most airlines. It is also now applied broadly from flight and cabin crew to maintenance staff and air traffic controllers, in fact any group of people who may be directly involved in the operational safety of the aircraft.

CRM is now considered to be in its 'Fifth Generation' of development and has led to a number of spin off practices. One of the main current focuses within contemporary CRM is «threat and error management» where both operating crews and management are trained to analyze errors in great detail to not only identify errors after they have been made, but also to recognize threats that can lead to errors before the error occurs. This process not only allows individuals to learn but also allows the organization to learn and help put in place affective mitigation strategies to identified threats.

With the expanded focus of human factors now considering not only the actions of individuals, but also groups of individuals, be they operators or managers of operators, a new concept and term started to develop. Investigation authorities started to use the term «systemic investigations». This term simply referred to an investigation with a broader focus. Such investigations look at the entire system that support the operation of the aircraft that may have been involved in an accident or incident, not just at those things or people who were proximal to the accident or

incident. The field has expanded with the development of the computer and computer applications.

### Conclusion

Human factors started with the development of aviation and were initially concerned only with the design of equipment and the training of pilots. It now deals with a much broader range of human science issues and has expanded its focus from individuals to entire organizations and systems. It is concerned with every level and every function within organizations that create the environment in which individuals design, construct, maintain and operate complex systems.

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## **THE HUMAN FACTOR AND LINGUISTIC ASPECTS TO ENSURE COMMUNICATION EFFICIENCY IN THE AVIATION INDUSTRY**

*The article focuses on the actual problems in professional communication in the aviation field. The authors consider linguistic aspects of human and air space interaction in different situational contexts where verbal communication plays an important role, so that communication error and misunderstanding can lead to several negative consequences.*

The fact that human factor impacts the causes of accidents and disasters is questioned more and more in the world aviation. According to the reports of international organizations on aviation safety, including Bureau of Air Safety Investigation (BASI) and Aviation-Safety.net (ASN) 70% catastrophes occur because of human error. In the professional activity in the course of development of modern technology and the establishment of complex processes the issue of specialist's false operations is obvious and becomes more and more important. In the aviation scientific literature, the problem named as a general term – the "human factor". This is the specific study which varies with the evolution of flying vehicles and improving the infrastructure of air space. When this term is commonly understood as a set of individual characteristics and qualities of a professional flight contingent that occur during the interaction of aircraft in specific situations[5]. "Human factor" is the object of study of such disciplines as engineering psychology and ergonomics, their origin is to be found primarily in the experience of the foreign, particularly American scholars. In the early twentieth century, the U.S. A. has formed the main subjects of the study areas of human interaction and technology: industrial engineering, human factors, human factors engineering, ergonomics. Today in this field effectively work Ukrainian and Russian scientists trying to improve the efficiency of the airline industry and to minimize the risk of dangerous situations.

In today's globalization actualized human role in emergency situations. Overall, the impact of technological progress on the nature of the professional activity of the person is obvious. After all, we can see the intellectualization of professional activities: increasing the number of control objects, increases the importance of organization and planning, control functions integrate in the sphere of decision-making [3]. Current researches and specialists' evaluations suggest that the factors of hazardous aviation events as follows: failure of aviation equipment – 20 – 25%; external circumstances – 10 to 15%; Human Factor – 70 – 80%. [6]. Scientists for a long time trying to outline the problematic issues in order to improve the interaction between human and technology, and most importantly – to find ways of solving problems. Researchers have proposed application of new methodological tools. In particular Y. Golikov expresses the idea of subject-object relationship

analysis that at a certain stage of technology development are the main for large-scale facilities [4].

It should be noted that to the complexity of the flight system structure when a person takes more control of technology increases the range of subjective factors, among which are urgent psychological and linguistic components, including properly organized communication between members of the flight team. Particularly significant will be the interaction of crew in emergency situations, including a personal attitude and motivation, the ability to listen to the other's opinions and follow instructions, good team thinking, the ability to deal with conflict situations, the ability to take criticism and compromise on the way to achieve a common goal. Today, increases the role of psychologists in aviation personnel training. As for the mental and physical analysis of the experts, it takes into account the realities of most professional activities, actively promote the conception of situational awareness of pilots [12]. In modern scientific articles with the aim of solving actual problems in the aviation field was outlined the latest methodological approaches, such as "problematic concept" of working the aviation system's structure, introduction to analysis the subsystems and the metasystems levels of professional work, and ergonomic design methodology of activity's operational components [6].

The purpose of this article is to consider linguistic aspects of human and air space interaction in different situational contexts where verbal communication plays an important role, so that communication error and misunderstanding can lead to several negative consequences. This approach reveals the consideration of the broader range of issues, including the psychological analysis, ethno-psychological factors of human consciousness in specific communicative situations. In our opinion this will give the possibilities to describe the ways of improving the work effectiveness of air transport system and expand the possibility of avoiding critical situations.

In the general context of human and air space interaction we can identify both verbal and non-verbal communication situations that can equally affect the quality of the aviation system. However, communication as an important factor of influence on social processes takes the priority place. Verbal communication "occurs as a purposeful process of creating, transmitting and interpreting messages by means of the speech code" [8]. The form of objectification of this phenomenon is the communicative process with member-communicant entities which come into verbal contact to achieve communication goals. In the context of our analysis, we propose to distinguish certain communicative situations and their most common members such as: **"pilot – dispatcher", "the pilot – crew", "stewardess – passenger", "the passenger – information service", "the passengers – baggage"**. We should admit that every single fragment of communication process is carried out at a particular time in a particular place according to the rules of the communicative code of a particular lingvo culture that entails a number of factors that actually make it possible causes of communication errors and misunderstandings.

During the verbal contact the communicants (participants of the communicative process) uses the system of linguistic means – verbal code. This code typically consists of three types of language resources: vocabulary (lexicon), grammar and phonology [8]. Lexicon is divided into productive (active) and

receptive (passive) and its amount of words ensures the success of communication. Grammar consists of inflections, functional words and rules for constructing statements and plays an important role in creating messages. Phonology distinguishes the meaning of words, morphemes, and sentences during speech production. It has got the structural units which are phonemes.

In the first communicative situation "**pilot – dispatcher**" is the most important role plays a message that is always oriented to a particular addressee. In this case successful implementation of communication depends on several components: the level of language resources (lexicon, grammar, phonology) that are characterized by the realities of professional activity; necessary reaction to the message by the recipient, namely feedback; channel of communication; interpretation of meanings by the addressee; valuation of statement with filters (linguistic, psychological, cultural). At the stage of pilot and dispatcher communication the terms, special professional phrases and words combinations play an important role in optimization of communication. All that provide the exhaustive information and unambiguous interpretation and perception of messages, conciseness and the specifics of the task, the wideness and completeness at the description of the situation. It is proved that the speech intelligibility and clarity of his perceptions affect both specifications channel message (line transmission of broadcasting frequencies, the degree of protection against noise, feature articulation) and a number of other factors. To these factors should be attributed a degree of uncertainty and the expectation of message, the content of expression, structure and localization in space of the source speech message, time and speed of approaching the message, the duration of pauses and so on. Thus, in the decisions of the tasks involving the highest mental functions of communication process participants. This is required to be addressed not only objective speech message transmission, but it needs proper subjective interpretation, understanding and perception.

In the aviation contingent working is extremely important the coherent team communication "**pilot – crew**". In this case, participants in the communicative act towards achieving a common strategic outcome. According to this can be essential the communication resources which are the set of speech and no speech actions of communicants. In the analysis of the communicative situation should consider the following elements of the strategy and tactics of verbal communication, and especially communicative behavior of the process. Communicative behavior is directly related to the communicative ethnic consciousness and it is the "way of communicative consciousness exteriorization"[8]. To improve the quality and efficiency of communication skills of pilot and professional team, except the verbal code, become obvious national cultural and psychological factors. Thus, anthropological, social, mental, gender, age, professional characteristics should be taken into account in the analysis of individual or social communicative consciousness. Currently, researching of mental communication categories organizes and enhances knowledge of the rules of communication implementation in a particular situational context [2]. When analyzing the teamwork of the crew in order to improve group communication type of professional should identify the following features of speech communication such as: speech communications which depends on context; situational conditionality; emotional fullness and significance; semantic

ambiguity; personal dependency, and so on.

In a situation of **"stewardess-passenger"** in addition to the above verbal factors are essential the extra-linguistic communication components, which include gestures, movements, voice effects named as nonverbal code. In this way communicants give to this code symbolic function and use it to create the messages and exchange them. However, besides the symbolic functions of non-verbal means of codes can execute pragmatic function as well. For example, to stop the transmission of any message or for a certain time to interrupt the communicative process, or deliberately draw attention on special actions. In addition, extra-linguistic means as universal codes peculiar and specific, including national characteristics, which sometimes play a decisive role in creating the communicative process. The same sign in different lingvocultures can do exactly the opposite function. Thus, in the minds of many ethnic peoples gesture nodding his head "Yes" represents the harmony, but in other language communities this sign is used to express disagreement, "No". Similarly in Western American cultures laughter often means commitment and satisfaction, but in some Asian nations smiling as non-verbal means, is used to mask the indecision and confusion of the speaker. So, the lack of ethno-cultural and lingvocultural competence, namely ignorance nationally specific meanings of nonverbal code may be one reason for cross-language communication barriers and misunderstandings that are essential for communication stage between air hostess and passenger.

The next communicative situation, **"passenger – information service, passengers – baggage"** reveals the crucial role of such a phenomena as context. In communicative linguistics context is "explicitly or implicitly expressed meanings that actually exist as part of a situation reflected in a discourse and relevant to a particular communicative act. Context is a fragment of speech communication, which is an implemented communication unit, which is subjected to analysis, and it is sufficient to establish its meaning that it receives in the statement "[8], [2]. Distinguish the linguistic context that is verbal surroundings of a separate linguistic unit and extra-linguistic (non-verbal) context that is the external factors influencing the content of the message. Nonverbal context is always accompanied by words or can replace it or be opposed to it. Researchers describe five types of context: linguistic, existential, situational, perspective, psychological [8]. Characteristically, in memory of perceptions and knowledge about particular types of situations and contexts are formed and stored in the form of specific scenarios, models, situations, concepts, stereotypes, frames. The frames "presented as structural models of knowledge related to recurring situations and linguistically reproduced in lexical relations between verbs and syntax of sentences" [1]. Frames stereotypically characterized as playable genre of speech interaction communicators, as well as a set of speech means that the speaker engaged in communicative acts, which often happen in life (at the station, airport, mail, shop, etc.) [8]. In this case it is a place of frames that the structure determines the actual place where the communicative interaction. At the stage of communication "passenger – information service, passengers – baggage" could potentially cause confusion in cross-language communication, as frames in different languages of the same events, places or activities with some differences. So communicant which speech interaction occurs in

the same frame should have a set of planned theoretical moves that will be used to achieve communicative goals.

### Conclusion

During our analysis we try to reveal some actual problems in professional communication between members of the flight team and technology with the aim of improving their interaction and common work. It can be proved that successful implementation of communication depends on the level of language resources (lexicon, grammar, phonology) that are characterized by the realities of professional activity; necessary reaction to the message by the recipient, namely feedback; channel of communication; interpretation of meanings by the addressee; valuation of statement with filters (linguistic, psychological, cultural). The terms and professional vocabulary play an important role in qualitative communication. In order to improve group communication type of professional should identify the following features of speech communication such as: speech communications which depends on context; situational conditionality; emotional fullness and significance; semantic ambiguity; personal dependency. And one of the main reason for cross-language communication barriers and misunderstandings in the aviation field can be the lack of ethno-cultural and lingvocultural competence. So, the linguistic aspects of work in aviation industry allow to define problems and their causes, and the solutions for these problems in the future.

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## COMMUNICATION IN AVIATION

*Effective communication in aviation is an essential pre-requisite to safety. The article analyses various types and forms of communication which are used in aviation today, the content, peculiarities and functions of all these forms and their importance for aviation safety.*

Effective communication is an important process in our everyday life. People must be able to communicate effectively with each other on both a personal level and a business level. Breakdowns in the communication processes can lead to misunderstandings. Misunderstandings and communication failures can cost money, loss of an important contract or a post, etc, but in aviation these misunderstandings can lead to a disaster. That's why there is no doubt that the communication process is most important in the cockpit of an aircraft than anywhere else. As history shows, a breakdown in the communication process between air crew members, a pilot and an air traffic controller is the major contributing factor in aviation accidents. It is considered to be the main cause of fatal air accidents because it is much more frequent than technical problems that could affect aircraft.

In the given article we will focus on different types and forms of communication used in aviation, their peculiarities and functions and highlight their role for aviation safety.

Several forms of communication characterize the field of aviation. D. Spinner distinguishes one-way communication and two-way communication. The former is, for example, from cockpit instruments to the pilot while the latter is also called 'interpersonal communication' and includes communication between individuals on the flight deck, in the cabin, and anyone involved in the operations, such as management and regulatory authorities [6].

M. Maddox [4] and some other authors [7] also divide communication in aviation into synchronous and asynchronous. Synchronous communication implies that the individuals exchanging information are dealing with each other in real time. The most common type of synchronous communication is the face-to-face conversation. However the participants do not have to be co-located to engage in synchronous communication. Telephone calls, instant messaging, chat rooms, and texting are all forms of synchronous communication. The synchronous verbal communication used by an airport attendant and a crew develops on a person-to-person basis. So, it is different from the verbal communication between pilots and air traffic controllers that is synchronous but has not physical presence. In this case, the tone of voice and the words issued are the most important elements. In synchronous verbal communication with the physical presence of the issuer and receiver, the non-verbal communication is also important [7].

Asynchronous communication implies that the individuals exchanging information are not dealing with each other in real time. In asynchronous

communication, the receiver typically responds to the sender after a time delay. E-mail is one of the most common types of asynchronous communication.

The most general classification of communication forms is the division into written, verbal and non-verbal communication. One of the forms of communication used in the aviation industry is **written communication**. It involves any type of interaction that makes use of the written word. In the aviation environment, a large amount of information is transmitted through written texts and that is why written communication is a common form of communication through the use of standard operating procedures, flight deck documentations, flight manuals, flight plans, checklists, operational bulletins and other documents between management and operational personnel. The use of these documents significantly influences the management and the operational personnel performance. The main benefit of these documents is to provide people involved in standard and non-standard processes of communication in aviation with the most precise, concise and direct information or instructions directly related to the situation encountered.

This communication can be one-way. There are some methods that relate in one-way communication. Aircraft maintainers use written procedures every day. Some of these procedures contain checklists designed to help complete tasks in an orderly and serial manner. The checklist or documents send the information but it is up to the pilots to interpret the message and then take actions based on their understandings. Thus, aircraft documentation is an essential tool to achieve the goal of safe flight. That is why the ability to write and understand these documents is vital for the flight safety.

The most critical form of communication within the aviation operational context between ATC (Air Traffic Control) and pilots, management and operational personnel is verbal interaction or **verbal communication**. Verbal communication can take place through various channels, such as face-to-face, telephone, radio, etc. The ability to communicate effectively will contribute to the reduction of aviation accidents. Verbal communications is one major media for communicating within the aviation operational context, and it needs to be improved along the practical drift for all employees. Communication errors between air traffic controllers and pilots is the main factor into aviation disasters, and it should be considered with great concern.

In a general meaning, verbal communication is the most common communication medium, because it is easy to perform. Verbal communication is an important part of the aircraft operations as well, as it happens everywhere from cabin crews greeting passengers onboard to pilots communicating with air traffic controllers, and between ground departments, etc.

First of all, let's consider the content of term "speech". According to H. Orlady and L. Orlady, speech is formed by the four primary characteristics (intensity, frequency, harmonic composition or quality, and the time or the speed with which words are spoken) which shape the meaning and emotions of the information being communicated [5]. Intensity is measured in decibels and results in the sensation of loudness. Sounds generally become annoying at about 80 to 90 dBs and can become damaging at 85 to 90. Frequency is measured in Hertz and gives rise to the sensation of pitch. Voice frequencies range from 1000 to 9000 Hz; and uninterrupted exposure to loud noises can cause hearing loss. Pilots who have spent

many years in noisy cockpits develop a characteristic hearing loss of higher frequencies because of long exposure to the noisy environment. Harmonic composition often means the quality. A change in the harmonic composition of speech can change the expression or meaning of a phrase, this quality is important in aviation. The harmonic composition of speech either from the crew or from the air-traffic controller can convey urgency as well as just conveying a routine communication. Time is related to the rate at which the words are spoken, the length of the pauses, and the time spent for different sounds, this characteristic is particularly important in ATC communications [5].

Communication between pilots and air traffic controllers is crucial. In fact, airplanes always need support from air traffic controllers so that safety often depends on an effective exchange of information between them and pilots. Although modern high-tech equipment used by operational personnel manages flight operations, the importance of radio-communication remains significant.

The quality of verbal communication between ATC and pilots has a direct effect to the safety and efficiency of flight operations, therefore ICAO has developed “The ICAO alphabet” to regulate the language used to communicate and these standard alphabetical words have been advised to increase intelligibility, especially when communication conditions are poor, and therefore reduce the risk of misunderstanding.

Moreover, the communications procedures should be in accordance with Volume II of Annex 10 “**Aeronautical Telecommunications**”, and pilots, ATC personnel and other ground personnel should be thoroughly familiar with the radiotelephony procedures. Here are some examples of such words and phrases and their meanings: AFFIRM (meaning “Yes”), APPROVED (“Permission for proposed action granted”), CLEARED (“Authorized to proceed under the conditions specified”), HOW DO YOU READ (“What is the readability of my transmission?”), I SAY AGAIN (“I repeat for clarity or emphasis”), READ BACK (“Repeat all, or the specified part, of this message back to me exactly as received”), ROGER (“I have received all of your last transmission”) [2].

The method that is commonly used between flight crews and air traffic controllers is readback. It is a form of verification from the receiver to the sender of information that the information has been accurately transmitted. The example below illustrates the application of this procedure:

Station: TWA NINE SIX THREE MADRID

Aircraft: MADRID TWA NINE SIX THREE

Station: TWA NINE SIX THREE MADRID – ATC CLEARS TWA NINE SIX THREE TO DESCEND TO NINE THOUSAND FEET

Aircraft: CLEARED TO DESCEND TO NINE THOUSAND FEET – TWA NINE SIX THREE

Station: MADRID [2].

Verbal communication between the air crew and the air traffic controller has significant safety implications. Because of these safety considerations, a formal structure and restricted vocabulary have evolved to ensure that unambiguous messages are sent and received.

Thus, one of the obvious factors affecting interpersonal verbal

communication is language. In particular, if the spoken language of the sender and that of the receiver differ, the chances of misinterpreting the message are fairly high. Unlike the verbal communication that occurs among flight crews and air traffic controllers, which always takes place in English, there is no international agreement regarding a common language for maintainers. Even among people having a conversation in the same language there is ample opportunity for ambiguity, confusion and misinterpretation [4].

One more form of information exchange often used in flight procedures is **non-verbal communication**. As its name implies, non-verbal communication is any method of conveying information that does not involve speech. It is an essential part of all person to person situations. Non-verbal methods commonly include facial expressions, body language, and even the setting chosen for the information exchange. Non-verbal elements affect only synchronous face-to-face communication.

Body language is the dominant form of non-verbal face-to-face communication, which is highly intuitive and very effective. It includes gestures, postures and facial expressions by which a person manifests various physical, mental, or emotional states and communicates nonverbally with others. Body language requires that the people who are communicating can see each other. In aviation, body language is employed in procedures requiring hand signals from the ground to the cockpit, between crew members during certain routine operations or even between the cabin crew and passengers during or after an encounter with air turbulence. During taxiing operations not all aircraft are met by ground staff with headsets. In this case, the signals can be also used.

Without a language barrier and being clear and concise, these signals can also eliminate some problems of verbal communication. In fact, not all staff working around aircraft are supposed to know English very well, while they are more likely to understand hand signals. The use of non-verbal communication between the cockpit and ground crew is indeed a tried and tested method of communication. Moreover, particularly in case of an emergency, hand signals cannot be considered any less safe than using headsets, which are not always 100% reliable [3].

Visual communication between the ground marshaller and the pilot is a very complex issue for the safety of marshalling aircraft and helicopters. Communication of the visual kind in this context requires a level of common knowledge shared by both the pilot and the ground marshaller. There is a list of standard signals set out by ICAO that pilots and ground marshallsers use to communicate. Some examples of these signals are represented below:

1. *“Straight ahead”* (Bend extended arms at elbows and move wands up and down from chest height to head).
2. *“Turn left”* (With right arm and wand extended at a 90-degree angle to body, make “come ahead” signal with left hand).
3. *“Normal stop”* (Fully extend arms and wands at a 90-degree angle to sides and slowly move to above head until wands cross).
4. *“Start engine(s)”* (Raise right arm to head level with wand pointing up and start a circular motion with hand; at the same time, with left arm raised above head level, point to engine to be started) [1].

Since the safety of any flight depends on effective development of such standard procedures, it is important to make all the personnel involved in such operations more and more aware of the fact that the non-respect of standard signals may create misunderstandings and have disastrous consequences.

### Conclusion

Communication in aviation is a complex system consisting of verbal, non-verbal and written communication. We also distinguish some other forms such as: synchronous and asynchronous (depending on whether the information is exchanged in a real time mode or with some time delay), one-way or two-way communication (only in one direction or interpersonal communication, respectively), formal and informal, etc. Verbal communication takes place through various channels (face-to-face, telephone, radio, etc), written communication often requires electronic communication link and non-verbal communication (body language, in particular) requires that all parties of communication can see each other. Because of the extreme importance of accurate information exchange in aviation, the main objective of people involved in such activities should be to tune all these forms in order to transmit messages in the fastest and the most effective way. The more accurately messages are exchanged through complementary forms of communication, the more likely flight safety will be guaranteed.

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## **MOTIVATION FOR TRAINING OF FUTURE SPECIALISTS IN AVIATION INDUSTRY**

*In this paper motivation is considered as the basis of training specialists in aviation industry. Various groups of motives are considered and the importance of the formation of cognitive and professional motives is emphasized. On the basis of research results of freshmen's motivation recommendations for teachers are provided.*

Attitudes to chosen profession and to specific professional tasks determine the success of business. Different attitudes make for purposeful actions of a man in the workplace. In the basis of professional activity lies a system of motives. Motives encourage for intensification of human actions and direct behavior. Motivation is a system of factors that determine behavior. These factors are the needs, motivations, goals, intentions, aspirations, etc. Motivation explains the reasons of employees' behavior in the workplace, their focus and level of activity.

In the basis of professional human motivation are internal and external causes.

Internal causes are due to psychological characteristics of personality. They are needs, goals, intentions, desires, interests, etc.

External causes are the objective circumstances of professional activity. It is a system of incentives.

The aim of higher education is not to equip the graduate with knowledge but to form a professional capable of solving various problems within the profession successfully. Determinant component of organization of training activities is motivation. Motive is a complex psychological formation that leads to conscious actions and deeds. There are different groups of motives in studying.

1. Social motives – a human desire to improve social status by means of education.

2. Stimulating motives – these are external requirements, such as requirements from parents, teachers, members of the team.

3. Cognitive motivations are realized through getting pleasure from the process of learning and its outcomes.

4. Professional motives appear in student's effort to get solid professional training for efficient work within their profession.

The last two groups of motives are related to the content and process of learning and a desire to master a certain activities. Formation of these of motives has to become a major objective for the universities.

Ukrainian students from the first to the third year of studies have no final certainty about the professional choice. In order for students to study effectively, they must be interested in studying. It is proved that positive attitude to learning provides successful mastery of knowledge and skills. High positive motivation can

compensate for the lack of academic abilities. But not vice versa. High level of skills can not compensate for the lack of learning motives and therefore can not lead to academic excellence.

There can be several motives for any activity. There are major and minor motives. The major motivation in educational activities of first year students must be educational and cognitive interest. Only then the educational activity will be effective. Interest – is the motive force of human behavior and the kind of indicator of individual's aspiration.

Modern science is actively investigating the problem of motivation of first year students to studying. The key aspect is the study of factors that influence the forming of positive educational and cognitive students' activity.

The leading method of research is studying the motives in learning of first year students at the university. This method consists of three scales:

- “acquiring knowledge” (the desire to acquire knowledge, curiosity);
- “mastery of the profession” (the desire to acquire professional knowledge and form professionally important qualities);
- “graduation” (the desire to get a diploma in formal learning, the desire to find workarounds in the preparation for exams and tests).

Research conducted at the National Aviation University showed that only 20% of students have a motive to gain professional knowledge. Thus half of first year students do not intend to acquire chosen profession, do not even conceive the content of future professional activity. Thus, to obtain diploma of higher education intend 80% of students.

Another method of studying the motives of learning activities of students is that students choose from a list of suggested learning motives 5 most important to them. The most chosen motives of first year students of National Aviation University are:

- “to be a highly qualified specialist”;
- “to get a diploma”;
- “acquire deep knowledge”.

On the basis of these two studies it can be confirmed that first-year students want to be experts in their field, but do not realize what it means, what efforts they must make to become specialists in their field. Half of the students showed the motive of cognitive interest. Considerable part of students has social and incentive motives to get the approval of parents and others, to achieve teachers' respect.

Such structure of motives of educational and professional activities reflects the state of the modern school education, which is not aimed at the formation of students' interest in acquiring knowledge. It can be claimed that school education is lacking the necessary conditions for the formation of theoretical thinking. However, the problem of school education is the subject of other studies.

Due to the fact that most first-year students' cognitive interests are not sufficiently developed there is need in formation of the motivational foundations of educational and professional activities. This problem may be solved by organization of educational process on basis of problematic studying.

Problems with studying – is the main stimulus that affects the formation of cognitive needs of students and of particular importance this need becomes at the

first year of studies. It is on the first and second years of studies when the foundation of the profession which is a professional interest is laid.

Students while studying in higher educational establishments form a definite attitude to various subjects. This attitude is caused by various reasons.

1. The importance of the subject for occupational training.
2. The interest in this discipline.
3. The quality of teaching.
4. The degree of difficulty of mastering this discipline.
5. Mutual relations with the teacher of the discipline.

All these are motivators of studying.

The main factors that affect the formation of motives to learning are as follows:

- content of educational material,
- organization of learning activities
- collective forms of learning activities
- assessment of learning activities and teaching style of a teacher.

Based on these data, we can provide some recommendations for teachers of the first year students.

At first classes with freshmen it is important to make the content of educational material clear, base it on their past experience, to evoke positive emotions. It is important to discuss with the students the value of content of discipline for future profession. Considerable part of freshmen who come to study at universities know little about the profession they have chosen. Therefore, the course "Introduction to the specialty" primarily shows the essence of the profession. It is necessary to build this course so that students could see in practice the application of knowledge.

The teacher should use group forms of studying. Working in a group affects the formation of motivation for studying since it makes all students be active, keep up with the others. Besides, group classes teach students the ability to communicate.

Assessment of knowledge of students seriously affects the motivation for learning. The assessment should be deserved by some educational work, performance of tasks. It is useful to encourage students to self-assessment of knowledge, to assessment of knowledge of their comrades.

Assessment system of students' knowledge should be clear, understandable, reasoned and transparent. It is important for students to be involved in assessment of their own knowledge.

Considerable part of students have not enough developed learning skills: the ability to take notes, build reports for classes, highlight main in the text, correctly organize and distribute study time, and others.

So maybe it is possible to establish for the first year students special training programs, which would include the following components:

- teaching note-taking;
- development of cognitive processes: memory, thinking, concentration, imagination;
- learning terminology of certain discipline;
- classes aimed at the development of communication skills.



It is particularly important that the forming of positive studying motives is affected by communication style and attitude of the teacher to the students.

### Conclusion

Motivation is the basis for training professionals of any profession, including the aviation industry. There are different groups of motives for learning, but the most important should be the cognitive and professional motives. The study of motivation of freshmen of Ukrainian universities showed that students want to be experts in their field, but do not realize what it means. Therefore, the teachers of various disciplines who teach at the first and second years have a difficult task – to generate interest to the chosen profession.

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## THE PROBLEMS OF THE AERONAUTICAL TEXT MACHINE TRANSLATION ADAPTATION

*The article analyzes the main problems of the machine translation adaptation based on the English text of the ISO – AS-9000 Standard. The Aerospace Quality Management System.*

Upon the globalization and the integration of Ukraine into European and global community space an issue of forming the regulations and rules of the aviation industry that will meet the international standards is emerging.

The monitoring of the documents and legal acts operating in Ukrainian aircraft structures revealed some set of problems. We can conclude that the main issue in this specific area is the active use of machine translation in modern aviation industry to translate the international documents to Ukrainian.

Experts don't always follow the sequence of formal operations for analysis and synthesis of machine translation. Thus, this also leads to violation of linguistic rules. All these mentioned issue are relevant in our study. The purpose of the article is to analyze main problems of the machine translation adaptation, based on the English text of the ISO – AS-9000 Standard. The Aerospace Quality Management System.

Machine translation is a translation based on the use of machine-defined and constant for the certain type of material correspondences between the words and the grammatical phenomena in different languages (both closely related and unrelated). Modern IT technologies offer a broad selection of programs that facilitate the translation. They can be divided into two main groups: electronic dictionaries and machine translation systems. Machine translation systems provide consistent translation, taking into account morphological, syntactic and semantic relationships between different parts of the sentence [1].

Machine translation programs have been created to meet the needs of the various specialists in prompt translation of different kinds of information. Translation, made by the computer, is not perfect. But the text, which is received as a result of machine translation, allows us to understand the essence of the translated document and to facilitate the further processing of it. It's clear, that this document needs further stylistic, grammatical and spelling correction. However, we should remember, that modern machine translation programs are well adapted to deal only with business papers, instructions, orders, e-mails, web pages and so on.

The idea of machine translation was first proposed by Charles Babbage. In 1836-1848 he has developed a project of the digital analytic machine. However, the first public demonstration of the machine translation was held only in 1954. That event gave an opportunity to develop machine translation in the Soviet Union. At that time prominent scientists e.g. D. Paniv, I. Belska, N. Trifonov and L.Koroliov

had been working on the machine translation programs.

In late 50's our domestic and foreign scientists tried to create the theoretical foundations of the machine translation. New branches of linguistics had emerged – Structural, Applied and Mathematical Linguistics. Such mathematicians as O. Lyapunov, V. Uspensky, O. Kulagina and such linguists as V. Rosenzweig, Noam Chomsky, P. Kuznetsov, O. Reformatzky, I. Melchuk played an important role in that development process.

Contemporary scientists – V. Anisimov, T. Vozniak, R. Panchuk, M. Fedoriv – explore the problems of machine translation in their works as well.

As Matsak Zh. and Skorobogatova T. mention, "modern machine translation has some unique features: the presence of the words, that are not translated, and errors, that occur while transferring the original foreign text onto the media carrier. Grammatical and stylistic shortcomings of the translated text exist because of the errors in machine grammar "[2].

In our study, based on the machine translation of the English text of ISO – AS-9000 Standard. The Aerospace Quality Management System, we will analyze main advantages and disadvantages of such text processing. Thus, for the analysis we compare two texts.

«AS 9000 – the Aerospace Quality Management System. When the ISO 9000 standard was first introduced, the aerospace industry took the program to heart and began reforming their quality management systems to comply with the standard. What many major manufacturers and suppliers soon discovered, however, was that the ISO standard did not go far enough in addressing the additional safety, risk management, and regulatory requirements of their business, so they augmented it with additional quality standards of their own. The result was a hodge-podge of company-specific quality management systems, many with competing, and in some cases contradictory, requirements, leaving suppliers and component vendors holding different sets of documents for each company with whom they did business».

The first effort at rectifying this issue was completed in 1997, when several of the big aerospace industry players, including Grumman, Rolls Royce, Lockheed-Martin, and General Electric got together with others to try and write a standard specific to their industry. This standard, titled AS 9000, was based on ISO 9001:1994, but added quality standards and best practices from across the industry.

AS 9000 was barely off the printing presses when a larger group of sector players and international organizations, including the Aerospace Technical Committee of the International Organization for Standardization (ISO), the European Association of Aerospace Industries (AECMA), and the American Aerospace Quality Group (AAQG), with oversight from the International Aerospace Quality Group (IAQG), sat down and began to rewrite the standard again. The final result was the AS9100 standard, published by the Society of Automotive Engineers (SAE) International in 1999. It was the first comprehensive standard written for the aerospace industry.

The driving factor behind the rewrite was to make it a truly global standard, touching all parts of the aerospace industry to keep costs down while maintaining compliance and ensuring quality. The new version helped to placate regulatory agencies like the Federal Aviation Administration (FAA) and others that felt that the

ISO standards did not go far enough to ensure the safety and quality of the industry. To complement the ISO standards, AS 9100 encompassed all military and non-military sectors as well as the space and defense industries.

«AS 9000 – система аерокосмічного управління якістю. Коли стандарт ISO 9000 був вперше представлений, аерокосмічна промисловість взяв програму до серця і почав реформування своїх систем менеджменту якості, щоб відповідати стандарту. Те, що багато великі виробники і постачальники незабаром виявив, однак, було те, що стандарт ISO не йде досить далеко у вирішенні додаткову безпеку, управління ризиками, і нормативних вимог свого бізнесу, тому вони доповнені його стандартам додаткові якості самостійно. Результат був мішанина систем конкретної компанії якості управління, багато з конкуруючими, а в деяких випадках суперечливі, вимоги, залишаючи постачальників і виробників компонентів проведення різних наборів документів для кожної компанії, з якими вони зробили бізнес.

Перша спроба на виправлення цієї проблеми було завершено в 1997 році, коли кілька великих гравців аерокосмічної промисловості, у тому числі Grumman, Rolls Royce, Lockheed-Martin, і General Electric отримали разом з іншими, щоб спробувати написати стандартний характерних для їхньої галузі. Цей стандарт, під назвою AS 9000, була заснована на ISO 9001:1994, але додав, стандартні якості та передовий досвід у галузі.

AS 9000 був ледь зрушили з друкарських верстатів, коли велика група гравців сектора і міжнародних організацій, в тому числі аерокосмічної технічного комітету Міжнародної організації по стандартизації (ISO), Європейської асоціації аерокосмічної промисловості (AECMA), і американський Aerospace Group якості (AAQG), під наглядом Міжнародного Aerospace Group якості (IAQG), сів і почав переписувати стандарт знову. Остаточний результат був стандартним AS9100, опубліковані Товариством інженерів автомобільної промисловості (SAE) Міжнародної в 1999 році. Це був перший всеосяжний стандарт написаний для аерокосмічної промисловості.

Рушійною фактором переписати було зробити його по-справжньому глобальний стандарт, торкаючись всіх частин аерокосмічної промисловості для зниження витрат при збереженні дотримання та забезпечення якості. Нова версія допомогли заспокоїти регулюючі органи, як Федеральне управління цивільної авіації (FAA) та інші, які вважали, що стандарти ISO не йде досить далеко, щоб забезпечити безпеку і якість цієї галузі. На додаток до стандартів ISO, AS 9100 охоплює всі військові і невійськові сектора, а також космічної та оборонної промисловості».

Let's analyze the errors of the translation derived.

The program usually makes a literal translation of the original text, that leads to the various types of errors, including mistakes in the content. For example, the phrase «took the program to heart» is translated as " взяв програму до серця"; «Whom they did business» – «вони зробили бізнес», that does not meet requirements of formal and/or business style.

Grammatical errors also take place in such translation significantly. For example, first of all, non-correct use of the grammatical form of number – " виробники і постачальники незабаром виявив, " "кожної компанії, з якими вони

зробили бізнес", " стандарти ISO не йде досить далеко". Secondly, there are errors in the selection of the gender forms. For example, "цей стандарт...була заснована", "рушійною фактором". These errors can be explained by the fact that the translating programs don't take into consideration grammatical features of different languages and can not maintain its compliance in the translation process. Thirdly, the rules of using appropriate grammatical forms of different parts of speech in a particular context are usually violated. For example, "всі військові і невійськові сектора", "перша спроба на виправлення цієї проблеми було завершено" and so on. Finally, the program doesn't avoid tautology, that also leads to stylistic errors. For example, "щоб забезпечити безпеку і якість цієї галузі".

Thus, the result of machine translation is only a primary material, very imperfect for sure. It's a subject for further careful processing. As a result of such translation only the skeleton of the future document has been derived, it's a literal transferring of the original text. The program usually selects most frequently used names from all the synonyms in the electronic dictionary. It is clear why such translation doesn't satisfy all the demands of the specialist in the aviation industry.

The solution to this problem can't be found by this research only. This article doesn't solve the whole spectrum of the problems in this area. In any case any specialist should have at least basic skills in certain language– to edit and complete machine translation. Without a doubt, the successful solution to all the problems of machine translation requires the cooperation of highly qualified professionals – both in applied mathematics and in linguistics.

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## **PROVIDING PROFESSIONAL RELIABILITY OF THE FLIGHT CREW MEMBERS**

*The article deals with the problem of providing professional reliability of the flight crew members. It explains the essence and importance of training and retraining these specialists of a new quality – the intellectually mobile specialists prepared for life-long learning in their field; capable of changing quickly the types of intelligence activity without reducing its productivity and ready to make complicated choices in changing circumstances.*

At present the system of air transport is undergoing fundamental transformation, in which the constant modernization of the aviation equipment plays an important role. Analysis of the professional literature and documentation of the Air Transport Administration shows that in this process it is training the flight crew members that represents a great challenge, especially considering the advanced requirements of the International Civil Aviation Organization (ICAO). The human factor issue is one of the most major problems in aviation. A human being is the most vulnerable part of any technological process. In aviation the human factor issue is considered to be more acute than in other dangerous fields because of tough demands set up for human operator of sophisticated control systems.

Human factor is a combination of mental, physiological, biomechanical, anthropometrical and other human features which are determined by the criteria of human to machine compatibility [1, 2, 3]. The concept of “human factor” in piloting the airplane represents the dependence of human activity on constructive and technological parameters of the machinery applied and involves all variables that influence the reliability and efficiency of pilot to machine integration, namely: mental and physiological characteristics inherent to all people; individual capability limitations which become apparent under special conditions of a certain pilot interaction with the controlled object; limitations inherent to all pilots when objective complications are available [4].

According to the scientific reports of International seminars and meetings on the issue of human factor in aviation, 86% aviation accidents were caused by human factor, among which 49% were caused by poor pilot training and 37% – through dispatchers’ fault [5, P. 26].

The analysis of the reports on the aviation accidents happened for the past 10 years, made by the Air Transport Administration of Ukraine, shows that one of the reasons of a number of aviation accidents and even aircraft disasters is either the violation of crew integration, or misuse of airplane equipment, or failure of this equipment and disability of pilots to identify it. In fact, during the mentioned period human factor contributed to 135 aviation accidents, which accounts for 78% of their

total number. This percentage includes the incidents that took place because of the violation of crew integration (14%) [6].

Thus, the level of training flight crew members did not appear to be sufficient that resulted in sharp increase in the number of aviation accidents, material losses for the past 15 years amounting to more than 4 billion dollars.

A thorough analysis of the Air Transport Administration documentation and other sources has shown that the critical problem of the process of modernizing aviation is to improve the training of specialists at higher education institutions for civil aviation and their further retraining, as providing flight safety is the key element of maintaining the viability of civil aviation. Providing safety is considered to be the main objective of the International Civil Aviation Organization (ICAO).

Human factor in aviation was and has been investigated by such Ukrainian and foreign aviation psychologists and educationalists as B. Aliakrynskiy, D. Gander, N. Gorbach, K. Platonov, C. Gellershtein, V. Ponomarenko, R. Makarov, C. Leichenko, B. Lomov and others. They all pointed out the existence of a number of scientific problems.

One should mention that the traditional system of training aviation personnel at higher education institutions for civil aviation and their further retraining in market economy does not sufficiently meet present-day airplane performance requirements, especially during the period of their constant modernization as well as possibility for personnel to fly different types of aircraft. The level of training flight crew members turns out to be insufficient, and the chain of recent human-error caused mishaps confirms this statement.

The National Doctrine of Education Development [7] states that the personality training for successful professional activity in the XXI century requires productive skills, which is possible only if the higher education system is transformed into personality-oriented one, when professional disciplines taught at universities do not only coexist within a training programme but also are interdependent and complementary to curriculum. In this way the foundation for further advanced training is laid.

The efficiency of the aviation personnel training system and flight crew members in particular is connected, first of all, with the solution of challenging tasks of professional activity. For example, to solve effectively non-typical professional tasks a future pilot has to learn how to independently choose appropriate personal knowledge and skills and use them in certain situations under certain conditions. Then, while retraining, a pilot has to use his profound background for continuous professional improvement. Another example concerns both professional training and retraining of flight engineers due to their possibility to work on different, maybe, more up-to-date types of aircraft. It requires such an integral professional skill that is based on the developed creativity and heuristic capabilities, expanded knowledge and skills to operate aviation and electric radio equipment underlying flight safety.

The appropriate realization of the modern branch standards of training flight crew members stipulates coherence and coordination of the disciplines content, which, in its turn, will ensure the optimal results. Furthermore, the necessity to develop in students of higher education institutions for civil aviation the ability to communicate skillfully in professional situations, to acquire interpersonal contacts,

especially, to perform communication within the flight crew has become of crucial significance.

Thus, an extremely vital problem of professional reliability of the flight crew members and the ways to its solution, especially while developing professionally important skills, qualities and, in particular, the problem of the reliability in decision-making and implementing decision process in specific and critical situations, require complex consideration.

Professional reliability, according to R. Makarov, is considered by us to be a sustainable integration of motivational, emotional, intellectual, mental and physiological, psychological and physical components of the personality activity which are aimed at the effective performance by a pilot of his professional functions in extreme modes at predetermined time.

In this connection, developing intellectual mobility of the flight crew members as their ability to change quickly the types and forms of intelligence activity without reducing its efficiency and productivity is becoming extremely important. After studying the results of scientific investigations on the problem of mobility (L. Khorunzha, G. Egorova) we define intellectual mobility as an integrated quality of a personality that combines intellectual capabilities and personality qualities in a system which ensure the readiness of a specialist to find quickly, process and apply information, to make decisions and act promptly in conventional and unconventional situations, to implement effectively the acquired knowledge in practice, and choose the best ways and means of solving both reproductive and creative tasks.

One should mention here that mobility is often limited, in the professionals' debates, to the physical mobility, that is to say to travelling, studying and working abroad or just at different places, on different apparatus. However, thanks to digital revolution, mobility is becoming more and more "virtual", it facilitates cooperation, synergy, cross-fertilization; people work and act locally but think globally, internationally. Mobility, first of all, can be linked with mental flexibility and innovative thinking, and in our opinion, it is intellectual mobility that is the base of the personality mobility, which shows itself in its other dimensions: professional, social, cultural, methodological, technological.

In the world of change, a singular specialist can be someone who knows more and more about less and less, someone inadequately prepared to acquire new forms of expertise in professional life and unable to adapt to new circumstances. It is important for students to find themselves, for example, in conversational seminar contexts, imaginatively occupying worlds they might not finally choose to inhabit and considering ideas they might not finally accept. Students should be taught to think both within and beyond the framework of a selected discipline, ready to ask the unexpected question and risk getting the unanticipated answer, able to situate specialized knowledge in the context of sophisticated general education perspectives. In other words, stimulating the mobility of the minds, being the key issue for the educational programs, will help to develop the intellectual mobility that enables them to make complicated choices in changing social and professional circumstances.

Taking everything into account, we state that the process of the



improvement of the professional training and retraining of the flight crew members is certain to be the process of enrichment, broadening and deepening available knowledge and skills, which can be realized only if the essential regulations of theoretical background, such as the law of succession of knowledge and skills, are followed, and if both demands of professional activity and personal needs of single specialists are met so that their professional reliability is continuously provided.

Besides this law, one should reconsider the existed system of the professional training and retraining of the flight crew members in order to provide optimal structuring of its content taking into account the conditions of further pilot's professional activity that is considering time-perspective orientation.

### **Conclusion**

To provide professional reliability of the flight crew members it is essential to train specialists of a new quality – the intellectually mobile specialists. They are prepared for life-long learning in their field; they are able to change quickly the types of intelligence activity without reducing its productivity and ready to make complicated choices in changing circumstances. Only then the process of the improvement of the professional training and retraining of the flight crew members can be considered as the process of enrichment, broadening and deepening available knowledge and skills, which can be realized only if theoretical regulations are followed and both demands of professional activity and personal needs of a single specialist are met.

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## **LANGUAGE COMMUNICATION DIFFICULTIES IN AVIATION**

*This article will briefly explore the role of communication in aviation safety, especially as communication functions to provide information, establish interpersonal relationships, activity, monitor conditions, and as a management tool. The article analyses reasons why people commit unsafe acts can serve as helpful guides in selecting. Several issues relating to language communication difficulties are reviewed in real-life professional communication.*

Language communication difficulties are an important contributor to stress and should be dealt with in preparing pilots for flight-related duties. Some problem areas are: English ATC for those to whom English is not a native language; differing English accents used by ATC in different geographical areas (even within countries); and flight crews comprising individuals with differing language abilities. Effective communication has been a topic of discussion for many years. With the increasing globalization of air carriers and corporate operators, and with the increased hiring of crew members whose native language may not be that of the employing organization, the potential for misunderstanding and miscommunication is great. In addition, some ATC controllers' lack of fluency in English contributes to the communications barrier. Although pilots and controllers can function effectively in standard phraseology, they may not be able to communicate effectively in an emergency. The problem ranges from difficulty in understanding heavily accented English to a total lack of comprehension. While evidence of accidents and serious incidents caused by language difficulties is elusive, the heavy dependence of the system on the quick and efficient voice transfer of information is at greater risk if this information is miscommunicated, misunderstood or not transmitted at all.

Taking into consideration aviation's high-risk environment, communication issues such as ambiguity of selected terms, aviation English, conflicting linguistic features and non-native English instruction for commercial aviators and air traffic controllers are important to strengthening safety across the globe. The question raised is what steps authorities and pilots/controllers need to take in terms of necessary precautions, and what systems of communication should be altered. The role of having a standardized language also needs to be addressed. Examples from incidents in the air and on the ground will highlight these concerns. The result of many studies by linguists and aviation authorities has amounted to a number of viable options for solution to communication problems. The most interesting and complex of these solutions is the idea that computer interfaces could replace controller tower operation and potentially be used to process information from pilots and instruct in a way that allows little to no confusion or possible ambiguity. Evaluating and prioritizing features of communication most necessary for safer and more effective operations along with testing of new communication methods is certainly the next

step for researchers. Taking into consideration aviation's high-risk environment, communication issues such as ambiguity of selected terms, aviation English, conflicting linguistic features and non-native English instruction for commercial aviators and air traffic controllers are important to strengthening safety across the globe. The question raised is what steps authorities and pilots/controllers need to take in terms of necessary precautions, and what systems of communication should be altered. The role of having a standardized language also needs to be addressed. Examples from incidents in the air and on the ground will highlight these concerns. The result of many studies by linguists and aviation authorities has amounted to a number of viable options for solution to communication problems. The most interesting and complex of these solutions is the idea that computer interfaces could replace controller tower operation and potentially be used to process information from pilots and instruct in a way that allows little to no confusion or possible ambiguity.

Communication has long been suggested as a critical issue in all aspects of human interaction. The above example from the ASRS database amply illustrates just how critical communication is in aviation and aviation safety, from the cockpit-controller interface to coordination in the cockpit to cockpit-cabin interaction to the management of safety and creation of a safety culture.

Safety culture research has the overall goal to identify and optimize the factors that affect human performance in maintenance and inspection. The focus initiates on the technician but extends to the entire engineering and technical organization. Research is optimized by incorporating the many disciplines that affect human factors and help to understand how people can work more efficiently and maintain work performance. By understanding each of the disciplines and applying them to different situations or human behaviors, we can correctly recognize potential human factors and address them before they develop into a problem or create a chain of problems that result in an accident or incident.

Clinical psychology includes the study and application of psychology for the purpose of understanding, preventing, and relieving psychologically-based distress or dysfunction and to promote subjective well-being and personal development. It focuses on the mental well-being of the individual. Clinical psychology can help individuals deal with stress, coping mechanisms for adverse situations, poor self image, and accepting criticism from coworkers.

Experimental psychology includes the study of a variety of basic behavioral processes, often in a laboratory environment. These processes may include learning, sensation, perception, human performance, motivation, memory, language, thinking, and communication, as well as the physiological processes underlying behaviors, such as eating, reading, and problem solving. In an effort to test the efficiency of work policies and procedures, experimental studies help measure performance, productivity, and deficiencies.

Anthropometry is the study of the dimensions and abilities of the human body. This is essential to aviation maintenance due to the environment and spaces that AMTs have to work with. For example, a man who is 6 feet 3 inches and weighs 230 pounds may be required to fit into a small crawl space of an aircraft to conduct a repair. Another example is the size and weight of equipment and tools. Men and

women are generally on two different spectrums of height and weight. Although both are equally capable of completing the same task with a high level of proficiency, someone who is smaller may be able to perform more efficiently with tools and equipment that is tailored to their size. In other words, one size does not fit all and the term “average person” does not apply when employing such a diverse group of people.

The technical definition for computer science is the study of the theoretical foundations of information for implementation and application in computer systems. How this relates to aviation maintenance is a lot simpler. As mentioned earlier, AMTs spend as much time documenting repairs as they do performing them. It is important that they have computer work stations that are comfortable and reliable. Software programs and computer-based test equipment should be easy to learn and use, and not intended only for those with a vast level of computer literacy.

Cognitive science is the interdisciplinary scientific study of minds as information processors. It includes research on how information is processed (in faculties such as perception, language, reasoning, and emotion), represented, and transformed in a nervous system or machine (e.g. computer). It spans many levels of analysis from low-level learning and decision mechanisms to high-level logic and planning. AMTs must possess a great ability to problem solve quickly and efficiently. They constantly have to troubleshoot a situation and quickly react to it. This can be a viscous cycle creating an enormous amount of stress. The discipline of cognitive science helps us understand how to better assist AMTs during situations that create high levels of stress so that their mental process does not get interrupted and effect their ability to work.

Safety engineering assures that a life-critical system behaves as needed even when the component fails. Ideally, safety engineers take an early design of a system, analyze it to find what faults can occur, and then propose safety requirements in design specifications up front and changes to existing systems to make the system safer. Safety cannot be stressed enough when it comes to aviation maintenance, and everyone deserves to work in a safe environment. Safety engineering plays a big role in the design of aviation maintenance facilities, storage containers for toxic materials, equipment used for heavy lifting and floor designs to ensure no one slips, trips, or falls. In industrial work environments, the guidelines of the Occupational Safety and Health Administration (OSHA) are important.

Medicine is the science and art of healing. It encompasses a variety of health care practices evolved to maintain and restore health by the prevention and treatment of illness. Disposition and physical well-being are very important and directly correlated to human factors. Just like people come in many shapes and sizes, they also have very different reactions to situations due to body physiology, physical structures, and biomechanics.

Understanding organizational psychology helps aviation maintenance supervisors learn about the points listed below that, if exercised, can enhance the work environment and productivity.

- Rewards and compensations for workers with good safety records.
- Motivated workers that want to do well and work safely.
- Unified work teams and groups that get along and work together to get the

job done right.

- Treat all workers equally.

Educational psychologists study how people learn and design the methods and materials used to educate people of all ages. Everyone learns differently and at a different pace. Supervisors should design blocks of instruction that relate to a wide variety of learning styles.

Industrial engineering is the organized approach to the study of work. It is important for supervisors to set reasonable work standards that can be met and exceeded. Unrealistic work standards create unnecessary stressors that cause mistakes. It is also beneficial to have an efficient facility layout so that there is room to work. Clean and uncluttered environments enhance work performance. Another aspect of industrial engineering that helps in the understanding of human factors is the statistical analysis of work performance. Concrete data of work performance, whether good or bad, can show the contributing factors that may have been present when the work was done.

Aviation safety professionals are not only responsible for assessing risks, identifying failures and educating colleagues, they must also consider the effects of their efforts on the general public and be able to accurately communicate to the public. The aviation safety and accident prevention field will continue to grow, especially as the commercial aviation industry continues to grow and general aviation becomes more accessible to the public.

In aviation maintenance, an intentional error should really be considered a violation. If someone knowingly or intentionally chooses to do something wrong, it is a violation, which means that one has deviated from safe practices, procedures, standards, or regulations.

Whether a casual or contributing factor to aviation accidents, human error is a significant element in many aviation accidents. The reason for this is quite simple: we are all human and susceptible to mistakes. Secondly, in every area of aviation there is a human factor. Whether discussing maintenance, inspections, schedules, piloting, management, computer programming, aircraft design, etc. each area has multiple human inputs all of which introduce an element of risk.

- People who do the job.
- Environment in which they work.
- Actions they perform.
- Resources necessary to complete the job.

Aviation maintenance human factors programs focus on the people who perform the work and address physical, physiological, psychological, and psychosocial factors. It must focus on individuals, their physical capabilities, and the factors that affect them. It also should consider their mental state, cognitive capacity, and conditions that may affect their interaction with others. In most cases, human factors programs are designed around the people in the company's existing workforce. You cannot apply identical strength, size, endurance, experience, motivation, and certification standards equally to all employees. The company must match the physical characteristics of each person to the tasks each performs.

## Conclusion

Evaluating and prioritizing features of communication most necessary for safer and more effective operations along with testing of new communication methods is certainly the next step for researchers. Taking into consideration aviation's high-risk environment, communication issues such as ambiguity of selected terms, aviation English, conflicting linguistic features and non-native English instruction for commercial aviators and air traffic controllers are important to strengthening safety across the globe. The result of many studies by linguists and aviation authorities has amounted to a number of viable options for solution to communication problems. The most interesting and complex of these solutions is the idea that computer interfaces could replace controller tower operation and potentially be used to process information from pilots and instruct in a way that allows little to no confusion or possible ambiguity. Evaluating and prioritizing features of communication most necessary for safer and more effective operations along with testing of new communication methods is certainly the next step for researchers.

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## **THE ROLE OF SCIENTIFIC HUMANITARIAN KNOWLEDGE IN SPIRITUAL AVIATION EXPERT PERSONALITY BUILD-UP**

*The article analyzes the philosophical and ethical aspects of spiritual personality in the process of preparing the future professional in aviation industry.*

Modern development of the international airspace and inclusion of the national airspace have put many diverse issues related to improving of the safety and efficiency of air transport on the agenda. As part of this problem, in our opinion, are its social and cultural aspects in its widespread sense and in particular the role of humanitarian education in future workers of aviation industry training.

Analysis of the literature on this subject affirms that technical and psychological side of the issues related to human factor is more completely covered. Sociological and cultural aspects mainly concerns some separate problems related to the direct release of technical issues for humanitarian ones [2-4; 8; 10; 12].

Less attention is paid to the role analysis of the educational environment in professional training of pilots, peculiarities an educated pilot's personality build-up, common place and the role of humanitarian knowledge in the system of future pilots training (and in general aviation sector workers) in the context of quality improvement of aviation management and security implementation flights. In regard to this, the works of philosophers have some importance, where matters of harmonious personality education are risen, to overcome its "one-dimensionality" and insufficiency in formation of new ethical attitude to life (K.-O. Apel, Herbert Marcuse, L. Memford, Toffler, A. Schweitzer, etc.) [1; 6; 7; 11; 13]. Therefore, in this article, we have attempted to examine the place and content of the humanitarian component of professional knowledge in the build-up of future pilot's harmonious personality.

The humanitarian aspect in the entire personality of aviation industry worker build-up involves his educational program requirements fulfillment as for mastering of a certain amount of knowledge in philosophy, ethics, and culture.

One of the most important of these components, in our opinion, is an in-depth study of axiological issues related to the practice of decision-making. This is in line with the personality-centered approach to the education of future pilots, which offers psychological and pedagogical theory. The essence of the latter is that a person gets not only a certain amount of knowledge, but involves in the educational process of personality build-up, gaining experience in the implementation of specific personality features: self-identification, reflexion, sense determination, will regulation, responsibility, creativity and so on. [2, p. 37].

The matter is that personal assessment includes personal ranking of importance level, or quality of the situation. In connection to decision making estimates serve as compass that indicates the desired direction to the person when it



is necessary to choose between several alternative actions. It is important to emphasize that any solution not only related to issues of social responsibility and ethics, are based on certain system of values foundation.

A number of ethical categories are closely related to the concepts of freedom, responsibility, the most important of them is duty as the need to fulfill own moral obligation and to obey the will which is more important than own. Its implementation implies agreement with those requirements that are placed in the imperatives of duty. Other moral and psychological mechanism is in tune with this concept; the conscience which operates out of our soul and is the indicator of our diligent performance of own duties. That is, the sense of responsibility for the specific duty, it is an internal self-report for performing a moral obligation of the individual [5, p. 81, 92, 94].

The importance of the individual value orientations are confirmed by that they influence the way the decisions are made. There are also many factors that make it difficult interpersonal and inside-organization communication that influence the decision-making. It can appear in different perceptions of serious current problems, restrictions and alternatives, leading to disagreement and conflict in decision-making. Therefore, an important part of education and training is to develop teamwork, shared value systems, a sense of team, and a kind of overcoming of "one-dimensional" man, where social nature of professional skills of the pilots appears.

Today, the dynamism of the cultural environment and its technical production has come to change slow institutional processes that prevailed in the past. So ethical category of responsibility which according to K.-O. Apel can be interpreted as the principle of the conservation and self-preservation as a principle of liberation and fulfillment of humanity in terms of the fundamental concepts of communicative philosophy [p. 46-67] can be considered more widely. At the same time the process of ecology concern and cosmic meaning of human activity contribute to some convergence of traditional notions of macro – and the microcosm of a separate personality, in connection with which crucial ideas of A. Schweitzer as for reverence for life and ethics as unlimited liability for everything alive are becoming more important [13].

In this to regard culture in its broadest sense (as a culture of behavior, communication culture, religious culture) can act as a guarantor of the preservation of real human freedom, in which a number of researchers are convinced (F. Zaragoza, A. Schweitzer etc.). V.S. Polikarpov draws attention to the phenomenon of "conglomerate culture", meaning of which lies in the fact that modern scientific and technological culture is a kind of set of different cultural microcosm that must be synthesized into single entity coherent [9, p. 212-213].

In his work "The Third Wave" Toffler main attention pays to the current period of transition from industrial to post-industrial (or super industrial) society, analyzing issues of economic transformation and spiritual values of life principles as a part. In the field of spiritual activity important meaning has the problem of creating of full value and healthy emotional life psychological sphere that depends on the full implementation of the three basic needs of every individual: the need for community, structural clarity and relevance, which are closely related to each other

and give the person a sense of vital necessity and appliance.

One of the major manifestations of systemic crisis of society of "The second wave" is a crisis of community disharmony and imbalance of social and psychological environment, which is determined in spread of loneliness "plague". According to Toffler one of the key reasons for the phenomenon of evil loneliness in modern Western society is increasing of social differences. Thanks to demassification of the society personal individualization is deepened opportunities for a more complete realization of the individual potential are created, but at the same time people contacts are becoming more complicated. Individualization strengthening increases legibility of individuals in their social relations, reduces probability of meeting people with similar interests, values, tastes and plans. Institutions traditionally depended on the maintenance of community, decay in all modern technological societies and the decay of mass society under conditions where maximum of individual self-fulfillment is observed, causes painful feeling of isolation, loneliness, a phenomenon which in modern Western society has become not only the spiritual, but also the economic factor. It is based on the analysis of all these phenomena – loneliness, structure and purpose losing, value destruction that accompanied the crisis of industrial civilization – you can understand the meaning of certain social phenomena of our time [11, p. 278, 281, 287-289].

Through a category – metaphor "one-dimensionality" of social life and the state of consciousness Herbert Marcuse analyzed dehumanization of advanced industrial society, being quite pessimistic to the possibility of overcoming the alienated nature of the social system, the subordinate rationalization as an end in itself and the meaning of human existence, the rule of repressive forms of individuals sublimation. "Developed one-dimensional society alters the relationship between rational and irrational... ever antagonistic realms – the magic and science, life and death, happiness and unhappiness are now combined on a technical and political background" [6, p. 124-125].

Technological determinism was critically assessed by L. Memford, emphasizing the danger gap between technology development and spiritual one, the possibility of human enslavement from the so-called Mega machine as extremely rationalized technocratic organization of modern society. He wrote that " Instead of active functioning as an independent personality, a man will become passive, an animal determined by machine that has no purpose, and own functions of... which are under the control for the benefit of personalized collective organizations" [7, p. 59].

## **Conclusion**

Therefore, taking into consideration everything named above we can determine the place and role of human knowledge in the training of future professional aviation industry. We need to emphasize the role of creating a valuable personality-centered model of education and training aimed at developing the entire personality of a pilot. Thus, we believe that this goal better achievement will contribute to broad humanities approach to specific content knowledge of professionally significant aviation safety issues. Prior to that content it is necessary to include the knowledge of such disciplines as ethics, moral consciousness, philosophy, cultural studies, to facilitate the acquisition of the necessary capacity to

perform personal functions of future professional pilots. From this perspective, modern education should ensure that everything which is necessary for full emotional life and a harmonious society psychological sphere conditions. This will harmonize the two main forms of vision: the rational – scientific and irrational within contemporary culture, on that basis, reproduction of a certain way of life, social and individual characters.

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**REQUIREMENTS FOR SCIENTIFIC AND PEDAGOGICAL STAFF  
IN THE PROCESS OF FORMATION OF FUTURE PSYCHOLOGISTS'  
READINESS FOR PROFESSIONAL ACTIVITY  
IN THE AVIATION INDUSTRY**

*The article substantiates the requirements on academic teaching staff for the formation of future psychologists' readiness for professional work in the aviation industry which is to be done during their professional training.*

**Statement of a problem.** In view of the European integration processes in higher education are complicated requirements not only for professional training of students but also for teacher's. A scientific and pedagogical staff member of higher educational establishment is the main subject of professional training. The multiplicity of functions performed by him is determined by the fact that teaching activity is realized in many ways: organization and active participation in the educational, technical, scientific, research and pedagogic activities. The leading one is educational activity which is focused on the organization of the process of scientific knowledge transfer and mastering, and also on the formation of students' practical abilities and skills. Such type of activity combines theoretical component which is related to the disclosure of the essence of science, its history, basic principles of functioning, laws and patterns, conceptual-categorical apparatus and practical which is directed on solving pedagogical tasks. A scientific staff member determines the purpose and tasks of a particular discipline taking into account the interrelation with other courses; thinks of training content, modern forms and methods that contribute to activation of students' educational activities and forms of control. At the same time he promotes the formation of future specialist personality, contributes to the development of his professionally important and human qualities that play a significant role in the formation of readiness to his future professional activity. That is why in the light of the European integration processes academic teaching staff should skillfully possess not only the methods of teaching and management of students' educational activities but also be a moral person with formed humanistic paradigm.

**The purpose of this article** is substantiation of the requirements on a scientific and pedagogical worker concerning the formation of future psychologist readiness for professional work in the field of aviation in the process of professional preparation.

**Exposition of basic material.** An academic teaching staff member preparedness for formation of future psychologists readiness for professional activities in the field of aviation is determined by the special knowledge and practical skills to apply the content of subjects and specialized training courses into practice; and by high level of professional qualifications and personality traits.

Moreover, at higher educational establishment he should promote the creation of conditions which will help students to master the psychological skills necessary for their future professional activity in aviation industry.

In general, future psychologists are considered to be ready for professional activity if they have some motives of choosing the profession of a psychologist, and if they are professionally focused (positive attitude towards the profession, mindset for professional activity), and have professionally significant qualities of a personality, broad amount of specialized knowledge and skills, developed emotional and willed personality traits.

At higher educational establishment the efficiency of formation of future psychologists readiness for professional work in aviation industry depends significantly on the certain pedagogical conditions created by the academic teaching staff.

We defined the main aspects of formation of future psychologists readiness for work in aviation industry. They are: understanding of significance of the aviation personnel work peculiarities; awareness of the possibilities of psychological support of aviation personnel, application of which will help to realize goals, needs and tasks; understanding of work in the extreme conditions; determination of studying conditions that will contribute to the actualization of experience to meet future requirements; practice of the most probable and assistive methods of solving tasks; awareness of future psychologist' personal abilities actualization for the development and self-development according to their motivational, emotional, volitional and intellectual features for professional growth and achievement of set goal and relevant result [1, p. 369].

Teacher's activity concerning the formation of students-psychologists' readiness for professional work in aviation industry is aimed at acquiring by future psychologists the basic knowledge and skills which they will need for work in aviation industry.

Let us outline the special *abilities* a psychologist of aviation industry should have.

- *Ability to think analytically, to be insightful and objective, to seek for scientific searches of optimal solutions and creative interaction with interested employees, airline staff:* to be able to use knowledge of methodological and theoretical psychology in the study and explanation of mental phenomena; to be able to conduct a psychological experiment, process and evaluate the results.

- *Ability to influence the individuals and social groups effectively:* to be perfect at communication skills; to be able to conduct educational work concerning the cohesion of airline staff; to understand the nature and patterns of mental phenomena, nature and psychological structure of a personality, theories of a personality in the international and national psychology and the conditions of personality's formation and development.

- *Ability to solve problems and tasks of social activity:* to be able to learn and generalize psychological problems, provide recommendations for their solution; to be able to predict the actions of an individual in the situations when it is necessary to make a choice; to be able to conduct trainings for personal growth.

- *Ability to provide effective psycho-diagnostics, correction and*

*rehabilitation of individuals and social groups*: to be able to carry out consulting; to be able to apply the methods of correction work with different categories of patients (passengers, personnel, airline managers, etc.); to be able to plan changes in behavior under the influence of psycho-measures; to advise the heads of airlines about the use of new social technologies for an effective organization of operational procedures.

- *Abilities related to the professional activity of a practical psychologist in the aviation industry*: to analyze the abilities and possible perspective achievements of a certain person in determining the prospects of airline development; to analyze the mental states and personality traits of an individual for the selection of professional personnel and business commands; to analyze the work of aviation specialists regarding the psychological requirements to it; to use methods of subjective assessment of functional state of a pilot, flight attendant and other aviation specialists; to use methods and application programmes of aviation specialists psychological autoregulation; to develop recommendations for the improvement and enhancement of the aviation specialists work efficiency both in individual and command activity.

Proceeding from the specifics of the profession of psychologist, in which the object of his professional activity is another personality, the insurance of individually oriented content of students training which is focused on the development of student-psychologist individuality while studying at the university.

L. Podoliak and V. Yurchenko unanimously agreed that education for psychologists should take the personal oriented content, which would be directed to self-determination and professional self-assertion, to preparation for future profession activities and development of potential opportunities. The general and professional abilities of psychologists will develop only if there is a need in self-actualization [2, p. 164].

The creation of optimal psychological and pedagogical conditions for self-development and self-actualization of psychologists, maintaining curiosity and "cognitive" psychological climate in the student group are of great importance. E. Shyyanov and I. Kotova state that *emotions* contribute to success in any kind of activities and positive emotions provide higher results in educational activity. The researchers consider that without emotions the aggressiveness can easily occur [3, p. 166-167]. From the prospective of the scientists it is important that the educational process of psychologists brought pleasure, gave a possibility of experiencing success, awareness of their personal and professional growth [2, p. 164].

A. Grebenyuk, A. Markova and D. Uznadze note that in order to increase the efficiency of future specialists educational and professional activity it is important to understand deeply and constantly improve their *demand-motivational sphere*. In particular, D. Uznadze emphasized that the need is the source of activity. Where there is no demand, there can be no question about the activity. Deep knowledge of students educational and professional activity motives can ensure success and will contribute to the professional development [4, p. 89].

The teacher, who works on the basis of individually oriented education, should take into account individual differences of students mastering the material and should be oriented more on the process than on the result. Communication,

mutual search for solutions and their interpretation are more important for personal development than ready answer. Tolerance, empathy and desire to understand the student, evaluate and accept his opinion contribute to the cooperation that promotes high effectiveness of training.

When students have their subject position in the process of professional training it will facilitate the formation of students attitudes to academic disciplines and to the process of cognitive activity; will contribute to the creation such situations in the educational process of higher educational institutions that allow students to assess adequately their preparedness for professional work and help to find out possible gaps in knowledge. Moreover, it will motivate all subjects of the pedagogical process to create a positive psychological microclimate in student audience.

The above-mentioned pedagogical condition helps to create in the student audience a positive psychological microclimate, business relationships, creative mood that provide mental activity and increased performance, job satisfaction, productive work of all participants of the educational process from setting goals and their implementation to monitoring of the results. The individual cognitive activity of students regarding self-determination and self-improvement can be developed only with a help of cooperation.

Formation of positive attitude towards work in aviation industry contributes to organization of current and final control which encourages students to evaluate results of their studies actively and systematically and take the appropriate measures.

In order to make the subjects of the learning process more active the active methods of learning are used. On contrast to traditional methods the subject of teaching plays more active role while using active methods. Among this group of training methods S. Smirnov identifies the methods of problem solving, noting that asking questions, formulating contradictions and making a problem of knowledge are quite ancient techniques of activate learning [5, p. 175].

V. Nagaev and V. Yagupov indicate on the importance of such imitation method as a business game. Such method allows to acquire professional skills [6, p. 114].

O. Zhdanenko, E. Matusiak, V. Zhuravlev highlight the importance of using while playing role games such method of training as a case study. This method involves the acquisition of professional knowledge through independent solving of problems that contain didactically grounded and accordingly selected up situation, rather than passive listening of information. The method of analysis of a particular situation gives the opportunity to solve any problems arising from the situational description. Usage of creative thinking during comprehensive analysis of the particular situation encourages personnel to act creatively and independantly [7, p. 45-46].

Among the methods that encourage educational and cognitive activity there are also methods that are components of pedagogical technology of "Creating a situation of success" (by A.S. Belkin). Sometimes a student future psychologist appears in such educational situations when he is afraid to make a mistake. The creation of situations of success in the classroom help to overcome fear of making a mistake, increase the interest of students to study, help to get rid of self-doubt and overcome various communication barriers. An advance in the study is a source of internal strength of a student that generates power to overcome obstacles and creates

a desire to learn.

A method of active learning is widely used in the psycho-pedagogical preparation of a specialist which this article is devoted to. This method is aimed at the formation of skills of effective communication, identifying leadership qualities, increasing the level of motivation and so on. Exactly during such classes a positive psychological climate is created in the student audience, allowing everyone to express freely their own opinion regarding the discussed issue, creates a case study which, in turn, will contribute to students mastering the profession effectively. However, the main training technology remains the method the essence of which is not in "transfer" of a certain amount of knowledge by teacher to students but in search and "development" of own knowledge by students, in the creation of themselves and in the establishing the relationships with other people [8].

### Conclusion

A teacher of a higher educational establishment is the subject of professional training that's why his role is a leading one in the formation of specialists' readiness for professional activity. In this article we considered the main professionally important qualities which are necessary for a lecturer of higher educational establishment during the European integration processes and described the pedagogical conditions of formation of future psychologists' readiness for professional work in aviation industry in the process of professional training.

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## **COMPENSATION FOR DAMAGES IN AVIATION: HISTORICAL AND LEGAL ASPECT**

*The article deals with the air carrier's civil liability for death or bodily injury to a passenger. It considers the historical and legal aspects of the problem, analyzes the main international conventions on the issue (the Warsaw Convention, the Montreal Convention).*

The 21st century can truly be considered a century of aviation: the number of airplanes as well as passengers is steadily increasing. However, at the same time the passengers' concerns about their safety are also growing. Despite the fact that air transport is not considered the most dangerous means of transportation, most people are afraid of flying, due to frequent accidents, falls and terrorist attacks on board. That means air transport involves certain risks, some of which can cause death or injury to passengers. That is why international and domestic laws that regulate air transportation traditionally contain norms that determine liability for death or injury to a passenger.

On 17 August 1923, the French government proposed the convening of a diplomatic conference in November 1923 for the purpose of concluding a convention relating to liability in international carriage by air. The conference was formally deferred on two occasions due to reluctant behavior of the governments of various nations to act on such a short notice without the knowledge of the proposed convention. Finally, between 27 October and 6 November, the first conference met in Paris to study the draft convention. Since most of the participants were diplomats accredited to the French government and not professionals, it was agreed unanimously that a body of technical, legal experts be set up to study the draft convention prior to its submission to the diplomatic conference for approval. Accordingly in 1925, the Committee International Technique of Experts Juridique Aeriens (CITEJA) was formed. In 1927–28 CITEJA studied and developed the proposed draft convention and developed it into the present package of unification of law and presented it at the Warsaw Conference which was approved between 4 and 12 October 1929. It unified an important sector of private air law. Thus, there was the first multilateral international agreement, the main international legal instrument, governing international air transportation and air carrier *liability Warsaw Convention 1929 for the Unification of Certain Rules Relating to International Carriage by Air*. Warsaw Convention was the first international legal instrument that establishes liability for death or bodily injury to a passenger.

According to the article 17 of the Warsaw Convention, the carrier is liable for damage sustained in the event of the death or wounding of a passenger or any other bodily injury suffered by a passenger, if the accident which caused the damage so sustained took place on board the aircraft or in the course of any of the operations of embarking or disembarking.

Article 22 of the Warsaw Convention states that in the carriage of passengers the liability of the carrier for each passenger is limited to the sum of *125,000 francs*. Where, in accordance with the law of the Court seized of the case, damages may be awarded in the form of periodical payments, the equivalent capital value of the said payments shall not exceed 125,000 francs. Nevertheless, by special contract, the carrier and the passenger may agree to a higher limit of liability. But if the carrier proves that the damage was caused by or contributed to by the negligence of the injured person the Court may, in accordance with the provisions of its own law, exonerate the carrier wholly or partly from his liability.

Between 1948–1951 it was further studied by a legal committee set up by the International Civil Aviation Organization (ICAO) and in 1952 a new draft was prepared to replace the convention. However it was rejected and it was decided that the convention be amended rather than replaced in 1953. The work done by the legal committee at the Ninth Session was presented to the International Conference on Air Law which was convened by the Council of the ICAO and met at the Hague from 6 to 28 September 1955. The Hague Conference adopted a Protocol for the amendment of the Warsaw Convention. Between the parties of the Protocol, it was agreed that the 1929 Warsaw Convention and the 1955 Hague Protocol were to be read and interpreted together as one single instrument to be known as the Warsaw Convention as amended at the Hague in 1955. This was not an amendment to the convention but rather a creation of a new and separate legal instrument that is only binding between the parties. If one nation is a party to the Warsaw Convention and another to the Hague Protocol, neither state has an instrument in common and therefore there is no mutual international ground for litigation.

United States courts have held that, at least for some purposes, the Warsaw Convention is a different instrument from the Warsaw Convention as amended by the Hague Protocol. The Convention was written originally in French and the original documents were deposited in the archives of the Ministry for Foreign Affairs of Poland. A court may also award a claiming party's costs, unless the carrier made an offer within 6 months of the loss (or at least 6 months before the beginning of any legal proceedings) which the claiming party has failed to beat.

The Montreal Convention, signed in 1999, replaced the Warsaw Convention system.

The Montreal Convention (formally, the Convention for the Unification of Certain Rules for International Carriage by Air) is a multilateral treaty adopted by a diplomatic meeting of ICAO member states in 1999. It amended important provisions of the Warsaw Convention's regime concerning compensation for the victims of air disasters. The Convention attempts to re-establish uniformity and predictability of rules relating to the international carriage of passengers, baggage and cargo. Whilst maintaining the core provisions which have served the international air transport community for several decades (i.e., the Warsaw regime), the new treaty achieves modernization in a number of key areas. It protects passengers by introducing a two-tier liability system that eliminates the previous requirement of proving willful neglect by the air carrier to obtain more than \$75,000 in damages, which should eliminate or reduce protracted litigation.

Under the Montreal Convention, air carriers are strictly liable for proven

damages up to 113,100 special drawing rights (SDR) (updated from 100,000 on 31 December 2009), a mix of currency values established by the International Monetary Fund (IMF), approximately \$138,000 per passenger at the time of its ratification by the United States in 2003 (as of December 2011, around \$175,800). Where damages of more than 113,100 SDR are sought, the airline may avoid liability by proving that the accident which caused the injury or death was not due to their negligence or was attributable to the negligence of a third party. This defence is not available where damages of less than 113,100 SDR are sought. The Convention also amended the jurisdictional provisions of Warsaw and now allows the victim or their families to sue foreign carriers where they maintain their principal residence, and requires all air carriers to carry liability insurance.

The Montreal Convention was brought about mainly to amend liabilities to be paid to families for death or injury whilst on board an aircraft.

As of May 2014, there are 107 parties to the Convention. Included in this total is 106 of the 191 ICAO Member States plus the European Union. The states that have ratified represent 105 UN member states plus the Cook Islands. Other states that have ratified include Argentina, Australia, Brazil, Canada, China, all member states of the European Union, India, Israel, Japan, South Korea, Malaysia, Mexico, New Zealand, Norway, Pakistan, Saudi Arabia, Singapore, South Africa, Switzerland, Turkey, Ukraine, the United Arab Emirates, and the United States.

So, a primary task of the international treaty – to provide the same legal regulation of certain issues in different countries. However, the history of creation of the Warsaw and Montreal Conventions suggests that its creators did not have the same views on compensation for moral and material damage, and therefore, for a long time, the question remains controversial.

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## **WOMEN-PILOTS IN THE GREAT PATRIOTIC WAR OF THE SOVIET UNION**

*The article deals with the role of Soviet women pilots in the victory over Nazi Germany in the years of the Great Patriotic War.*

About 600,000 women fought together with men in the Red Army in the years of the Great Patriotic War. Over 90 of them were awarded the titles of “Hero of the Soviet Union,” the highest Soviet reward, and over 100,000 were decorated with orders and medals [2]. Not all women, of course, directly participated in warfare. Many served in the rear occupying economic, medical, managerial, and other positions; but many, nevertheless, took direct part in war operations. The specter of their activity was rather wide; they participated in reconnaissance raids and fought in partisan units, served as nurses, machine-gunners, snipers, and tank drivers. Many women served in aviation: pilots, navigators, mechanics, and radio operators. Even before the war, in the 1930s, such slogans as “Girls to Aviation!” became popular among the young. With the outbreak of the war, hundreds of thousands of women rushed into the army, not wanting to lag behind men, and feeling capable of bearing a heavy load of military service. During the war years women ensured their rights to fight on par with men for their motherland.

Preparation of aviation personnel was an important task in the war years, and women pilots distinguished themselves in that activity. In the war years the centre for aviation personnel training moved to Siberia and Central Asia. There were 15 training squadrons in the Civil Aviation Fleet’s west-Siberian management [2]. By October the Civil Aviation Fleet’s training schools had prepared 9910 pilots for the U-2 plane, 7756 of them were sent to military aviation schools [2]. Study programs were revised in accordance with the front requirements; the periods of study were significantly shortened. The system of draft to aviation schools was changed: aircraft mechanics were enrolled in the first place. On graduation the school they were able not only to fly an airplane but also to do the necessary repairs.

The training program focused attention on flying at night, in bad weather conditions, over forest areas, at low altitude, and landing in forest clearings designated by fires. Among the instructors who devoted their lives to aviation as early as the 1930s there were many women pilots: M. Yaremchuk, N. Sliusarenko, K. Krasnokutskaya, D. Rubanenko and others. In all, the pilots-instructors and teaching staff in the Civil Aviation Fleet had prepared in the war years over 40,000 aviators; 20,900 of whom were sent to the Air Force [2].

Women aviators had fought in air regiments together with men and also in exclusive ‘women’s units.’ A call to enroll girls into the army was sent to all Soviet youth organizations on October 8, 1941. The news spread at a moment. Many responded to the call and were selected to the air force. Hero of the Soviet Union V.

Grizadubova selected people for long-haul aircraft. Her unit became known as the 31<sup>st</sup> regiment of the bomber forces. At the time another Hero of the Soviet Union, M. Raskova, formed an aviation unit consisted entirely of women. Thousands of girls dreamed to serve in it. As a result, three women's aviation regiments were formed. They were: the 46<sup>th</sup> Guards regiment of night light bombers, the 25<sup>th</sup> Guards regiment of dive bombers, and the 586<sup>th</sup> aviation regiment specializing in destruction of anti-aircraft forces units.

All the staff was divided into groups according to specialties: navigators, pilots, and mechanics. Women's aviation regiments were staffed with pilots from the Civil Air Force and *Osoaviakhim*. Many of them were skilled pilots. University and college students, factory and office workers became navigators and technicians. Girls with technical education were appointed to the positions of aircraft mechanics. The 586<sup>th</sup> regiment was ready to be sent to the front in the spring of 1942. Its commander was T. Kazarinova. Soon after that the 46<sup>th</sup> light bombers regiment under the command of O. Bershanska was also ready for the front. At the very beginning of 1943 a new women's regiment of dive bombers arrived in Stalingrad. The regiment's commander was Maryna Raskova.

Originally many pilots and navigators of the 46<sup>th</sup> regiment were disappointed with flying PE-2 planes which were small and not furnished with radio. They dreamt of heavy bombers or fighters. In time, however, they understood the qualities of PE-2, which became a serious threat to the enemy. During the war women pilots courageously fought for the motherland. Many of them made over 1 000 operation flights.

Major Nadia Fedutenko, air squadron commander, became a bright star among Ukrainian women pilots. She proved to be a courageous and resolute pilot, made hundreds flights and rescued from encirclement more than 150 wounded [4, c. 58]. Fedutenko performed various important and risky tasks: she delivered ammunition, food, and medicine to the encircled troops or the units located in the enemy rear; brought intelligence data to the Ground Forces Command.

N. Fedutenko revealed high professional and organizational skills. She was one of the first who mastered the PE-2 dive bomber. Hence she was appointed commander of the 1<sup>st</sup> air squadron of the 125<sup>th</sup> women's guard air regiment. Her unit consisted of experienced women pilots who arrived to the front from the Civil Air Force. The 125<sup>th</sup> air regiment went a glorious way from the Volga to the Baltic in the war years. Using the PE-2 dive bombers the women pilots destroyed the enemy's fortification lines and troops on the banks of the Volga River; they helped the ground forces to break the enemy's defense in the North Caucasus; provided air support for a tank group's attack in the Orel-Kursk direction; destroyed the enemy's resistance pockets on the Bogushevsk-Orsha defense line. The regiment took part in the fight for Yelnya, Smolensk, Vitebsk, Borysiv; it participated in liberation of Belarus and the Baltic republics; assisted the Red Army's ground forces in destruction of the Nazi troops in Northern Prussia. During the Great Patriotic War the regiment made 1134 operational fights and dropped 980 tons of bombs on the enemy [1, c.356].

For the revealed heroism the regiment was decorated with the Order of Suvorov and the Order of Kutuzov. Nadia Fedutenko demonstrated high mastery

and professionalism in flying the PE-2. During the war she made 69 operation flights [3, c. 147]. In May 1943 in Kuban she was heavily wounded in action but managed to fulfill the task and returned to the aerodrome. Dozens of times N. Fedutenko led her air squadron into battle providing a powerful air support to our ground forces.

On August 18, 1945, Presidium of the Supreme Council of the USSR conferred the title of “Hero of the Soviet Union” on Nadia Nikiforivna Fedutenko for courage and heroism revealed in action, successful command of the squadron, and exemplary fulfillment of military tasks. She was also decorated with two orders of the Red Banner, the Order of the Great Patriotic War type 1, and many medals [4, c. 54].

The 588<sup>th</sup> regiment of night light bombers that first attacked the enemy in the Donbass region on June 8, 1942 achieved great fame. Such outstanding women pilots as E. Nikulina, S. Burzayeva, S. Amosova, R. Rozanova, E. Nosal, A. Popova courageously fought under the command of E. Bershanskaya. The regiment’s pilots made 23, 672 operation flights and dropped 2, 902, 980 kg of bombs and 26, 000 ampoules with incendiary substance on the enemy. According to incomplete data, the regiment destroyed or seriously damaged 17 ferries, 9 trains, 2 railway stations, 46 ammunition dumps, 12 fuel tanks, 1 airplane, 2 barges, 76 motor vehicles, 86 weapons sites, 11 searchlights. The regiment caused 811 conflagrations, 1,092 powerful explosions. The women pilots delivered 155 sacks of ammunition and food to our encircled troops. The regiment’s pilots spent 28, 676 hours in operation flights [2]. Brave women pilots took part in liberation of the Northern Caucasus, the Crimean peninsula, Sevastopol, Mogilev, Bialystok, Warsaw, Gdynia, and Gdansk. The regiment especially distinguished itself in destroying the powerful “Blue Defensive Line” on the Taman peninsula. As a result, it received an honorable name “Tamansky.” For exemplary fulfillment of combat missions in liberation of Crimea and Poland the regiment was awarded Guards status and decorated with the Order of Red Banner and the Order of Suvorov type 3 [2].

Thus, women pilots, who fought in practically all types of aviation (bombers, fighters, attack planes, transport planes) made a great contribution to the victory over the enemy.

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## **CROSS-CULTURAL FACTORS IN AVIATION SAFETY**

*This paper presents cross-cultural factors in aviation safety. Situations in which members of one culture encounter representatives or realities of some other culture are emphasized. With the safety purpose, it is important that such situations should not be ignored or eliminated, but should be successfully coped with, since they may pose potential threat. Culture is closely interrelated with a context. Of the many types of contexts the four are covered in this paper: the political, the physical, the social, and the economic.*

For many years, culture has been a safety related issue in the aviation community. Globalization of the airline industry is now a reality and is expected to continue. As airlines of different nations continue to combine operations and increase their international destinations, cultural issues will gain prominence. Aviation has changed the way we think about the world and what is possible in the world. Unlike no other technology before or since, aviation is responsible for creating the “global village.” It is now possible to reach any part of the world by air, and to do so in previously unimaginable time. Business, leisure, even religious pilgrimages are now achieved with the help of air travel. It became more evident over the last years that migration moves people around countries. Besides that, flying became more affordable for every class of the society. Demand for international travel has also exposed people to many different cultures and languages. This brings us to the point that we must recognize nations may, and probably do, approach opportunities and problems from quite different perspectives because of their basic language and cultural differences. Naturally enough, individual nations may feel that their point of view is correct, especially for them.

Unfortunately, language barriers and cultural differences can tend to polarize the participants in any discussion and can lead to total inaction or to ineffective and unsatisfactory compromises. Either of these results is absolutely unacceptable to anyone interested in aviation safety. Today, we are in the midst of an aviation safety evolution. No longer are we trying to improve aviation safety one airport at a time, one pilot at a time, or even one airline at a time.

This paper presents the safety case for the consideration of cross-cultural factors in aviation. It does so by focusing not on cultures per se but on cultural interfaces, those situations where members of one culture encounter people or artifacts from other cultures. Put at its most simple, as long as one stays within the bounds of one's culture, all of the advantages of cultural membership hold; fellow members and the environment are predictable, thereby making daily routines easier and quicker. But as soon as we encounter members or artifacts (aircraft, procedures, regulations) from other cultures, these cultural efficiencies are challenged and the opposite occurs: the environment becomes less predictable, more uncertain, and

requires more cognitive effort.

Because a culture is shaped by its environment and evolves in response to changes in that environment, culture and context are really inseparable. There are many layers of context in which a culture is embedded, including the political, the physical the social, and the economic. Any airline finds itself influenced by these contexts; its daily operations are the solutions to the problems and demands created by these contexts. The layer of economic and political context includes several macro-levels, including: national wealth, per capita income, tax base, population size and density, stability of economic and political systems, laws, and education. Together these factors decide the size of the aviation customer base in a country and the general affordability of air travel for people in that country. It also decides the size and stability of government support for the aviation infrastructure.

The features that define physical context include geography and complexity of terrain, climate and weather, population dispersion and accessibility. These factors decide flight routes and schedules. The physical context is easiest to see.

The third layer, the social context, is most closely related to the people and their customs. They include: socially agreed upon ways of making sense of the surrounding environment, a group's preferred ways of thinking, acting, and interacting, values (what is considered important), behaviors (what is considered normal). These features develop over time, handed down from one generation to the next, evolving into a social system of shared meanings and coordination among a culture's members. The social context is what people most associate with culture because of the customs, norms, values, and beliefs. Historically derived and shaped over time in response to environmental demands and changes, the social context is every bit as important as the economic, political, and physical contexts in determining how people will act and react.

To summarize, a culture can be considered the ongoing interaction of a group of people with their environment. It can be understood more completely by paying attention to economic, political, physical, and social factors.

By its nature, aviation is a cross-cultural endeavor. The cultural interfaces in aviation are many and diverse. Given the daily occurrence of cross-cultural interactions in aviation, there are several factors that moderate the experience, including cultural distance, resource match, and experience at the interface. The great talent of humans is their ability to adapt. The more experience at the interface, the less the interface will appear challenging. With experience and exposure comes adaptation. Experience at the interface builds familiarity and reduces uncertainty.

Culture is a factor of how a person perceives the world. It is affected by such things as language, education, religion, and customs. There are both positive and negative effects. The overall advantages due to culturally mixed crews are that individual crew members can provide different interpretations of the same information and different approaches towards problem solving. Conversely, when these cultural differences are not channeled properly, misinterpretation of information can cause misunderstandings that will reduce crew effectiveness or lead to an accident. Each airline must analyze its own cultural effects when it considers its options on flight crew integration. Most airlines' primary method for reducing any negative multi-cultural effects and building on the positive effects to increase



cabin and cockpit safety is through a high level of training and standardization. Since people of different cultures may have varying interpretations of the same situation, a high level of standardized training will refocus cultural variations so that crew members view a given situation with similar levels of understanding.

There are two critical safety obligations of the flight attendant. The first is to prevent accidents, primarily by means of the conveyance of information regarding hazardous conditions to the flight deck. If the accident cannot be prevented, the second obligation is to maximize its survivability. The highest levels of safety are reached when all crewmembers contribute their best efforts toward a common goal. Each member of the crew has an assigned role in the aircraft. This role must be clearly defined and communicated, so that each member clearly knows what is expected of him or her and what to expect from others. The cockpit crew, as well as the cabin crew, needs to take specific initiatives towards building a team that functions effectively. The culture of the cockpit crew is very different from that of the cabin crew because each has different priorities and value systems. Flight deck crews focus mainly on flying the aircraft and operating systems. Their culture is considered to be of a technical nature. The cabin crews focus mainly on cabin safety and passenger service. Their culture is oriented towards people and involves a lot of communication and coordination. Both roles require effective communication between the two work areas.

Standardization of communication is also a vital factor. Flight crews use standard words or phrases for specific situations to prevent cultural misunderstandings. The effect of non-standard words or phrases among multi-cultural crewmembers is similar in effect to the use of slang words among crew members in those countries where English is the primary language. A way to overcome limitations or barriers in communication among people of different backgrounds and idioms is to attach to procedures and regulations. Radio communication, the seven-headed monster for many, must be kept to simple terms; slangs eliminated and read back a habit. As the Australian Civil Safety Authority resumes what is valid for the industry in general: "Being mindful of each spoken word and how it might be interpreted is something that must be recognized as a vital component of crew co-ordination and effectiveness."

Within the culture of the international aviation community, diversity is hidden by a high level of information exchange, advanced technology, and the "language of aviation". The technological advances in aviation have been increasing for the past decade and have helped reduce individual workload and have decreased the probability of human error. Improved technology's effect on aviation safety has become more significant as most major airlines in the world operate new models of aircraft, such as the Boeing 777 and the Airbus 340. People must be receptive to change. The increased use of technology is changing the way all crewmembers work. New skills are needed to replace the old ones that served so well in the past. Human factors are concerned with solving practical problems in the workplace. It is all about relationships of individuals with each other and with situations. It includes such things as how people communicate and behave during individual and group situations. Most communication involves speaking, reading, writing, listening, and nonverbal signals. Recurrent and initial training in the airline has said little about

communication between cockpit and cabin, except in extreme cases such as hijacking or evacuation. The quality and effectiveness of communication is largely determined by how well individuals understand what is being said. Therefore, one task of human factor training is to increase communication skills and reduce communication errors.

One of the interesting things about culture is that everyone is a member of at least one culture, yet people can rarely explain their culture very clearly to others. That is because people in their own culture tend to be unaware of the principles and values that guide their behavior. It is natural for people to believe that the culture in which they were socialized is the “way of the world” and the practices and beliefs are similar the world over. However, in today’s world of global media and global travel, this ethnocentrism cannot be logically sustained. To believe that one culture is inherently superior to another is arrogance or ignorance or both.

Helping people move beyond their own cultural boundaries to accept other cultures without becoming defensive is something that can be addressed through training. Being able to accept other cultures requires a person to look objectively and with some distance at their own culture. Next, the person can then start to see how something that works in their culture may not work in another culture. The final step is to be able to see how an idea or tool from one culture can be modified to make sense in another culture.

Culture plays a strong role in all airlines and airline managers must have a full understanding of cultural influences on their operations if they are to be successful in safety. Culture has strong influences on every single department in domestic and foreign airlines, but the flight crew faces cultural challenges more than other departments because of their close working conditions and the critical safety issues.

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## **THE REQUIREMENTS FOR PERSONAL AND PROFESSIONAL SKILLS OF AVIATION INDUSTRY SOFTWARE ENGINEERS IN THE CONTEXT OF PROFESSIONAL COMMUNICATION READINESS DEVELOPMENT**

*The requirements for personal and professional skills of aviation industry software engineers in the context of professional communication readiness development are considered in the article. A list of required and desirable software engineer's soft skills was made. A list of software engineer positions for which professional communication is a means of professional activity was defined.*

Training specialists for information technology has a number of features. It is related, first of all, to the specificity of software, which is the object of their professional activity. The sites of many leading national and international software developing companies describe the specific professional activity of a software engineer in the following way: "A software engineer is a qualified professional who focuses on software designing, development, testing, and maintaining. Software engineer can either write or not write a program code. A software engineer should possess excellent communication skills and teamwork skills as he interacts with the programmers and performs business functions. Software engineers often need to explain business functions to programmers and technical details for managers without technical education" [1].

Future aviation industry software engineer should be prepared for rapid changes in the industry, and therefore he should be professionally mobile. He should understand that he will service different areas of human activity, and thus he should be ready to absorb new knowledge from different fields; he should be prepared for competition, rapid change of companies, posts, a large number of business trips, meetings, dealing with business correspondence and customers; a software engineer must know a foreign language and be willing to improve his skills throughout life, since most software development and maintenance companies in Ukraine either have investments from other countries or they are completely foreign. Modern software is extremely complex and voluminous. The teams of specialists must be involved in its development, and therefore a software engineer must possess teamwork skills, know the basics of psychology, group dynamics and communication to achieve significant professional results.

Professional communication of future software engineers is becoming an integral part of their professional activity while readiness to professional communication can be considered as a component of their competence. Developed readiness to professional communication of future software engineers will allow them:

- to find or change a workplace and adjust themselves to new conditions quickly;

- to interact effectively with all members of the modern business process (partners, customers, colleagues, management, subordinates and others);
- to carry out operating procedures (negotiations, preparation and demonstration of work presentations, oral and written reporting, precise target setting to subordinates or colleagues, etc.);
- to work in a group, build and manage a team;
- to prepare and draw work or professional papers;
- to take part in the field development and exchange of experience (organizing, conducting and participating in conferences, disputes, lectures, workshops, presentations, writing articles, etc.);
- to research, etc.

Rapid changes in the IT field and other production and non-production areas condition the need for more complicated software products and more sophisticated methods of their development. As a result, the labour market advances qualitatively different professional and personal requirements before future specialists. After analyzing software development requirements of various domestic companies to software engineers presented on the websites of the companies in professional journals and in the internal documentation of personnel departments, we found that most employers divide all requirements into hard skills and soft skills [1-3]. Since most domestic software developing companies operate on the basis of outsourcing, we can presume that all the requirements to software engineers are identical in any country of the world. The study of American companies advertisement shows that in the software engineering field the employers also divide all the requirements to software engineer into two categories :“hard skills” and “soft skills” [2].

Hard skills are technical requirements and knowledge a specialist should possess to perform a task. These skills include theoretical foundations and practical experience that a specialist should have to comfortably execute the planned task. Some employers consider that theoretical foundations and practical experience should include [2]:

- deep knowledge of programming languages;
- the skills needed to create algorithms;
- knowledge of operating systems, software architecture;
- software coding and testing;
- software adjusting;
- knowledge of software development process methodologies;
- knowledge of English;
- the skills needed to create technical documentation, etc.

Soft skills incorporate the psychological phenomena that include the personality types, social interaction abilities, communication, and personality habits, etc. Specialists apparently need soft skills to supplement hard ones while hard skills determine soft skills that a specialist should possess or develop for his professional growth. Having analyzed the data taken from software development companies sites, we can determine the following requirements for software engineers [1, 2, 3]:

- communication skills;
- interpersonal relationship skills or ability to work with people;
- ability to work independently;

- individual thinking ability;
- an active listener;
- developed logical thinking and numerical ability;
- deep analytical skills;
- patience, persistence and purposefulness;
- responsibility;
- problem solving skills;
- willingness and rapid adaptability to changes;
- ability to innovate;
- organizational skills;
- meticulousness and attention to details;
- ability to learn quickly;
- ability to work in a team.

After analyzing the hard skills requirements of all positions that a software engineer can take in the company, we understood that such personal quality as communication skills, i.e. professional written and verbal communication, is a must virtually for any position. To implement the communication process and create the documentation in the software designing process a future specialist should be able [4]:

- to support interaction and communication;
- to find common interests with a customer or a partner;
- to understand the partner's point of view;
- to respond quickly to a customer or a partner's statements;
- to build a system of evidence;
- to speak, listen and write;
- to run meetings, debates, negotiations, discussions and presentations effectively using computer and network communications;
- to draw documentation;
- to review written technical documentation to identify various problems.

The future aviation industry software specialist must know [4]:

- modern aspects of business, professional, and cross-cultural communication;
- business and professional communication components;
- business letters drafting specificity;
- online communication specificity;
- types and methods of running business debates, negotiations, presentations, etc.

Personal quality of professional written and verbal communication acquires particular significance for engineers who are team leaders, project managers, customer engineers, analysts, managers and directors of all levels. Holding any post, engineer must be able to describe and present his ideas in a clear, precise and shortest way. Being in a leading position, a software engineer, who has developed professional communication skills, will be able to persuade and manage subordinates and demonstrate interesting, motivated and valuable presentations.

The analysis of the requirements for personal and professional skills of aviation industry software engineers allows us to contend that professional qualities determine a list of required and desirable software engineer's soft skills regardless of

the position which he claims for or holds in the company. We have also identified the soft skills that are required for all software engineer positions and which should be formed in future specialist preparation process; they are professional communication skills, ability to work with people and in a team. These conclusions have been made on the basis of the fact that in the modern software field the interest in traditional programmer is vanishing, and a need for professionals who could communicate well at all organization levels is growing. We have also defined a list of software engineer positions for which professional communication is a means of professional activity and a key requirement for personal qualities.

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## THE ROLE OF HUMAN FACTOR IN AVIATION SAFETY

*This article deals with human factors and safety in aviation. The author explains that human factors are important for safe and efficient aviation. Technology continues to evolve faster than the ability to predict how humans will interact with it. The author stresses that humans must continue to be knowledgeable, flexible, dedicated and efficient while exercising good judgment.*

The term human factor refers to the wide range of issues affecting how people perform tasks in their work and non-work environments. The study of human factors involves applying scientific knowledge about the human body and mind, to better understand human capabilities and limitations so that there is the best possible fit between people and the systems in which they operate. Human factors knowledge can be used to reduce the likelihood of errors and at the same time build more error tolerant, and therefore more resilient, systems. Human factors are the social and personal skills (for example, communication and decision making) which complement technical skills, and are important for safe and efficient aviation.

For centuries before the first flight of Orville and Wilbur Wright, humans had engaged both their imagination and ingenuity in an attempt to emulate bird flight. This early achievement began an evolutionary program which has led to supersonic civil transport, to spaceflight and to outstanding military capabilities. In fact, it is difficult to imagine a more impressive tribute to applied physical sciences than the recognition of the achievements in aeronautics and astronautics.

To recognize the aerospace achievements in solely engineering terms would be to ignore an important element. The fact that aircraft are controlled by people who, together with the many ground support personnel essential to their safe and effective operations, had led to a need to understand the human role in aircraft operations. This in turn had led to the involvement of the applied human sciences in aerospace. As a consequence we are now fully aware of the fact that flight crews and other operational personnel must be selected and trained according to clearly defined criteria and that equipment must be designed to ensure that the task demands will not exceed the capabilities of human performance.

The term "human factors" has grown increasingly popular as the commercial aviation industry has realized that human error, rather than mechanical failure, underlies most aviation accidents and incidents. If interpreted narrowly, human factors is often considered synonymous with crew resource management (CRM) or maintenance resource management (MRM). However, it is much broader in both its knowledge base and scope. Human factors involves gathering information about human abilities, limitations, and other characteristics and applying it to tools, machines, systems, tasks, jobs, and environments to produce safe, comfortable, and effective human use. In aviation, human factors is dedicated to better understanding how humans can most safely and efficiently be integrated with the technology. That

understanding is then translated into design, training, policies, or procedures to help humans perform better.

Despite rapid gains in technology, humans are ultimately responsible for ensuring the success and safety of the aviation industry. They must continue to be knowledgeable, flexible, dedicated, and efficient while exercising good judgment. Meanwhile, the industry continues to make major investments in training, equipment, and systems that have long-term implications. Because technology continues to evolve faster than the ability to predict how humans will interact with it, the industry can no longer depend as much on experience and intuition to guide decisions related to human performance. Instead, a sound scientific basis is necessary for assessing human performance implications in design, training, and procedures, just as developing a new wing requires sound aerodynamic engineering.

The overall goal of Aviation Maintenance human factors research is to identify and optimize the factors that affect human performance in maintenance and inspection.

Human factors play a major role in almost every accident. If you are in a crash then human factors were probably involved. Some of the human factors that might contribute to a crash include:

- a poorly designed instrument interface that led to confusion over where you were or what the aircraft was doing
- a decision to show off your piloting skills by buzzing some friends on the ground
- a failure to notice a developing problem because you were preoccupied with some other issue
- a decision to press on into deteriorating weather, because you underestimated the risk and overestimated your personal capabilities

However, the other factors are examples of things that you can control to some degree. These are all related to poor Aeronautical Decision Making (ADM), and most of this web site is devoted to helping you understand the psychological factors that influence ADM, and what you can do to improve your decision making.

Over the past several decades, safer and more reliable designs have been responsible for much of the progress made in reducing the accident rate and increasing efficiency. Improvements in engines, systems, and structures have all contributed to this achievement. Additionally, design has always been recognized as a factor in preventing and mitigating human error. When Boeing initiates a new design activity, past operational experience, operational objectives, and scientific knowledge define human factors design requirements. Analytical methods such as mockup or simulator evaluations are used to assess how well various design solutions meet these requirements. Underlying this effort is a human-centered design philosophy that has been validated by millions of flights and decades of experience. This approach produces a design that applies technology in the best way to satisfy validated requirements:

- Customer input.
- Appropriate degree of automation.
- Crew interaction capability.
- Communication, Navigation and Surveillance/Air Traffic Management



improvements.

Flight crew communication relies on the use of audio, visual, and tactile methods. All these methods must be used appropriately in the communication that takes place during flight. This includes crewmember-to-airplane, crewmember-to-crewmember, and airplane-to-crewmember communication. Consequently, the duplicated flight controls of all Boeing airplanes are also interconnected. Both control wheels turn together when either is moved so that the control inputs of each flight crew member are immediately obvious to the other. The same is true for column movements. The tactile and visual feedback provided by interlinkage is much more immediate than verbal coordination and better enables pilots to help each other in time-critical emergencies.

In the future, flight crews will be expected to assume much larger roles in route planning and metering for approaches. Cognitive engineering has already assumed an important role as the industry considers the effects of new technology on the skills, workload, and coordination with other airplanes required of both flight crews and air traffic controllers. For example, cooperation among human factors specialists, data link communications engineers, and end users has resulted in significant changes in the design of the interfaces that flight crews and controllers have with the computers that support their tasks and in the operational use of data link messages. The changes enhance user comprehension, reduce error rates, and result in decreased training requirements.

Warsaw is remembering the victims of the air tragedy that killed 96 passengers, including the president, first lady and most of the country's political elite. On April 10, 2010, a high-profile Polish delegation was flying to western Russia to pay tribute to the victims of the 1940 Katyn forest massacre in which thousands of Polish officers were murdered and executed by Stalin's secret police around 14 kilometers west of the city of Smolensk. The plane never reached its destination. The tragedy soured already strained relations between Russia and Poland. Separate investigations were carried out by the two countries. Bad weather and dubious decisions by the crew were blamed by both expert commissions. It turned out that the personnel were warned of heavy fog and low visibility and asked to reroute to a different airport, but decided to land regardless of the poor weather conditions.

## **Conclusion**

Since the early 70s, one of the principal topics under consideration has been the development of flight deck automation. Over the last 15 to 20 years there has been a rapid evolution of display and control devices including the introduction of electronic computing devices which provide a range of support facilities for aircraft guidance and control. In the early stages of automation, the systems were developed by engineers and human factor specialists were not involved until the system had been installed in the cockpit and required evaluation. The increasing awareness of human factors has led to the situation where the major manufacturers now involve human factor expertise at all stages of the design process. The recognition that flying a modern aircraft is no longer a one man effort but rather a team managing a system has led to the acceptance of the importance of human factors training and indeed

crew resource management for all pilots. In the space of sixty years, human factors has not only emerged as a discipline but has been recognized as being of such importance within the aviation community that in the UK human factors is part of the licensing requirement for all new pilots. In addition, crew resource management training is mandatory for all commercial pilots and part of recurrent training. The lead shown by pilots to recognize the value of human factor training will, it is hoped, be followed by other personnel in the industry responsible for safety. The complete elimination of human errors may be an unrealistic goal but advances to minimize the causes and consequences of error in aviation is one to which all human factors specialists are dedicated.

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## **THE RESULTS OF THE DEVELOPMENT OF THEORETICAL AND METHODOLOGICAL FOUNDATION OF SOCIAL AND PSYCHOLOGICAL SUPPORT OF AVIATION**

*The development of theoretical foundations of social and psychological support (further – SPS) of aviation activities (further – AC) is a natural result of modern native and foreign sociological and psychological theories, the answer to the needs of solving of current social and psychological problems of the subjects of aviation practice.*

Studies that have been conducted allowed to determine scientifically proven data that reveals the specifics of AC, design and create effective systems of SPS. Scientific-based conclusions and practical recommendations give the opportunity to optimize the process of SPS at the strategic, operational and tactical levels, to justify certain theoretical positions that enrich the content of sociology and psychology courses that are taught at the National Aviation University and other universities and enable further activation in scientific development of the set of problems of SPS in the Ukrainian airline industry.

SPS AD should become a certain technological scheme, which allows making optimization of key elements of the social and psychological preparedness (hereinafter – SPP) of aviation personnel. Its main purpose is to expand the spiritual and psychological features of AC subjects on better solving professional problems maintaining their efficiency and mental health. The object of the SPS system AD is "aviation expert environment " and the subject is its consciousness, mind. These elements should be described in terms of specificity, characteristics features and certain structural levels.

SPS of aviation practice contains two types of assets: real and possible. They must be the condition of transferring the potential mind elements of AC subjects into real ones with the usage of specially made mechanism, which is formed on the basis of functioning and development. The general theoretical definitions and formulation of ideas about SPS aviation specialists and factors by which its determined, emphasizing on their essential characteristics is a precondition for identifying the most important index and indicators that could be considered as components of the models needed to build research programs, instruments and further relevant projects of SPS.

Reflecting the current inner and psychological features of AD subjects is the degree of SPP, allowing them to solve the problem of certain content. Use of existing approaches, criteria, indicators of readiness above made it possible to conclude that the classification of types and levels can be based on qualitative and quantitative indicators of social and psychological phenomena, their intensit, frequency, nature, the principles of manifestation, stability, degree of variability in

the change internal and external conditions.

AC is the sphere of realization of SPP. Insofar as it acts as a manifestation of differences in social and mental development of aviation professionals and there is connection between them, so the way to solve the problem firstly is to create and use models of their training, which would include an assessment of the types and levels. The main criterion for assessing the degree of their development should be considered a measure of correlation, consistency between indicators of socio-psychological factors and potential subjects AC, which in its most general form, has on the one hand the elements of focus, and the other – of the actual behavior.

Determination of basic principles, requirements, rules that regulate AC, result in creation of tools, analysis of the results of research conducted by its aid SPS has revealed a first-order factors. They get their name based on the analysis of structural elements: the "duty"; "courage", "courage", "activity in daily routine"; "discipline"; "honesty"; "responsibility"; "hard work"; "demands"; "conscience"; "honor"; "dignity"; "company", etc. Lately they were considered as the simplest components of the socio-psychological potential and relevant factors of AD subjects.

Analysis of SPP of aviation specialists also determined to see its vertical structure, "High", "High Enough", "Satisfactory" and "Low" level. They were the main components of its content is largely similar to the second-order factors, the degree of SPP. The research value of its constituent stages and levels of the importance of social and psychological characteristics revealed and analyze the main determining factors. The mechanism of communication may be explained by using the principle of "morality, AD subjects belonging to a particular moral system." It was found that it is the general criterion of moral activity and the ability to self-regulate their behavior, and the most morally developed social and psychological formation is carried out, usually a strong influence on the level of social activity aviation experts who can speak the foundation for building applications SPS and AC projects.

Mechanisms for optimizing the extent of SPP are a set of specific processes, tools, techniques and principles. It should be the optimization of social and psychological capacity in the relevant factor that should be based on scientific knowledge and subject to the laws of functioning, mental development and determination of pilots. This effect should be aimed at all-round expansion of its spiritual possibilities. It is as such a mechanism should act SPS AD. It should be built using modern social and psychological technologies, viewed as a set of activities that must be implemented at all stages and levels of government. It should include : an analysis of social and psychological situations, forecast their development, development of optimal programs and projects impact on the psyche of AD subjects and ergonomic environment.

SPS shall be the technological system that allows you to optimize the formation of the required SPP of aviation specialists with specific requirements for them by the content of their work conditions. From its characteristics, characteristics determine its content and direction. Their determination and further consideration is one of the prerequisites for the effectiveness of SPS.

It should include two basic strategies : social and psychological projection and correction. The first involves analyzing and forecasting trends, the dynamics of

the current social and psychological situation (or extraordinary social and psychological situation), social and psychological circumstances of AD and their comparison with the prerequisites that can provide the desired effectiveness of the pilots. Correction, in turn, should be to study the options and features of the above situations, the social and psychological aspects of AD and in the implementation of measures for adjustment, support focus, mental components of subjects required within permissible norms.

Subjects SPS should act at different stages and levels controls aviation organizations, experts, sociologists, psychologists, psyhofiziology, mental health professionals – scientists and practitioners. Principles of SPS AC, diversity and complexity of its tasks determine the need for further development and use of various technologies of social and psychological impact. One of them has to perform psychological training – general, special and destination.

The presence of AC pressure of a number of staff who could potentially get trauma and reduction, in this context, efficiency makes it relevant and necessary to the implementation and further development of the social and psychological assistance. It requires a complex social, psychological, medical and organizational activities, etc., aimed at updating, mobilization, compensation, save and restore mental capabilities of subjects AD in accordance with the requirements of conditions, problems to be solved. Social and psychological assistance should take the form of social and psychological support and rehabilitation.

SDR is part of a system of AD. This process is complex, requiring decision-making taking into account the large number of factors of modern forms of organization and includes: planning, optimal allocation of functions between different activities, operational and strategic management, monitoring social and psychological situation and control. In addition, the SDR should be directed to the development and implementation of measures of effective use of existing capabilities. The problem of making its management decisions should be divided into a number of tasks: to collect and systematize information about the current (over) the social and psychological situation, measures grassroots structures and their degree of effectiveness; setting goals and objectives in the context of various aspects of AD; develop criteria for evaluating decisions, specification limits controlled parameters, the generation, evaluation and analysis of the optimal policy solutions; development of measures for implementation and monitoring of implementation.

Great information, many variations and many calculations determine the need to develop a holistic methodological apparatus, which would make it possible to adapt to the requirements of SPS AC, would solve a wide range of tasks in the field of resource management. Improving the quality of decisions can be made through the use of mathematical models, optimization methods and game simulation, the creation of software tools to automate the calculations for the development and implementation options for activities.

Today Sociology in Ukraine to some extent is focused on the investigation of the functioning and development of the subject of all kinds of professional activity. However, it should be noted that the problem considered SPS AC is not yet up to the mark: there is still no common ideas on the organization, operation and

further development of this type of software at various stages, not performed adequately study its components, functions, directions and more. Consequently, the future prospects of research problems SPS AC should be the development of its theoretical and methodological bases of the modern concept of partial improvement and development of technology implementation.

### **Conclusion**

Development of methodological, technological and organizational elements of the theory SPS AD will have theoretical significance, contribute to the further development of knowledge in social psychology, sociology, management, human resource management theory and so on.

The practical significance of the results of the above studies on the development of the concept SPS AC is that their results Smozhe direct impact on solving the needs of management practices, improving efficiency, streamlining processes and improving the professional activities of aviation specialists, development, justification and experimental verification of relevant conceptual and functional models.

After developing and testing concepts SPS AC can be proved consistency of its implementation in a certain stage and perform aggregate functions. The first one of these steps can be represented as the development of theoretical constructs SPS; second – the creation of technologies for collecting, analyzing data in order to obtain the necessary sociological information; the following may be practical to build a system SPS and implementation.

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## TRAINING OF THE FUTURE AVIATION EXPERTS FOR PROFESSIONAL ACTIVITIES

*The technological revolution in civil aviation identified the interaction of humans and technology in a specific way, in particular, despite the creation of automated control systems and the changing role of the human factor, the main control function still belongs to the man: he programmes, manages and controls, and therefore, physiological and physical training has become an integral component in the process of future operators training.*

The relevance of the study. The rapid development of technological complexity, expanding operation conditions in the world have led to an increase in the number of operator errors and their consequences. Accidents and disasters of recent years are connected with operators' activity. At the present stage of technical development requirements for quality and professional training staff are steadily increasing.

In recent years, staff training is specified in the concept of safety culture: not only the need for a high level of professional training, but also the presence of such an important element as psychological training is highlighted. The latter is regarded as a key priority and an element of safety culture. Application of new methods for the preparation and improvement of existing ones can be considered as the main ways that effectively influence the quality and reliability of teaching profession.

**The goal** – the formation of future aviation operators scope to the professional activity.

**Connection to prior research.** Recent studies in the aviation industry were conducted by Asriyan B., S. Gorbiv, L. Hrimak, P. Onipchenko, R. Pashchenko I. Filenko and others, that made it possible to formulate the concept of human factor, the essence of which is that the main component of the "crew – aircraft – environment" system is the crew. In addition, recent psychological and educational research were carried out in the direction of methodological research and practical development of new aspects of preventive psychology and psychology of crisis situations of complex socio-technical systems (potentially dangerous areas of human activity), prognostics of emergencies and their prevention solution. B. Research conducted by Babonko, V. Dobrynskaya, V. Klimchuk, S. Rubinstein and others indicate a direct connection and interdependence of motivation character and learning performance, cognitive interests and needs of students.

It is known that in the professional activity of operating personnel there may appear certain strained situations – the circumstances that give rise to significant challenges and require that the person should perform fast, accurate and error-free operations, the implementation of maximum workload for a given (usually – minimal) amount of time.

In such cases ultimate capacity of the operator's ability to think critically and

make logical informed decisions which will help to stabilize the parameters of technological systems is tested. Dynamic stressful situations, often very stringent requirements for timeliness and adequacy of workflow necessitate an advance psychological training of operators and forming their readiness to perform suddenly emerging complicated professional tasks. Effectiveness of the service in a tense situation is largely determined by the prevailing level of preparedness for events by the operators, developing the ability to manage their emotional state. Unpreparedness of an operator to control his behavior, errors arising from it can contain prerequisites for future crises and failures in the profession.

Readiness is a primary, fundamental condition for a successful operator's activity. In other words, readiness as a special mental state defines the limits of the primary stimulus – an emergency. If readiness is formed, the operator perceives and adequately interprets complications that appear and performs the necessary actions; if readiness is not formed the operator is unable to respond adequately to the situation, and performs impulsive, premature or delayed action. Thus, in order to maintain the operator's readiness to standard, one should: be able to create and maintain a reasonable operator activity; to be able to manage difficult conditions arising in operator activity.

Psychological training, aimed at forming and maintaining operator readiness, includes training on the following topics: severe conditions encountered in operator activity, their symptoms, causes; methods for ensuring the readiness of the operator (methods of self-regulation), their mechanisms, characteristics and applications; mastering the techniques of psychological self-regulation. The primary goal of self-regulation employment is realized in the development of two teaching methods: Relaxation designed to relieve mental stress; Activation aimed at removing fatigue and optimizing current functional state and so on.

The problem of evaluation of training and psychological readiness of the modern professional to act in emergency situations, according to R. Makarov [1; p. 143], requires the study of indicator attributes, criteria and methods for quantitative assessment of personality: social skills and special moral and volitional, leadership, commanding and communicative skills, determining the suitability of a professional.

Thus, according to the views of R. Makarov, the formation of a creative individuality of a future operator student, his ability to make the right decisions in extreme conditions of activity focuses on the improvement of training in higher technical education. In addition, this activity is connected with the necessity to maintain a long-term forced sitting posture, suggesting the presence of resistance to the hypodynamic activities regime.

Thus, for the profession of a pilot, operator and dispatcher it is important to have sometimes lasting throughout the day, steady focus on one or more objects or switching attention from one object to another. Regardless of the type of activity, memory is of great importance. Moreover, the peculiarity of this feature is that memory is of high importance when certain skills are not formed yet. After forming the basic skills burden on memory is reduced.

Changing the basic physiological functions in the performance of professional activities is also characterized by high emotional stress. As an adequate reaction of the body, there is mental fatigue, resulting in a decrease in sensitivity



analyzer (visual, auditory), declining efficiency and critical thinking, memory, focus and intensity so on. The degree of mental stress depends on the complex reasons: forced rapidity of activity; unexpected occurrence of contingencies; danger to life in the wrong or untimely action; the impact of adverse external factors; great responsibility for the task. Mental conditions that occur at high neuropsychiatric effort represent different manifestations of emotional stress.

In considering the issues that fall within the neurophysiology of professional activities, exploration of emotional processes plays an important role. This is due to the fact that emotions as to their origin in the evolution and the functional role in human life are a key connecting unit, which is an expression of the unity of biological and psychological processes and patterns.

Also, specific and important professional and emotions caused directly by specific employment are taken into account. They can be divided into two subgroups. The first subgroup represent emotions that connect people with the process of collective teamwork. The second subspecies of professional emotions are the the emotions that arise in the course of the work. This subspecies is especially important to those occupations in which emergency situations can arise and where incorrect, delayed decision may result in high emotional tension before the accident (drivers, operators, steeplejack). The degree of mental stress and forms of emotional stress are determined mainly by the workers' preparedness to a situation, the nature of the assignment, work experience and individual characteristics of the operator [2].

Therefore, along with professionally important features, special attention is drawn to the individual characteristics of the human individual style of work as one of the means of human adaptation to the profession. About 80% of incidents on international aviation routes happens for a reason of imperfect interaction of the manager of air traffic control and aircraft crew. [4] Information processing, decision making, hypotheses and its implementation are hampered in many cases by time limit, and in some cases by lack of time. Studies have shown [3], that under these conditions an important role is played by the dispatcher of air traffic control who displays flight conditions, according to the information of the crew, which is in a high state of tension caused by the extreme conditions of flight.

Analysis of extensive experimental material obtained in the investigation aviation accidents[5; with. 6] allows to affirm that 82% of them the "trigger factor" of emergency were the own decisions and actions of the crew, that the "human factor" and only 18% of cases were caused by other reasons (failure of aviation equipment, etc.). More than half of the events that are directly related to the actions of the crew, can not be explained in terms of the logic necessary to perform safe conduct of the flight. These include, in particular, the refusal to enter the second round at the obvious testimony to this, the performance of landing in weather conditions below the minimum landing performance parameters by explicitly non-landing parameters etc.

Particular attention is paid to the study of psychophysical factors that are the cause of many aviation accidents. Qualities such as the ability to make decisions, focus, fatigue and disability, being a very important variable, are often difficult to specify. Therefore, the connection between any deviation from the norm and the real reason of the accident almost always remains as an assumption. Statistics show that

one of the main reasons that cause the reduction of computational efficiency and reliability of "operator – machine – environment" system is that when designing and developing these systems sufficient attention is not given to the coordination of technical devices with the characteristics of a person which leads to errors of human activities that are "enshrined" in the technical device. Also, in our opinion, it is important to include the information interaction between man and machine in control systems, because the circulation and transformation of information is the foundation of any control process. Design and layout of equipment, information display, communications, controls should be based on sound knowledge of the laws of processes of reception and processing of human information in special circumstances.

However, the problem of professional training that emerged from the qualitative complexity of aviation technology and tactics of its use, entered the stage where the usual level of physical and physiological characteristics of the human body, as defined in [6], does not sufficiently meet the requirements of scientific and technical progress, which is expressed in a difficulty in mastering the aviation profession, a large number of erroneous actions in flight, insufficient adaptation of the organism. Training sessions in professional and specialized training of future operators are conducted during the whole training period in aviation higher educational establishments. Their volume is determined by the purpose, objectives, scope of educational material based on professional orientation, age and health condition.

Of essential importance, in our view, is the understanding of the need to develop preparedness for future careers of students already in the early course of study in a higher educational establishment. This step is especially important for professional self-awareness of the student and assessment of himself as a future professional of social services. During this period the foundations of readiness for future work are laid down. In view of the need for the mentioned above there exists a need to assist first-year students on the correctness of his assertion of his professional choices, certainty of further specialization, setting out the need to form certain personal qualities that correspond to features of the profession of aviation expert.

The most efficient for the 1-st year students was the course of training "Communication Partnership" and "sensitivity" training; and the enrollment of students in the working groups by interest, since these tools have contributed to the intense self-teaching of first-year students. The problem of establishing optimum relationship with classmates and teachers has acquired outstanding value.

In the second year of study for the formation of readiness we used "training of professional skills", case methods, situational and role projects of professional orientation. We noted that the specific use of these teaching materials and methods had contributed to the successful development of students' diligence, persistence, rational allocation of their time.

In the third and fourth year of training future operators of aviation were offered trainings of "social responsibility" and "creativity training". The training program "Responsibility in our lives" for the students of the third and fourth courses was tailored to their age peculiarities, and doing so we set a goal to stimulate

students to further self-development and self-improvement towards the formation of professionally significant features, among which special attention was given to the formation of responsibilities, development of skills to analyze their behavior and actions of others, understanding their relationship with the world of other people, selected activities, arming students with basic techniques and methods of formation of their responsible behavior. The use of appropriate interactive methods (training, business and role-plays, case management) showed the extent of formation of the attitude of students towards society: intense formation of life and spiritual values of the individual; assessment of their abilities become more adequate, young people seriously think about what awaits them after graduating the higher technical schools.

### **Conclusion**

Design of human activity is based on fundamental studies of human higher mental functions – perception, memory, thinking (figurative and conceptual) that are internal psychological and human activities tools. These internal features are experience, knowledge, programs, schemes and skills of the operator. Based on internal activity tools constant and operational figurative and conceptual models are formed, that determine the activity of the operator and the process of decision making. The operator, using an arsenal of inner means of activity relies on external means, which include information models, implemented on devices such as information displays or in the form of a document, engine algorithms and other training aids for problem solving, controls and means of communication.

Focus on the professional training of social workers and the formation of readiness for professional activity require the use of new educational technologies that can promote teaching and learning activities of students-future professionals of aviation industry; promote independence of thought and action, attitude to learning as a creative process, self-mastery of the knowledge that requires such technologies that during training sessions support the use of cognitive activity of students.

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## **METHODOLOGICAL APPROACHES TO THE RESEARCH OF THE PROBLEM OF TRAINING OF FUTURE SOCIAL WORKERS IN THE AVIATION FIELD**

*The article analyzes methodological approaches to the research of the problem of training of future social workers.*

Justification of the methodological principles of training of future social workers use technology to clarify design approaches that would provide practice-oriented nature of the training of future social workers to use design techniques.

During the study the theoretical and methodological principles of professional and meaningful qualities formation of future social workers, researchers have used various approaches to integrating them. Specifically, O. Karpenko applied sociosystematic, structural-activistic and synergetic methodological approaches; interdisciplinary approach, which necessitates the use of theoretical positions of other human sciences – sociology, psychology, ethnology, law, social work, etc. ; L.Badylevych has used a systematic and active, integrational, project approaches; N. Milutina – integrational active, design, humanistic, psychodynamic; A. Galimova – active, humanistic, psychodynamic, existential, functional role.

We believe that the development of practice-oriented psycho-pedagogical training of future lawyers also involves the integration of different methodological approaches.

The aim of the research the study of approaches to the development of principles of professional training of social workers to use design techniques.

At the methodological level selection approach prioritizes the principles that underlie the design of the learning process, it serves the guidelines.

According to the concept of four levels methodological analysis I. Blauberg and A. Yudin, there are four levels of methodological knowledge: philosophical, scientific, and Specifically scientific own methodological level. By philosophical approaches include global approaches of understanding reality. General scientific approaches concerning several of the objects of science (system, functional, synergistic, personality, activity, etc.). Specific scientific approaches used for scientific knowledge specific object, such as education, methodological level are specific methods of science.

In general philosophical level, the study of training future social workers to the project activity (PPP) should rely on the provisions of the relationship between things and good, things and phenomena in the dialectic of general, special and individual, necessary and accidental as determinants of the formation processes and phenomena that are investigated.

In general scientific level during the study used a systematic approach to the development of the significant contribution made by T. Ilyin, V. Bepalko, I.

Blauberg, P. Korolev, N. Kuzmin, E. Yudin, V. Yakunin and others.

Describing the systems approach, I. Blauberg see it as a definite direction methodology especially scientific knowledge and social practice, the fundamental methodological orientation of the study, the view from which is considered an object of study (method of determining the object), the concept or principle that guides the overall strategy of the study.

Advocating systematic approach to pedagogy, V. Bezpalko indicates: "Any process that occurs in certain conditions, together with these conditions are systemic. In systems distinguish elements – objects and their interactions, structure and function. Systems addressed by educational processes called pedagogical system. Thus, the systemic-structural approach to pedagogy is to ensure that education as an applied science studies educational system, their origin, existence and death as a natural historical process".

Systematic approach in the context of our research is the basis for consideration of training future social workers to use technology as a design system that includes a base and training future social workers.

Learner centered approach (I. Zyazyun, D. Levites, A. Petrovsky, V. Serikov, I. Yakymanska and others) provides priority of personal – semantic sphere of the student, including motivational value ; cultivation of a unique student experience, including the experience of the educational process, joint learning experience in the process of teamwork ; of the learning process, taking into account the individual characteristics of students; develop their independence in learning objectives and methods of their implementation; facilitative and coordination in relation to the position of teacher students.

Learner centered approach in our study we will use to create such conditions for training of social workers to use design techniques that ensure both personal and professional development of students, considering facilitation and position as a teacher, coach regarding students as well as a determining feature of interpersonal communication in the learning process of students in the university's ability to exercise which is necessary to form.

Research training future social workers to use technology to design its appeal to researchers and active approach, the theoretical foundations laid by Mr. Halperin, B. David, A. Leontiev, A. Talyzina and others. According to A. Leontiev, all life is a system of activities that change each other. In the opinion of the activity approach activity acts as a basis, the means and the first condition of the individual.

Creating social projects is an important area of professional activity of social workers and readiness to undertake design technology corresponds to one of the professional features – namely, the design, the implementation of which is to prepare the student in the process of getting the profession of "social worker." Analysis of the design of the social worker's advisable to carry out precisely the activity approach.

Along with these general scientific approaches should be used specifically scientific ones.

Modern studies of higher education specifically singled out a number of research approaches: a modular, technological problem, contextual, interactive,

competence and so on. Briefly outline the nature of the approaches that we believe is more effective to apply in relation to humanitarian training, which also relates to prepare future social workers and taking into account the possibility that these approaches are opening it for the practical training of future social workers to use design technologies.

Problematic approach for learning – a way to organize the active interaction of the educational process (learners) of the problem presented by the curriculum (A.Matyushkin, M. Mahmutov and others). The essence of this approach – learning from problem situations, whereby conditions are simulated research students. Addressing these situations encourage students to seek the necessary training material. The student becomes an active subject of the educational process. In what may be problematic part – when a student solves the problem set by the teacher, or full – and when problems nomination is made by students. The advantages of such an approach is not only more profound, meaningful learning information, but also – more importantly – finding creative experience formulating and solving specific problems.

Problematic approach to the study of problems of training future social workers to the project activity involves the use of problematic situations in the course of training, which appears as an urgent task.

Since the practice-oriented training future social workers to use technology to improve the design exactly practical aspects that can be achieved not only increasing intensification of training, and above all – the saturation of the learning process interaction, interactive approach urgency is interactive approach (O. Pometun), cooperative learning, training in cooperation (V. Dyachenko). Game studies, case studies – methods used in line with this approach, it is appropriate to use and to provide training future social workers practice-oriented character.

It seems appropriate to also use role-based experimental approach developed by O.Kotykova to provide practice-oriented nature of the system of psycho-pedagogical training of future lawyers. Underlying this approach is the author's idea of synthesis and experimental approaches to the role of training future specialists.

The basis of the experimental approach was the concept of "experience." The experimental approach was once founded John Dewey and later his ideas are reflected in the research and D.Kolba, R.Fraya, their concept of experiential learning, namely learning through experience. The basic idea is reflected in the representation of the learning process (learning) as a particular cycle in which specific experiences (SE) as another stage of learning is changing – reflective observation (RO), then abstract conceptualization (AC) and active experimentation (AE). To effectively teach the student should be able to a particular activity, as determined by these modi learning.

Role approach was used by O.Kotykova in order to develop ways of acquiring experience in the process of experiential learning.

The researcher carried out the integration of competence, and experiential and role approaches that have been used as the basis to justify specific methodological copyright experiential-role approach to the development of practice-oriented psycho-pedagogical training of future lawyers to form the students multirole professional competence. This approach can be used in the preparation of

future social workers.

Since the ability of the design project activity involves owning technology, a key specific methodical approaches in the study of technological approach should act.

The technological approach is to use clear, algorithmic training programs that lead to more or less guaranteed results achieve their educational goals (V. P. Bezpalko, M. Klarin GK Seleucus). This approach is particularly useful in mastering certain standard ways of actions and procedures that constitute the algorithms and linear motion.

### Conclusion

Modern scholars to address the problems of training future professionals use several approaches, perform their synthesis, resulting in a justified and applied in new ways to prepare them.

Summary of the views of different authors, which are devoted to the study of general and specific academic approach to education, allowing a conclusion that: in the classification of approaches to training future professionals in higher education researchers use different criteria; trend towards integration of different approaches to reflect the specificity of the phenomena studied. In particular, the nature of the problem, contextual, interactive, competency approaches highlighted the importance of these approaches to model building practice-oriented training future social workers.

The basis of the development model of practice-oriented training future social workers assigned problem, experimentally-role approach that integrates competency, role and experimental approaches and technological approach that provides guaranteed results achieve their educational goals.

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## PSYCHOLOGICAL CAUSES OF HUMAN FACTOR OCCURRENCE

*This article deals with the problem of human factors in aviation, namely its psychological basis, the cause of traumatic situations, at what levels they occur so on. It also contains a classification of the causes of dangerous situations and accidents.*

The technical development of mankind is accompanied by the transfer of a person of an increasing number of control functions, allowing it to change from performing in the control of production. Such a transformation of the role of man leads to the replacement of manual labor mentally, reducing the need for muscular work and related energy costs. However, it significantly increases the load on the human psyche, which has to meet the challenges of evaluating and predicting the efficiency of equipment and others, secure interaction with various elements of socio technical systems – industrial machinery.

The main cause of accidents in aviation is usually not technology, not the organization of work, and the person who for whatever reason do not comply with safety regulations, aircraft maintenance. According to statistics, more than half of the failures in social engineering system (air 90% of events) related to the human factor – due to increased concentration of power in the hands driven one person.

The question is, why are a person who by nature is inherent instinct of self-preservation, so often the perpetrators of such events?

This is a general review of the laws of life and allows you to emphasize that the circumstances that contribute to the increase in the number of accidents occurring with quite general objective reasons.

*The first reason is the analysis of the evolution of man.*

With the development of the tools has increased the range of human action in the world, both in variety and intensity. In this expanded and the range of responses outside world. If primitive man according to their individual physical abilities was able to confront emerging in the workplace hazards, then the possibilities of modern humans significantly behind the level of danger. However, the development of production technology allows for the design to make it less dangerous, and create appropriate remedies to choose ways of acting on the basis of danger, but the danger of the development of technology is growing faster than human fighting.

*Another common cause*, making working conditions and life tougher and dangerous is the increasing price errors. Payment for error primitive man was not as great as modern human error cost them much more.

*The third common reason that contributes to accidents* – human adaptation to danger. Using the benefits given by the technology, one often forgets that electronics usually are also a source of high danger, and its intensive use increases the possibility of the realization of this danger.

Interact with machines and the lack of information on accidents leading to



the fact that people no longer fear what in fact is a very dangerous and adaptable to danger. Often, because of the small profit it deliberately goes to a security breach. Not every breach results in an accident. People once with impunity violated the rules and getting through some of the rewards of repeats such violations. Gradually occurs adapting not only to the danger, but also to violations.

In addition to the general reasons, there are many purely individual factors that contribute to intentional violation of safety regulations and the growing number of accidents, so-called – the human factor – or a personal approach. The personal aspect of the study of professionally significant property rights is to treat them as a form of activity that occurs under certain grounds, moral values and needs, and to address important human problems.

In the aviation field stress can create dynamic events that need quick decision-making, lack of coordination between individual characteristics and the nature of rhythm. Factors that contribute to the occurrence of danger in these situations, there may be lack of information, its contradictions, diversity or excessive monotony evaluate the work that exceeds the capacity of the individual in terms of the degree of complexity or conflicting or ambiguous requirements, critical circumstances or risks in the decision.

Causes of dangerous situations and injuries related to the human factor can be decomposed into different levels, namely:

- *The level of the individual* (congenital or acquired temporarily or permanently psychological and physiological characteristics of the organism);
- *The level of near environment* (working conditions, violations of collective relations, poor instruction on safety, housing and physical care, etc.);
- *The level of society* (lack of awareness of occupational hazards and their consequences, flaws in the strategy of safe work in the area or region, etc.).

So, if a person can get things done in different ways, it just chooses the path that, with reference to our own experience, requires the least expenditure of energy, and that path she spends no more effort than necessary. This desire is a special case of the general principle of least action. In the circumstances, the same for all employees, decisive importance in shaping the courses of each person has its individual qualities that reflect the totality of socio-psychological and physiological properties. These include the types of the nervous system, temperament, character and peculiarities of thinking, education, experience, education, health and so on.

A wide range of personality traits, social circumstances and working conditions form the psychological reasons for knowingly violating the rules of safe operation:

- *Saving power* – demand that calls for action to conserve energy. Human behavior is based on a "least action";
- *Time saving* – the desire to increase productivity for the plan or personal gain by increasing the pace of work, skipping some operations that do not affect the final result of work but necessary to ensure its safety;
- *Adaptation to danger or underestimation of risks* and the consequences resulting from a person's ability to get used to the phenomena assimilated with them. The base factor "underestimation of danger" – physical and social impunity for committing wrong actions;

- *Assert themselves in the eyes of colleagues*, desire to please others entail risky action risks for – a noble cause;
- *Self-affirmation in the eyes* may be the cause of a conscious disregard of safe working methods. Often this is due to an innate self-doubt or reproach any person not associated with a specific production;
- *The desire to follow group norms workforce*. This is where a security breach or process is encouraged. Implementation of safety in such cases can put people in the "black sheep";
- *Focus on ideals*. Ideals can be both exemplary staff and offenders.
- *Revaluation of own experience leads* to the fact that, knowing the danger and its consequences, people at risk, thinking that her experience will help to quickly take action to prevent an accident or an accident;
- *The habit of work with impairments*;
- *Stress conditions* that motivate people to action, which are able to remove or reduce this condition. Man is driven by feelings, not reason;
- *Propensity to take risks*; taste for risk as a personal characteristic. In the mental structure of some individuals is the increased tendency to risky actions. These people feel pleasure, "putting it on the map";
- *Over situational risk* (selfless, spontaneous, unmotivated, not pragmatic, risk for risk). The phenomenon is that the subject successfully implementing any action suddenly aims, the appearance of which is not dictated by the situation and is not directly derived from it;
- *Infringement action in general*: in every human action there are three functional parts: motivational and executive estimated. Violation of any of these parts will violate action as a whole. A person violates the rules, instruction of the following reasons: either it does not want them to do, or they do not know how to do it or are not able to do so.

Thus, the psychological reasons for the classification of dangerous situations and accidents can be divided into three classes:

- *Violation of the motivation of action*: it turns its unwillingness to perform certain actions (operations). Violations may be relatively constant (people underestimate the danger, at risk, negatively related to labor and (or) technical regulations, safe work not stimulated, etc.) and temporal (a man in a state of depression, intoxication);
- *Violation of the orienting action*: is ignorance of the rules of operation of technical systems and standards of safety and methods of their implementation;
- *Violation of the executive parts* found in non-compliance rules (guidelines, regulations, rules, etc.) as a result of non-compliance with the mental and physical capabilities of the human requirements of the job. This discrepancy, as in the case of violation of the motivation of the action may be constant (lack of coordination, poor concentration, etc.) and temporal (fatigue, decreased performance, poor health, stress, alcohol intoxication).

## Conclusion

Thus, the reliability of flight activity is closely related to factors that caused effective and safe operations professionals who can be regarded as a generalized

"human factor". Thus, we believe that the "human factor" in aviation should be considered not only as a factor that is peculiar only to aircrew, it should include a wide range of people – air traffic controllers, flight organizers, technicians and other professionals whose work may significantly affect the overall performance and safety.

The key factors in maintaining high levels of reliability and efficiency of flight activity are measures of improving adaptation abilities of pilots, their rehabilitation and development of professionally important qualities normalization of functional states. Their solution can be implemented based on the establishment of centers for psychological support flight personnel whose activities will be directed not only to preserve the health and longevity of professional pilots, but also to improve the reliability and security of air transport in general.

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## **PHILOSOPHICAL SCIENCES IN SHAPING IDEOLOGICAL CULTURE OF AVIATION UNIVERSITIES STUDENTS**

The basic value of modern education and its ideal appears an integrated personality in the unity of his knowledge and intelligence. As S.B.Krymsky noted, "Personality is not given by nature, even in conjunction with its social conditions, but it arises from the rebellion, mystery, struggle with oneself. It is built through a system of bans and aesthetics of moral effort. Here some spiritual cosmogony deals, when, according to Plato, a person must realize what he has overcome himself every day. Personality – is morally self-governing system, the result of man's conscious choice of his own image "[1, p.23].

This idea can be fully attributed to the process of young professionals training in the aviation universities, whose future task is to ensure the safety of air transportation at all levels, starting with the organization of this process and ending the flight itself.

According to the ICAO definition "human factor – is the science of humans in the environment where they live and work, about their interaction with machines, procedures and surroundings, as well as interaction between people» (DOC 9683-AN/950-ICAO).

Man as an individual can develop and realize his potential only through the essential social activities. Mutual interest of man and society is formed according to four parameters: the level of economic potential of individuals (training, industrial interests, qualifications, work priorities); his citizenship determination (socio-political activity, a place in the social structure, the implementation of the total volume of political rights and freedoms, sense of justice); the level of welfare (standards of living, social rights, the degree of satisfaction of current needs); maturity and the complex world of spiritual values (ideas, guidelines, people's mood and their compliance with human canon). Social progress is impossible without each person implementation of the factors mentioned above. Society must endeavor to create conditions for an individual's full and comprehensive realization as a personality.

Personal potential is the basis of the human factor, activation of which is a problem faced particularly acute in the early XXI century in all spheres of human activity, including aviation. This is due to complications of the relationship between the factors of production. This complication is characterized by the fact that the technical, organizational and economic aspects of the operation are becoming increasingly dependent on the human factor, and hence man's ideological base and the existing socio-psychological climate in the team.

It also should be noted that the rapid development of aviation technology significantly alters the conditions of labor activity by complicating the system of factors that affect the realization of the labor potentials of employees of the aviation industry.

We should also mention some lagging of the production management system, and often its unreadiness to address issues associated with the current pace of staff mobility and variability of social interests of modern man.

Modernity has set a new task to the man of the XXI century, when it is necessary to train personnel capable of not only mastering the methods of accumulation of knowledge, but also their constant updating in accordance with rapidly changing environmental conditions.

Modern society needs people who can control themselves and their desires, who are sympathetic to other people, who are able to feel and understand the eternal values of society and culture and who are deeply aware of their responsibilities in the world.

While realizing the above mentioned objectives a liberal arts education of future specialists – aviators plays fundamental role, philosophy in particular as the methodological basis of humanitarian, scientific and technical knowledge. Teaching philosophy is regarded in close connection with education and upbringing. This is a single dialectical subject-subject process of learning and education, formation of human qualities, development of civil position, which is carried out not only in the classroom, but in all spheres of human life, where teachers and students are turning to philosophy as to the theory, methodology, and spiritual practice.

From the point of view of the famous philosopher M. Mamardashvili "unlike any knowledge philosophy, as we know, is directly related to the establishment and existence of man as human proper, not as a biological being. For, – the thinker notes – the appearance of man in the world, because he is born or self-born in history and culture, due to the specific environment of symbolic entities having their own language, the language of symbols, mediated by special conditions of their existence and availability. And it is in these conditions, through symbols man is reproduced as a human "[2, p.58-59].

Timeless philosophical questions of human life are also eternal, because everyone should find the answer by his own. That is when searching for these answers man thinks about his life, about life in general, and this way he generates his thinking skills. Eternal problems play a role of the exciter of thoughts in the culture for as soon as a person only touches them they draw him heavily in his thinking and "pull" a thought therefrom. Nowadays the image of "man who knows" is opposed to "man-personality." Therefore, the formation of the full value creative personality is the aim of modern education.

Philosophy cultivates general worldview and ideological settings that are not oriented directly on the specific application in some specific situations, but contribute to the formation of intellectually mature person.

Today there is an urgent need for philosophical education of young professionals-oriented on culture of thought and intellect. Thought unlike knowledge-information arises in situations of ignorance that can be overcome only by human activity. If actual essential reality is perceived through the universal

existence: being as the need that conforms to the law, the non-existence (that we do not know) is perceived as a necessity, as a requirement of way out of ignorance. Therefore, education should form a thought, but not only knowing the same thought for the formation of the thought as the living state of consciousness is possible only through the formation of personality. That is why the whole structure of education adequate to modern culture must be subordinated to educating a personality. Life and the development of modern culture is not based on human cognition, which does not now act as culture-formative component, but on its ability to identify the border between significant and insignificant. It is this ability becomes culture-formative. Just this ability should be formed in man by the education system.

Culture-formative education can be the factor that will change the trend of transformation of knowledge into a unified and impersonal information characteristic of the last few decades.

On the other hand, there is an acute issue of overcoming the division of culture into humanitarian and technical: the two areas are farther away from each other, so that at times it seems that there already formed two different types of humanity – "humanitarians" and "technicians" (scientists engineers, generally people with rational-technical orientation and way of life). Obviously, the state of separation between technical and humanitarian cultures contributes to the crisis of our civilization. It is necessary to work on their rapprochement, to strive for holistic humanitarian-technical person. An ideal –is an integrated, organic man, who orients in both cultures, in which both there are visible "sprouts" of a new culture, without this very opposition – "humanitarian and technical."

In our opinion, the alpha and omega of the high school philosophy course should be the philosophy of spirituality as the subject of philosophical understanding of the system of the relation "man – man's world". Revealing the essence of spirituality as an integral characteristic of the person, specifying it through ethical, aesthetic, logical, epistemological, axiological and other areas of philosophy helps students to shape not only their consciousness and self-awareness, but also cross-cultural consciousness, without which a person cannot become a man, and turns into Mankurt, zombie, man-machine. By its nature, philosophy is one of the forms of spirituality, the unity of worldview and morality.

Spirituality as a principle of life, which is a methodological core of philosophy course, is substantially expanded and logically culminated in such philosophical disciplines as ethics and aesthetics. Ethics and aesthetics, using the expression of Kant, can be called "practical philosophy", as their subject matter is comprehension of man's inner world.

Insistent demand of the day is the formation of moral and responsible man. It is meant man's understanding of moral realities, of good and evil, tolerance and compassion, one's destination and proper place in life, responsibility for nature, for the fate of culture, the fate of people close and people entrusted to him.

Aviation university students usually have no difficulties in formulating the laws of natural sciences, but they are completely helpless in the definition of universal moral principles and laws.

An anonymous survey of the third-year students of technical specialties in Kiev Aviation University showed that out of 183 respondents, only 3 gave

affirmative answer to the question of whether there is a universal moral rule, but nobody has been able to formulate it specifically. In this case it was the golden rule of morality, which appeared simultaneously in different cultures of the ancient world in the so-called "axial age" (Karl Jaspers), when a humanistic breakthrough in history took place and universal cultural norms were formed.

### **Conclusion**

To overcome the crisis of values in students of Aviation University it is necessary to raise educational process to a higher cultural level, providing primarily philosophical, spiritual and moral education of students.

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## **TECHNOLOGICAL AGE: ETHICS OF RESPONSIBILITY**

*The article is devoted to the ways of problematization of the ethical category of responsibility within philosophy of technology as a response to increasing technological power of the mankind*

"Finally liberated Prometheus given the unprecedented strength by science and indefatigable incentive by economy, calls for the ethics constraining his power with voluntary bonds" [3, p. 3] is the beginning of H. Jonas' book titled "The Imperative of Responsibility. In search of an ethics for the technological age" causing a resonance far outside a circle of professional philosophers.

Lack of interest to the problem of responsibility till the XIX century reveals the peripheral and coordinated status of this ethical notion in philosophical researches. The honor to be called the ancestor of ethics of responsibility could be given to M. Weber, who in his researches opposed it to I. Kant's "ethics of belief". In Kant's ethics responsibility is connected only with the internal life of an actor. In Weber's ethics of responsibility the main emphasis is placed on expected consequences of actions.

The scope of responsibility in both concepts is limited to present and past without taking into account the remote consequences of man's activity as one ethical concept deals with the motive of an action while the other – with the direct result. It should be noted that in many ethical traditions (evdemonizm ethics, ethical egoism, utilitarianism) responsibility extends only for the consequences of man's activity in foreseeable prospect. Thereof the concept of responsibility assumes the moral obligation for interpersonal relationships, as a duty imputed by the moral law in the face of present and past.

In the XX<sup>th</sup> c. the problem of responsibility is rethought because of changes in nature of man's activity in technological era. Among apologists of the new concept of responsibility G. Picht, G. Anders, H. Jonas, X. Lenk should be named. The basis of refreshing is man's new attitude to opportunities of his own freedom guaranteed to him by technology. H. Blumenberg notes that technology is "a new dimension in man – world relationship rather than a realm of definite objects emerging as a result of man's activity" [1, p. 81].

Activity of The Club of Rome, official declarations and agreements had essential impact on development of the new concept of responsibility. In particular, one can mention the Pugwash Conferences on Science and World Affairs urging scientists to reveal hidden dangers concealed in modern unprecedented development of science and technology; Russell-Einstein's manifesto (1955); Mount Carmel Declaration on Technology and Moral Responsibility (1974); conference in Asilomar, the USA (1975); ethical codes of technical-engineering associations.

X. Lenk distinguishes the types of responsibility, following the theory of a



well-known English lawyer G. Hart. On an equal basis with *causal* responsibility (for done actions), *role* responsibility (caused by duties or competences), X. Lenk mentions *moral* responsibility which has the universal importance [4].

X. Lenk defines relations of responsibility as:

- *somebody*: the subject of responsibility, the carrier (personality/corporation) is,
- *for*: something (acts, consequences of acts, states, tasks, etc.),
- *in relation to*: some addressee,
- *in the face of*: defined (authorizing and taking out judgments) instance,
- *according to*: concrete (prescriptive, standard) criterion,
- *within*: definite area of man's responsibility and his acts [4].

Uniqueness of the modern moral situation is caused by expansion of the sphere of collective actions, accumulation of results of technological change of the world, increase of their scale and irreversibility. All the mentioned demands revision of traditional ethical categories, creation of the new ethics, new scale of responsibility. Classical ethics directly or indirectly is based on several inseparably ideas:

1. The fundamental principle of traditional ethics is the belief that man's nature and the nature of things in their essential properties are invariable and invulnerable. Due to the development of technology the mankind realized that the nature is vulnerable, its resources are limited, including ability to self-restoration. Achievements of modern technology testify that *Homo faber* has turned himself into the object of technology. Artificial maintenance of life, genetic control of future generations, cloning and transplantation of artificial organs are the things able to change drastically our ideas of man's nature and the boundary between *physis* and *techné* in his life. Almost boundless man's power over the nature and his own essence demands man's responsibility for the invariance of his own nature and existence of mankind.

2. Another fundamental idea of traditional ethics is connected with ignoring of remote effects of man's activity. Preceding ethical requirements, including both golden rule and categorical imperative, foresee certain absolutes or some invariable properties of man's nature, appealing to which it is possible to specify criteria of morality of an act, significant at any temporal and spatial coordinate of the Universe. Theorists of new ethics of responsibility affirm that the kind of ethics focused on the changing world is needed: "If morality is created for man, instead of man for morality, ethics can't deny its orientation to consequences" [5, p. 376].

3. The idea of an invariance and eternity of the nature carved paradigmatic features of the preceding ethical tradition. First of all, its "vertical" orientation on transcendent highest good, the ontological correlate of which is the idea of completeness, true, eternal life. Most fully this theory is presented into Plato's philosophy. The theory reveals itself in Kant's ethical heritage, whose "regulative idea", to H. Jonas' opinion, is an equivalent to Plato's "idea of the good", as well as in Hegel's system, with that only difference that the "vertical" orientation was replaced with "horizontal" aspiration of self-developing spirit to the completeness. This installation is to be overcome with ethics of responsibility: it isn't necessary to look for the good-in-itself somewhere out of the world or at the end of history; it is

necessary to prove the value of present temporary and changeable life.

As the knowledge of consequences acquires the moral sense and becomes a prime debt of the mankind, there is a problem of anticipation of the remote consequences of collective activity and their forecasting. According to H. Jonas' opinion, the principle of "*fear heuristics*" ought to be the decisive principle in science, economy and policy.

Without calling into question the axiological and ontological priority of good and "preferred" values, H. Jonas demands to focus attention of ethics on what we would like to avoid. Heuristic function of fear estimating possible consequences of any action implies the demand to take into account the evil which it can cause. A. Ermolenko says that H. Jonas has represented a new type of fear, "it is both existential fear of anything (Angst) which is a source of man's ability to possible freedom, and the fear of something concrete, fear which is tied to the world (Furcht). For example, the fear of a nuclear catastrophe" [3, p. 376].

Development of ideas of possible remote consequences of collective practice as well as the moral debt interweaved into it (refusal of actions, consequence of which can threaten mankind's existence) is explications of the fundamental principle saying: "the mankind ought to exist". H. Jonas declares the following formulations of the imperative of ethics of responsibility: "Act in such a way that consequences of your action are in a consent with a continuity of true man's life on Earth"; "Act in such a way that consequences of your action are not destructive for future possibility of man's life"; "Include in your real choice the future man's integrity as a co-object of your will".

H. Jonas states that only this very imperative can apply for the status of the categorical one in Kant' sense, that is really unconditional. First, this imperative doesn't have the formal character; its pithiness is based rather on the consequences of an action taking into account the continuation of man's life in the future than on its self-coordination. Secondly, the new imperative is turned to political activity, in place of private behavior. Thirdly, the imperative demands to provide man's future existence. Thus, along with the imputed responsibility connected with done actions causing the sense of guilt, H. Jonas reveals responsibility of the actions are to be done.

There is the problem of justification of such an imperative. It is beyond both autonomous Kantian ethics, and any heteronomous ethical system. The ethical tradition has been focusing on the concept of moral action for ages. The problem why man in general *is*, is out of discussion for the traditional ethical thought. Being, including man's being, is the subject of the metaphysics. The new imperative – the mankind *ought to be* – is both ethical and metaphysical. As this requirement deals with being and doesn't imply the quality of a moral action, H. Jonas concludes that the justification of his imperative should be found not in traditional ethics, but in metaphysics within which the question why the mankind *ought to be* can be only raised. The attempt of justification is both interesting and vulnerable for criticism the part of ethics of responsibility.

Thus, H. Jonas' philosophical ethics is the ontological theory of values created and developed in contrast to the formal ethics, in particular to discourse, normative one. It means that the problem of justification is connected with a wider

one – the problem of correlation of material ethics of values and formal ethics of norms for the first time initiated by M. Scheler and actualized in the modern discussion of axiological conservatism and discursive ethics.

While H. Jonas justifies responsibility by intuition and metaphysics, in discursive ethics (K.-O. Apel, J. Habermas, D. Beler, V. Kuhlman) responsibility is justified by norms of communication [2]. H. Jonas's concept and discursive ethics – are two paradigmatic answers to the problem of justification of the phenomenon of "responsibility". At the same time, two approaches – transcendent, ontological-axiological and transcendental, normative ones don't exclude each other. In such complementarity ontological ethics of values would be necessary for substantial and motivational components while a reflection concerning the principles and a discourse concerning justification of norms could be a logical component.

This thesis could be operational, in particular, at estimation of consequences of one or another economic, scientific or engineering project. The value of being concerning non-being demands our preference of negative forecasts and fear heuristics. However the procedure of clearing of negative consequences should be carried out in the framework of a discourse which wouldn't appeal to emotions, but look for arguments of dangerous nature of these projects for mankind's future. This is very H. Jonas who agrees with it, noting that ethics isn't the monopoly of the chosen people engaged it professionally. This means there is the need of a wide-ranged discourse of ethical problems.

Unlike H. Jonas' excessively paternalistic type of responsibility, dialogical responsibility of communicative ethics is provided by the democratic horizon starting point of which is the ethos of reciprocity of mature personalities and the regulatory principle of justice foreseeing common responsibility on the basis of reasonable consensus. As discursive ethics considers man's dignity through his communicative freedom, it refuses all the attempts to preserve the view of man only in the biological dimension. Consequently discursive ethics couldn't follow H. Jonas' logic of mankind's preservation basing on his ontological idea, nevertheless, H. Jonas' concept of responsibility within discursive ethics could be considered as a debt of preservation of a real communicative community or as a condition of possibility of an ideal communicative community.

## **Conclusion**

The new concept of responsibility is the answer to crises of the technological civilization. The orientation of responsibility to remote, irreversible and cumulative consequences of man's activity causes the change of its temporal horizon (responsibility is directed on the remote consequences in the future); its object (it includes the entire biosphere in view of principle value of organic life, and also future generations); its subject (it represents both an individual and the mankind). Scales of critical check and legitimation of man's activity are defined within a civil discourse as an instance which is able to control dangerous projects of experimental and technological science.

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## **KYIV AERONAUTICAL SOCIETY AS THE LEADING CENTRE OF AVIATION SPECIALISTS' IN UKRAINE TRAINING**

There is considered activity of the public organization – Kyiv society of aerostation (1909–1916), its role in the outset of national aviation era, formation of the first generation of aviation specialists, pioneers of the airplane manufacture in Ukraine.

Revolutionary achievements and changes in the sphere of science and technology spontaneously contributed to the outset of the world and National aviation era at the beginning of the XX century. On the territory of Ukraine there were formed several centers of aerostation and aviation: in Kyiv, Odessa, Kharkiv, Lviv. The creation of aviation in Kyiv is explained by the fact, that there was a significant scientific and technical potential, concentrated mainly in Kyiv University and Kyiv Polytechnic Institute (KPI) That's why it's not accidentally, in August of 1898 there was held the X All-Russian Congress of naturalists and doctors, where by section of physics there for the first time worked a division of aerostation headed by famous professor, corresponding member of the Petersburg Academy of Sciences M.Zhukovskyi (1.74).

KPI was the first institution to initiate the development of light airplanes where at the mechanical circle of students of the Institute in 1905–1906 there was formed the aerostation group. The fruitful activity of the members of the group under the guidance of professor M.Delone got wide publicity and even the Prime – Minister P.Stolypin was to acknowledge “that its desirable to open at the Polytechnic Institute a new department of aerostation” (2,2) Keen interest of national enthusiasts to aviation lead to setting up in bank Ukraine of public aviation organizations. After the Emperor's All-Russian aviation club, which was opened in January 1908 in Petersburg, in March 1908 started it's functioning an aviation club in Odessa, in 1909 there was formed the Kyiv society of aerostation (KSA) and in Kharkiv – an aviation department of the Kharkiv branch of the Russian technical society. It which in 1910 was opened an aviation section alt was the Kyiv society that initiated the foundation the aviation in Ukraine. The aim of this society, as it was stated in its rules, was to contribute to the development of aerostation in Russia in all its forms and displays, first of all in scientific – technical and sporting” [3.2.].

KSA included the aerostation group of the Kyiv Polytechnic Institute. Among 110 member – founders of the society together with prominent scientists and designers there were state and military figures (in particular, Defense Minister, Commander in Chief of the Kyiv military district, two governors, merchants, bankers, engineers and even one peasant. Among the honorable members of the society there were foreign designers – Right brothers, Farman and others. The initiator and permanent leader of the KSA was professor M.Delone. The society

conducted multifarious activity aimed first of all, at forming of aviation specialists, which were able to produce innovations and create original technology, expanding scientific and technical knowledge among specialists, as well as among various strata of society.

With this purpose members of the society published scientific works, gave professional advices, were lecturing, made reports, acquaint people with special literature. Only in 1910 under the editing supervision of M.Delone there were published works by L.Bodri de Sonie, F.Ferber, S.Dzhevetskyi under the general title “aerostation library”.

Ile took part in publishing of “The collection of articles about aerostation” by members of the KSA, and from March 1914 in the magazine “Automobile life and aviation”, which was an official issue of the society.

In KSA there was organized training of pilots and taking exams as to the title of a pilot. By March 1913 the certificates of a pilot – aviator had 15 men [4.80].

The most active members of the society, which had material possibilities, worked out original projects, constructed gliders and experimental planes, helicopters, aviation engines and propellers, conducted flight shows and their analyses.

In the KSA there were functioning scientific – technical and sporting committees, board of experts, a commission on setting up of a museum and promoting in construction of wind tunnel in Kyiv Polytechnic Institute, and a library of the special literature. The KSA had its own insignia: chest emblem, gold, silver and bronze medals (stationary and breast), honorary diplomas, certificates. In April 1918 the famous Odessa aviator S.Utochkin was rewarded with the first silver medal of KSA for engaging in propaganda of for aerostation. Later M.Zhukovskiy, M.Efimov were rewarded with gold medals.

An important role in spreading ideas and creative experience of the inventors of aviette played exhibitions of aerostation, which were organized by members of the KSA. In January 1911 there was held the first aerostation exhibition, the goal of which was to demonstrate society’s activity for initial years of its existence. At the exhibition there were shown planes, aerostats, took place a competition of aviation models, the special literature was exhibited, etc. The second aerostation exhibition was held in March 1912 in Kyiv, and in 1913 there took place the all – Russian aerostation exhibition.

Out of the KSA came the majority of aviation designers in Russia. During the period for 1909 to 1912 the Kyiv enthusiasts created about 40 various types of planes, more than in other parts of the country [5, 29]. Among the tested planes there were 3 monoplanes, 21 biplane and helicopters. At that time the members of the KSA were famous scholars, designers and pilots: G.Adler, F.Bulinkin, D.Grugorovych, V.Grugoriev, V.Jordan, A.Karpeka, J.Kasianenko, A.Kasianenko, E.Kasianenko, O.Kudashev, P.Nesterov, A.Sveshnikov, A.Serebrennikov, I.Sikorskyi, F.Tereshchenko, S.Halutin, A.Falts – Fein and others.

In 1909–1912 there opened several specialized workshops – by A.Karpeka, V.Jordan, A.Sveshnikov, F. Tereshchenko and others.

The peculiarity of the Kyiv designers activity was the fact that in most cases they worked as one command or in close contact, in one hangar, helping each other,

meanwhile the planes They produced differed by original design.

The KSA members cooperated with Odessa aviation club, military aeronauts of aerostation regiments and aviation detachments. On the 27 of August (9 September) 1913 on the Kurenivskyi airport of the KSA first lieutenant P.Nesterov on the “Newport–4” plane first by in the world fulfilled the “dead loop” and was awarded a gold medal by the society.

A historical event became the flight of the professor of Kyiv Polytechnic Institute, member of the KSA A.Kudashev on the plane “Kudashev–1” in Kyiv on the 23 of May (5 of June) 1910. It was the first flight of the plane of national design in the Russian empire. For his third monoplane A.Kudashev received the big silver medal on the first international exhibition in Petersburg in April 1911.

One of the most bright figures of the Kyiv society of aerostation was the student of KPI I.Sikorskyi, which later became the world known aviation designer. Made by him in April of 1910 the first plane біплан “BIS–1” was a failure, but already on the 16 of June a new plane “BIS–2” was successfully tested. In 1910–1911 Sikorskyi designed 3 more types of planes: S–3, S–4, S–5. After testing of the plane biplane S–5 Sikorskyi on the 12 of June 1911 for the first time in Russia carried out several flights with passengers on board.

On the S–5 plane he passed the test to get the title of the pilot – aviator and set 4 All Russian records: flight height – 500 m, distance – 85 km, duration – 52 minutes, speed – 125 km per hour. During the military manoeuvres near Fastov (September 1911) the designer demonstrated advantages of his S–5 plane over foreign models [2, 32].

All further planes after S–6 Sikorskyi designed in Petersburg, where from April 1912 he worked as the general designer of the aviation department of the Russian–Baltic carriage plant. The technical personnel of the department included Kievan designers G.Adler, K.Ergant, A.Kudachev, A.Serebrennikov, motor mechanic V.Panasuk and others, which were invited by A.Sikorskyi for work at the plant. Created by him in Kiev S–6A plane became a prototype of the giant airplanes “Russian warrior” and “Illia Muromets”, designed in 1912–1913 at the plant. Practically these planes initiated heavy multi-engine aviation and were used effectively in years of the First World War. It should be noted that for the first time the conception about creation of multi-engine planes I.Sikorskyi expressed in his report “Factors of the airplane flight” at the general meeting of KSA members in February 1912. It goes without saying, the departure of I.Sikorskyi and the whole group of designers to Petersburg was an essential loss for KSA Aviation community approved of planes, designed by other members of the Kyiv society of aerostation Besides creating planes, Kasianenko brothers were engaged in working out of aviation engines, which were in serial production at workshops of KSA in First World War years. Aviation crafts “Kasianenko brothers” were more perfect than French ones, ensured more powerful thrust and thus increased the flight speed.

F.Tereshchenko alongside with designing series of the “Tereshchenko” planes which were worked out from 1909 in aviation workshop, built by him in Chervonomu (Volunska district) developed and took out a patent for mobile airplane workshop for planes repair” [6, 39]. In January 1914 F.Tereshchenko as the investor took out a patent for “flexible wing”. For such fruitful activity he was rewarded with

gold medal of KSA.

While a student, began its activity as an aviation designer D.Gruhorovuch. In 1910–1911 he constructed – 15 monoplanes and later hydroplanes (M–1, M–2, M–4 and other). The most successful was the hydroplane M–9, which made him famous all over the world. Flying airliners of Grugorovuch, which were in serial production during 1913-1916 in many aspects overcome foreign ones [2, 41].

The achievements of the KSA members were widely used both by national aviation specialists as well as foreign ones.

Conclusions. The results of the Kyiv society of aerostation were: beginning of the national aviation era and heavy multi-engine aviation, formation of the powerful Kyiv school of aviation design, training a big number of aviation specialists: pilots, mechanics and technicians The KSA members become the founders of sea aviation, initiators of, introduction of aerobatic and in whole made a substantial contribution in the development of aviation science and technology at the beginning of the XX the century.

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## **FORMATION OF THE NAU STUDENTS' VALUE SYSTEM DURING THE PHYSICAL EDUCATION CLASSES**

*Article includes practical and theoretical materials of problems researching value orientations and student's motivation to physical education in the university.*

**Relevance:** In our university, physical education is presented as educational discipline and as an important element of the harmonious development of personality. One of the conditions for the preservation and strengthening of health during studying at university is regular physical education and sports. So nowadays the orientation on the students' understanding of the necessary for personal health values, ways of its preservation and cultivation by means of physical culture becomes actual. It is necessary to understand students needs, their goals and skills they wish to learn during studying at the university, to determine their values.

**The purpose of the study:** To determine features of students' value orientations to physical education.

**Methods:** Theoretical analysis and synthesis of the literature, questionnaires, teachers' observation, mathematical analysis.

**Results and discussion:** M. Pyrene and O. Tsymbaliuk believe that, in general, value orientation can be defined as the selection of certain human material and spiritual values. Which are objects that define person's targeted livelihoods, the whole life. Value orientations are formed during our whole life under the influence of various factors. Basic individual values are formed during the primary socialization of the individual till 18-20 years and then become sufficiently stable, substantially changing only in crisis times of human life and his social environment. At this time person is actively involved in social activities, self-awareness, standards of conduct begin to develop. There are many political and apolitical factors, which influence on the person's socialization: family, school, media, informal groups. They take the young men into the system of social relations; prepare to assimilate existing social norms, cultural values and develop them on the basis of their own position [1, p 1].

Today requirements for the quality of training in higher vocational education are constantly increasing. It not enough to have only physical skills, you should be socially active and mentally should prepared, you should maintain a healthy lifestyle. However, experience shows that the most young people apply to university with a neutral or even "negative" attitude toward physical education. Unfortunately, they think it is obligatory, but not necessary educational discipline for professional formation and development. M.A. Leontyeva and V.K. Talantsev are searched, that if the lessons of physical education were not mandatory, more than 51% of students would not attend them. The main reasons for students, which miss lessons: lack of time – 48% state of health – 29% and laziness – 23% [2, p 108].

Students' interests in the physical activity are closely related to their social activity, which make such a significant impact on those elements of psychic structure, which is called value orientation. They are the important criteria for free choosing of the physical training form. Knowledge of students' value orientations allows exactly and efficiently use physical activity facilities, evaluate results and clearly coordinate them [3,p 107].

Y.M. Vyhlyayev studied how we should optimize students' physical education and decided that during the compulsory group lessons with students, who give themselves at the disposal of the teacher, effects of personal alienation is saved. In addition, when value orientations are not activated and they exist at the level of declarations, a student does not want to fulfill in the space of physical training and finds it necessary to develop a personal physical training [4,p 52].

In order to determine value orientations we made a survey. 84 students took part in the survey, they were from the Institute of Environmental Safety of National Aviation University in Kyiv. Students were told to choose the best kind of sport, to answer which value orientations they want to achieve, if they want to go into sport and what can motivate them, how they evaluate their state of health and lifestyle. Students had to underline the right answer or write their own version.

Students' purposes were divided into groups: personal, substantive, cognitive, organizational and communicative.

Personal purposes included: improve health, body shaping, obtaining self-confidence, improve emotional state, the development of personal qualities.

Substantive purposes included: getting a good grade for the semester, participate in contests, opportunity to better pass tests, participation in the conference.

Cognitive purposes included: to try on new activities, to understand the strengths and weaknesses of his character and his personality, acquire new motor skills.

Organizational and communication purposes included: learn to be active, to understand better other people, work as a team.

We got the following results: 23 out of 84 students were assigned to special medical group, because of their health. 18 of them had never gone in for sport. 95% – the improving health and get a good grade, students were interested in. 53% – are going to get the self-confidence. And 22% – are going to engage in physical education just for themselves.

17 out of 22 chosen sport games (basketball, volleyball or soccer). 5 of them chose table tennis. 15 of them had experience in sport. Their purposes were: getting good grades (92%), try on new activities (65%), acquire new motor skills (42%) and teamwork (24%), to take part in the competitions (44%). (32%) of them want to go into sport.

18 out of 29 girls chose fitness classes, 7 sport games and 4 table tennis. They were the most interested in getting the mark (98%) and body shaping (58%). The development of their personal qualities (36%) and improving an emotional state (24%). Organizational communication and cognitive purposes didn't cause the interest. 8 out of them went into sport before. They are planning some additional classes (18%).

83% of students think that the personality of the teacher has an influence on motivation to classes. 26% think that they follow a healthy lifestyle.

Among the factors which determine the ratio of students to physical education, researchers S. V. Orgeeva, K. V. Starostina, O. S. Harun perceive such ones 33% of young men think that one of the direction of physical education is a development of moral and volitional qualities. 91% of girls identified an adjustment of figure flaws as a goal. 86% of respondents strive to get physical load which is enough to support their health. So, 37% of students think that the main purpose of the physical education in the Higher educational establishment is physical improvement of the students. 52% of respondents have the goal to get ready for implementation of control standards. And only 5% identified the preparation for future trade as a goal. Development of physical qualities at the physical educational classes is a priority for 27% of respondents. 56% of students identified lack of time for sports considering their working day, lack of financial opportunities for employment in the sections is the main problem for 62% of students. 72% do not attend sports clubs and don't do it independently. And only 28% attend additional sections (aerobics, sport games, swimming, wrestling, power lifting, track and field and so on) involved in dancing and alternative sports (skateboarding, climbing). Common interests with friends as an incentive to self-development are on the first place for 38% of boys and 13% of girls. It should be emphasized that the high level of interest in joint sessions with friends is mostly selected by the students who attend a specialization in team sports (football, volleyball, table tennis). 86% of respondents answered positively the questions if they are satisfied with classes and if there is an incentive for attendance them in future. Among the priority forms of physical education classes, students identified playing sports (67%), aerobics (56%), training in the gym (51%), swimming (49%). The desire to engage in new directions aerobics recognized 95% of girls and to try a new sport agreed 97% of boys. The connection of good physical fitness and desire to attend classes in physical education marked 97% of students. 91% of respondents marked a personal example of the teacher as a stimulus to employment. 68% of students emphasized the influence of the teacher's mark on the desire to study. The conditions of the classes at the gym are important to 91% of respondents [5, p. 133]

Although, researchers' results are not always the same, which can be explained by the fact that the survey are conducted in different educational institutions and among the students with different specialization, but in general we see the students' desire to engage in physical education, especially when it is consistent with the achievement of their personal goals.

### **Conclusion**

1. The ability to choose types of motor activity greatly increases the desire to engage in physical education in Higher educational establishments.

2. Physical education classes increase incentives for employment significantly and allow students to achieve their goals and unleash their creativity.

3. Ability to discuss employment goals with the teacher promotes the understanding that physical education can help students in implement their life plans.

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## **SOCIAL PROJECTION OF JUSTICE IN THE GLOBAL AIRSPACE OF THE 21ST CENTURY**

*The work reveals the importance of social projection of justice in global context of international air law. It is noted that the rule of international law is determined as the main ideological issue of social projection of justice.*

Social projection is seen as creating of a single global communication system in contemporary culture, the extension of the dominant society and practiced attitudes to values. Social projection in a global environment is characterized by political, economic, cultural integration and unification. The processes of social integration affect all spheres of social life, including legal sphere.

In the modern sense the social project is the innovation projection by an organizer, this aims to create, upgrade or maintain in the altered environment some material or spiritual values, which has space and time and resource limits and the influence of which is considered to be positive on people according to their social value [1, c.9].

Multipolar conceptual system dictates the need to harmonize conflicting parameters and requirements when developing social projects. Finding suitable solutions to meet requirements of various systems of cultural identification, social differentiation and cooperation generates variability of project activity. Today it serves as one of the dominant traits in the basis of values in modern culture, which has a variety of presentation and information exchange means. At the same time, the social construction programs permit "to describe the entity that have own natural life, the product of which is our thoughts and observations which allow us to form laws as necessary relations" [2, p.19]. Communication paradigms changing is influenced by the results of the generalized practice of social projection, which create conditions for continual individual reproduction, society and the worlds they have created. For a person this means the process of introduction into the world that is characterized, on the one hand, by creating visible conditions of the world and on the other hand, opposition to ideal structures.

As for projective personality reproduction and "personality dimension" of social projects the prominent philosopher S. Kryms'kyi wrote: "Experience of future creation and construction in modern civilization has shown that acts of the transformation from theory to practice, from past to future, from potential to actual require a special type activity. Such activity is to be project designing and its main conceptual reflection is project. Project making today is gaining integral status and begins to compete with traditional means of knowledge and activity, even proposing a theory as the main form of scientific knowledge" [3; p.6].

The system of social projection techniques is based on the following properties of consciousness as psychology of images formation, the ability to free

association, the development of subjective perception of space, logical organization of information and value relationship examination. Accordingly, models of the world operating, goal-setting, planning, decision-making procedures, adjustment operations, new systems development of evaluating results and perspectives of social institutions development, including global air rights are becoming the attributes of social projection of justice.

The international air law is a part of Global Institute of International Public Law and follows fundamental principles determined in the UN Charter and in the Declaration of Principles. Contemporary international air law "contains universally acknowledged and compulsory to all countries principles and norms of behavior that are created by agreements between the entities, such as the principles of non-aggression, national self-determination, peaceful resolution of conflicts, disarmament, human rights respect, international agreements following"[4].

Stated in the Charter of the United Nations basic principles of international law are the basis of international legal relations and are generally recognized standards of the highest order, to ensure stable and effective functioning of the international system. Key principles of international law are reflected in the authoritative issues of air law and include:

- Rule of law, in the form of "institutional objectification of law, equal and fair limit of freedom, which is reflected in the principle of legal consciousness, which provide self-social relations" [5, p.13];
- The legality which supplies the form of state-specific legal regime by means of which general compulsory measurements of legal rules are ensured;
- Coordination of elements in the system and structure of aviation law, which enables the formation of law based on the clear structure of its elements.

Thus, projective patterns are traced in the globalization process of justice in the sphere of air law: firstly, in the process of justice development we can see gradual transformation from law regulation character to fair dimension of freedom, where the emphasis is put on legal permissions and subjective rights. Secondly, personal independence and human rights are acquiring more stable legal status. Thirdly, the power of the state is subjected to comprehensive regulation generally accepted by international norms of higher order and is becoming dependent on the civil society. Lastly, more humanistic principles are detected in the construction of legal regulation.

These conformities with law have led to consolidation in the global sense of justice common to all mankind principles such as: the rule of rights and freedoms of a personality and citizen in the legal organization of public and social life; strengthening of respect to law and order, ideas and values of law and order; citizens' legal activity in exercising their rights and performing their own legal duties.

## **Conclusion**

In today's global world, social projection of justice is characterized by aiming to progress as a definite social value, personality-centered approach, where an individual appears to be as fulfillment of creative activity, and that lets him/her feel being "inscribed" in the history with prospects for future. The rule of law is

becoming the main ideological issue of justice social projection and personality and his/her freedom, equality and justice are recognized as absolute values within the international legal system.

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## **SYNERGETIC MODEL OF INTEGRATIVE-AND-ACTIVITY EDUCATIONAL SYSTEM AS A BASIS FOR FORMING PLANETARY THINKING IN THE PROCESS OF FUTURE AVIATION SPECIALISTS TRAINING**

*The article investigates the theoretical and methodological ways of mastering the synergetic model of integrative management and activity in the educational environment of universities in the process of training aviafahivtsiv.*

In the World Declaration on Higher Education for the XXI Century, signed on the eve of the new millennium, the need for a new vision of higher education paradigm was formulated, focus in which is on the person who is trained and on a new vision in the paradigm of "its content, methods, practices and tools of ensuring based on new kinds of relationships and partnerships with the community and general strata of the population" [1]. The document stresses that higher education institutions (HEIs) should provide such education for students that educates them well-informed and deeply motivated citizens capable of critical thinking, of social issues analysis, of research and problem-solving skills, citizens being able to take on social responsibility. Autonomy and professional responsibility in decision-making, relations democratization among the subjects of the educational process, problems of humanization of society require awareness of actions from each future professional, reflective and communicative culture, which in its turn requires mastery of synergetic models of managing integrative-and-activity educational process in a higher education establishment.

On the other hand, cognitive and methodological significance of the new paradigm of higher education system is to determine the personality of the educator not as of a retransmitter of values, cognitive and ideological content, but as of a communicator, the actions of whom influence the success of the main goals of the educational process both at the micro – and the macro level. That is why the training of such an educator at universities should be the result of implementing the goal of a developed personality education that converts unlimited number of different, often conflicting ideas of its formation, modern philosophical basis of new educational systems that include both general principles and features of specifying the latter in each type of culture, national mentality as well as features of any educational and pedagogical action, linking, thus, the values theory with the theory of personality.

In the scientific field the values, as a rule, are included into the competence of the humanities, but the study of the behavior of an individual by its specificity excites interest not only in the humanities but also in social and even natural sciences, which allows to add other variants of the concept of values associated with the theory of social systems, which, in its turn, defining the subject of an individual behavior study in complex, prompts the application of such cognitive approaches that would make it possible to compare the results of applying the methods of the



humanities, social and natural sciences. The best, in our opinion, is a systematic approach. Definitely axiological (values) characteristics of a person's behavior are more significant for the humanities and social sciences. Natural sciences are usually based on the theoretical scheme of causal chains, functional dependencies between groups of phenomena that, at first glance, are independent from an individual participation or non-participation in them. However, these chains and functional relationships of natural factors make a significant impact on the behavior of the individual, and by exploring the social and human sciences, are largely transformed by the influence of values.

Thus, it is no exaggeration to state that values may be viewed as one of the main factors of a person's behavior, especially the ones which to some extent sooner or later are understood by the person as a motive, suggesting that a stable motivation that integrates social, humanitarian and environmental aspects, is ensured by means of values structure being reproduced by any society. Intensive and objectively reasonable integration of the national higher education system into the European and world educational space requires not only the introduction of new methodologies for assessing learning outcomes and adapt to the academic requirements of the educational process, but also the improvement of the structure and content of higher education in the country. We may address this issue using following three approaches:

- mastering the best achievements of European and global higher education;
- preservation of existing national educational traditions;
- reference to the achievements of modern science.

Why do we choose these approaches as key? The choice is grounded by the fact that these approaches clearly correlate with basic paradigms of higher education, namely: preserving national educational traditions (traditionalism), mastering the best achievements of European and global higher education (modernism), enriching educational content through the adoption and introduction of the latest achievements of modern science (postmodernism). Viewing the last approach as a priority it is obviously possible to define the criteria both for ensuring certain elements of the traditional educational content and for borrowing some elements from the content of higher education in other countries.

Many concepts on philosophy of education both earlier and nowadays are based on different, often conflicting principles. The big drawback in this area is that they do not take into account major advances of postnonclassical science, which is the basis of our synergy as a system of knowledge about the world in general [2].

Reflection on the fact that our era is transitional has attracted attention in the early decades of the twentieth century. This is the era of sharp break with previous experience of historical stages, which many thinkers wrote about, among which: Nikolai Berdyaev, Jose Ortega y Gasset et al. The same idea back in the 30s of the twentieth century was beautifully expressed by W. Schubart, "We are living in a transitional period which makes it both moving and controversial" [3]. Already in the deployment process of transition that has a multidimensional character, stands one of the most profound and rapid change periods in history: very soon almost all aspects of human life and activity will be permeated and shaped by global circulating information; changes will occur in global interaction, global markets and

globally active technology. The result is a new social structure, which can be associated with the emergence of a new way of human civilization – informationalism (M. Castells), the specifics of which lies in the characteristics of knowledge generation technology, information processing and symbolic communication.

Thus, it's not the knowledge and information that become determining factors of modern society, but the exact specificity of their interaction, which, in terms of network information technology, provides with a new quality of the complexity of knowledge and information [4]. Therefore, human activity in the context of emergence of new information and communication mode of development becomes significantly non-linear, innovative and cyclical. Its content is being changed: it becomes a creative communicative activity of designing new active nonlinear media, complex reality (material, informational, sensory-and-emotional, symbolic, intellectual and spiritual) that are intersected and mutually reproduced. Thus, here arises the issue of forming a new "reflexive society" capable of understanding its abilities and limits of their implementation in their own space of freedom, of realizing all the risks of the activity in the uncertain world of culture and nature, in understanding responsibility for the world.

But to live and work in the new environment one needs a different mindset, a different course of action, and appropriate changes in the logic of thinking, new values and skills of life. We are often forced to act at random or by touch through fear to make a mistake that leads to stress which A. Toffler calls "the shock of the future". This inadequacy sets a goal: to learn to think, live and act according to the conditions of time, and this requires new insight, new feelings, new ways of seeing ourselves, nature and everything that surrounds us, that is complex (planetary) thinking, self-identity as a continuous identification process, that is activity open to the uncertainty of the future which we are all involved in.

The Encyclopedia, published in 1997 by the International Society for the study of complex systems, names a number of prominent scientists who have made outstanding contributions to the development of certain aspects of complex (planetary) thinking. Among them are Gregory Bateson, Stafford Bohr, Francisco Varela and Humberto Maturana, Norbert Wiener, Ilya Prigozhyn, Claude Shannon, Edgar Morin and others [5].

It's a well-known fact that we always think in some way, according to certain rules which can be not realized by us, but still they may determine our outlook and our place in the society. According to these rules, we create the context as a whole, in the space that each fact takes meaning and value, the values are set, motives and goals of the activity are formed. A powerful tool for understanding the way we think and create a context is the concept of paradigm (from Greek – model, pattern, example) as a structure of thought, its inner form that "completes" itself from the outside as a set of rules and regulations, establishes boundaries, forms the algorithm of understanding and explaining reality and at the same time acts as the basis of activity. It sets relationships in accordance with which axioms are formulated, concepts are defined, theories are built and considerations are deployed, thus including the variety of "human factor" with goals, values, purposes, methods, tools, creative-and – constructive potential. This complexity, constructing the

character of the object of scientific inquiry and the diversity of its contents subjective component contributes to a situation of pluralism and competition programs that are developed in an interdisciplinary and transdisciplinary areas. This integrated study of complex objects, the implementation of the transfer of cognitive models from one discipline to another, forms planetary transdisciplinary thinking. This study of complex objects by I. Prigozhyn led to the idea that only the thing which lacks symmetry, is disordered and in a state far from equilibrium, has the ability of self-development and self-organization being the highest manifestation of complexity.

Summarizing the methods and approaches in the study of complex systems, H. Haken in 1970 called it synergy or a theory of collective, complex systems behavior.

However, the underlying ideological reorientation in the ways of describing and reasoning the scientific knowledge contributed to the revival of the principle of global (universal) evolutionism which helps to describe the patterns of evolution in inanimate nature, living matter and society which allows to identify a coherent and consistent picture of the world, according to which man is a part of evolution of the world process, making the picture of the world historically and culturally conditioned. Thus, it can be argued that synergy is a core that generates a multidisciplinary and transdisciplinary potential of postnonclassical science which overcomes the gap between the sciences of nature and man.

It is the synergetic picture of the world in which come across physical, social and mental aspects of existence both of an individual and the society, problems of "two cultures", of education, of intercultural and interdisciplinary communication. However, due to synergetics the differences between natural, social and human sciences are gradually leveled, and man and society become the factor of their aggregation, resulting in an integral dynamic image of the universe that is "self-organized and includes a person as a part of processes happening to it"[6].

Thus, we can define some principles, which are most important for planetary (complex) thinking while studying self-organized and self-developing systems, which cover the education system:

- systematic principle that links knowledge of the parts with the knowledge of the whole, which gives new properties or qualities to the parts considered separately, at which new qualities are emergences that cannot be contracted to pieces;
- holographic principle means that in any complex phenomenon not only parts make the whole, but the whole is built into every single part (e.g., a cell and a living organism, an individual and society);
- the principle of return coupling that locks cause and effect into a recursive loop: the cause affects the effects, at the same time the consequence affects the cause;
- the principle of recursive loop means that the products themselves are producers and causes of what or who produces them (e.g., individuals create society in their interaction, and society as a whole, that has emergent qualities, creates individuals as its members);
- the principle of auto – eco – organization means that the complex systems

that are self-organized and self-developing, obtain energy and information to support their autonomy from the environment;

- uncertainty principle means incompleteness of any cognitive process and practice, any action initiated is determined by non-linear terms of environmental or social surroundings, and therefore may deviate from the originally set direction;

- the principle of non-linearity and contemporary nonlinear models give "a chance to prevent chaos in complex nonlinear world and use the creative possibilities of synergy effects"[7];

- dialogical principle lies in establishing additional, competitive, antagonistic connection between two opposites, helping to move beyond unresolved contradictions in the wider context of possible solutions.

Provisions formulated above suggest that the principles of the complex (planetary) thinking allow creating a system of higher education for a person who is able to be successful through education.

Let's present the implementation of the formulated above principles of complex thinking as a basis for forming synergetic model of designing student-centered didactic technology at higher educational establishments.

It is a well-known fact that the main contradiction of synergetic systems, which include the educational system, lies in the interaction between the two – the one that creates new structures and the one that blurs the new structures – dissipative chaotic. On the other hand, the dialectics of scientific and methodological approach to the design of learning environment at universities requires the educator in his activity to search continuously for new theoretical and methodological approaches which will allow to design and implement into the educational process the invariant basis of modern synergetic paradigm, as of a relatively rigid framework of methodological principles that should be aimed at optimizing the solution of all conflicts that stipulate the existence and development of various phenomena of the real world.

In addition, the introduction of synergetic paradigm, in our opinion, allows to justify the use of creative approaches for dealing with complex components of the educational process, including its main components – the subjects of educational process – the personality of the educator and the student as the basis for self-organization and self-development of the educational process at universities.

Based on the fact that the basis of system analysis is the principle of consistency, and the basis of the synergetic paradigm is the principle of development, dialectics of these principles and inter-complementing and inter-conditioning each other, in fact, form epistemological (gnosiological) unity. Therefore, as one of the directions of designing modern educational environment, we use the construction of synergetic model of integrative-and-activity educational system as the basis for forming planetary (complex) thinking of the future professionals of higher education establishments.

The rule formulated by N. Bohr that "opposites are not a contradiction, they are a supplement", allows creating new logic of structure building of synergetic open dynamical systems, to which the education system refers: new thinking and new technologies of communication and behavior. This synergetic principle of supplement will be considered as the system-forming basis of the self-organized

systems theory, the most difficult of which is a man with his consciousness, the dynamic state of whom can be described by the scale of "chaos-order". Balancing their interaction in capacity of the existence of quality invariability of the system during a definite period of time at a constant difference in the outcome of their interaction at the output makes it possible to form two ways: evolutionary stage of development and rapid bifurcation chaotic breakdown of the old education system. It is the second way that promotes the appearance of a great number of attractors (new centers of organization) that aspire for a new organization of society, and the most important task of a synergetic paradigm, according to I. Prigozhyn is a "choice of one of many possible paths" of developing appropriate systems.

Thus, the synergetic model designing educational environment, which views the psyche of the subjects of educational process as open, unbalanced, nonlinear system, is under the influence of the outer information space fluctuation, which by means of affecting conscious and subconscious mind, allows to formulate hypothetical assumption about the bifurcation development mechanisms of the student's personality, at which the process of evolution of the educator's and the student's personalities may be represented as a continuous chain of discrete areas of a specific subject parameter space near critical points, which is the result of small irritants of the informational-and-education environment on the psyche of the subjects of the educational process.

Based on the fact that the psyche of the subjects of the educational process can be viewed as a non-linear system, which is almost always in the mode of exacerbation, the presence of these possible (subjective) bifurcation mental points is due to the fact that in the information environment of any small excitation can cause severe reactions, which in its turn will cause a structural transition of the system (e.g., failure in one or more disciplines can trigger the reluctance of students to successfully master a particular profession). In addition, taking into account the spontaneous choice of further trajectories of the education system evolution at bifurcation points, can serve as an explanation of the probable nature of the nonlinear dynamics of forming the subjects of the educational system during the learning process (this may explain failures in the process in the education of the individual on the final phase of learning process, which may significantly differ from those that were designed at the initial phase of this process).

Considering the subconsciousness of the learning environment subjects' as determined chaos of probable trajectories of mind development and being based on the fact that the nature of mental attractor may have different origins, we believe that these attractors can be efficiently generated in socio-and-biological system, too and the totality of them makes up the educational environment.

Constructing such mental attractors by the educator in a student (special structures, asymptotic areas, centers of gravity trajectories of evolution) can be regarded as the basis for designing integrative-and-activity educational system in general and student-centered didactic technologies in particular, taking into account mental attractors that are present in the subconscious mind of the educational process subjects or the collective unconsciousness, which makes up the structure of the microscopic level of the individual.

The suggested hypothesis on the bifurcation nature of the microstructure of

the psychic system of educational activity subjects requires, in its turn, methodology of planning the educational process at universities on the basis of forming "pedagogic attractors" and non-linear educational environment with resonant pedagogical influence and the learning process (production of knowledge and the formation of integrative abilities and skills) can be viewed as a continuous chain of structural phase transitions of the individual (cognitive, behavioral, and other states of students) from one topology to another, which in its turn evolves from one symmetry to another through the development of existing mental structures to creating additional mental innovation.

As far as self-organization is considered the essential characteristic of the psyche of the individual, the educational process at universities can be represented as a deliberate process of creating pedagogic attractors, that is most probable areas where the trajectories of the self-development of the educational process subjects may be found, which will facilitate the emergence of new ideas on the education as a continuous process. The mottos: "Education through Life", "Education without borders", "education for one and all" are the essences of the new paradigm of education which are exactly described by the phrase "information is not yet knowledge, knowledge is not yet education, education is not yet success". "The difference of the definitions mentioned above requires from the system of modern higher education innovation models and technologies, oriented at students, ensuring their professional subjectivity, the ability to be the master of their fate, success in life.

### **Conclusion**

In addition, the inclusion of system-and-synergy, self-organizational concepts into the structure and content of an individual formation is, in our view, reflected in the humanistic paradigm of education and their implementation is associated with the individual-centered didactic technologies of education that form the resonant pedagogical action through deep motivational influences on the student's personality. On obtaining the nonlinear individual-centered didactic technology the educator at the university by his activities promotes the organizational development of the student's personality, that is capable not only of compensating degradation over time (forgetting knowledge, destruction of cognitive innovative forms, patterns of moral behavior and so on), but also of forming a predominantly positive innovative forms (as an example of the newest student-centered didactic technologies can serve the method of "knowledge zigzag", technology of probabilistic learning, technology of forming the dynamic model of a personality). More and more evident becomes the understanding of the fact that the educational process is a specially organized pedagogical process of education, training and development being the integral parts, which interpenetrate, forming a planetary (complex) thinking of the future aviation sphere specialist in the process of professional training.

Thus, new goals and values of higher education in the XXI century conditioning innovative technologies of the education process in their core should have a synergetic model of interaction as a model of collaboration and co-creation, communicative and reflective trainings and organization-and-activity technologies.

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## **THE HUMANITARIAN ASPECTS OF SECURITY POLICY OF UKRAINE IN THE CONTEXT OF EUROPEAN INTEGRATION**

*In the article in contemporary academic discourse author examines the humanitarian aspects of security as the problems of preservation of the human person by the destruction of traditional cultural norms and values while preserving essential conditions for the identity of the people.*

This particular set of ideological and socio-cultural value orientations is the basis for the scope of the safety of society and underlies the formation of national identity as one of the major consolidating and integrating community factors.

In this context, humanitarian security of the state should focus on the protection factors for preserving and developing the cultural identity of the Ukrainian nation. This is also one of the pillars of national security in the humanitarian field.

In the National Security Strategy of Ukraine clearly states that the strategic priorities of the national security policy is to achieve national unity and consolidation of society by addressing both objective and artificial contradictions of socio-cultural, confessional, ethnic, linguistic, interregional, and regional character based on strict observance of constitutional guarantees rights and freedoms of man and citizen. [1]

Implementing the main areas of humanitarian policy in Ukraine, we must focus on the positive experience of foreign countries, particularly in Europe. Today the formation of a European educational space is particularly relevant in the humanitarian sphere.

Really powerful impetus for Europeanization of Education of Ukraine was the Bologna Declaration (1999). Under this agreement, European integration is aimed at consolidating the efforts of scientists and educators to significantly improve the competitiveness of European science and higher education, and thus their role in the development and strengthening of stable, peaceful and democratic societies. In the Bologna Declaration states that "Europe of Knowledge" is now a recognized priority factor for social and human development. It is the key to strengthen and enrich the Europeans, because Europe can provide them with the necessary knowledge to adequately respond to the challenges of the new millennium, aware of shared values and belonging to common social and cultural institutions [2, 17].

The purpose of the constitution of the European Higher Education Space is also a desire to preserve its cultural diversity of Europe. "The real culture – said D. de Rougemont – is not some ornaments, the usual luxuries, or set of specialties that do not relate to the layman. It raises awareness of life, the constant need to deepen the meaning of life, increases the power of man over things. It has created greatness of Europe "[3, 66]. Actually the creation, transfer and development of culture, according to Dr. de Rougemont are the result of continuous dialogue between the



abundance of reality and antagonistic tendencies. It is in this debate the mystery of dynamism and creative discontent that encourages Europeans to ask and discuss from century to century, their relationship with God and with the world, with the state and community.

Basic philosophical principle of European education is a unity in diversity. It finds itself in the pluralism of national education systems and their alignment with European standards. This consistency is presented as development of the European features of education taking into account national circumstances.

European integration processes in education are based on the principle of national education systems identity. European education has been and remains national. Science and ruling elite, despite the crisis, their spirituality is also national. It follows that a necessary condition for the integration of education to European space is to build a national educational space. Its task on the one hand is to ensure assimilation of civilizational achievements, but on the other – to become a cultural barrier of homogenization. It should establish a national identity and cultural identity. [4]

Analyzing the impact of globalization on national cultures, T. Friedman said: "The irony of human life in the context of globalization represents remarkable characters – " Lexus "(hyper-modern Japanese cars) and the olive tree". Lexus "symbolizes the technological revolution, without which it is impossible to achieve prosperity in globalization system. Olive trees "symbolize all that exterminate us, give us identity and define our place in the sun. Olive trees are the family, community, tribe, nation, religion, and most importantly are the place that we call home "[5, 54]. Actually olive trees represent the structure of the living world of every nation, membership of which makes the life of every person meaningful.

Despite the fact that modern machinery and technology integrate and unify all spheres of human activity, it appears that the process of modernization of modern society does not diminish their desire to assert their cultural and national identity, language, religion, traditions and customs. Thus, the problem of identity still exists, and education is the social institution that is able to form a national identity not only individuals, but also the people.

Analyzing ways for implementing humanitarian policy in the context of national security, we must first focus on the following areas:

- consolidation of Ukrainian society through the formation of national identity and the development of national culture and the cultures of national minorities (in particular through the comprehensive development of the Ukrainian language and support for minority languages);
- development of national art, film industry, printing, etc.;
- formation of historical memory, preservation and popularization of cultural heritage;
- accelerating innovation in educational, scientific and technological fields;
- protection of the national information space;
- creating conditions for harmonization of religious and denominational relations.

An important aspect of the development of national consciousness of Ukrainian society and promotion of national culture is supporting the national

language. According to the Constitution of Ukraine the state language of Ukraine is Ukrainian language [6;5].

The State ensures the comprehensive development and functioning of the Ukrainian language in all spheres of public life throughout Ukraine. Recently, this issue is too politicized, a number of political forces demanded the introduction of Russian as a second language. Although no sample use of the Russian language in Ukraine is not, as it freely enjoyed by citizens, the media are given, it is used in schools. The legislation is also supported, as in Article 10 of the Constitution of Ukraine clearly states that in Ukraine, the support of Ukrainian as the state language and the free development, use and protection of Russian and other languages of national minorities of Ukraine.

To reduce stress in this area should also be actively implement the provisions of the European Charter for Regional or Minority Languages, ratified by Supreme Council of Ukraine, which explicitly states that the right to use a regional or minority language in private and public life is an inalienable right according to the principles enshrined in the International Covenant United Nations Convention on Civil and Political Rights, and according to the spirit of the Convention for the Protection of Human Rights and Fundamental Freedoms.

One of the areas of humanitarian policy is the study of the preservation and promotion of cultural heritage. Our country is one of the leading countries in Europe for a number of historical and cultural heritage (about 150,000 – almost 2.5 times higher than in Poland) [7]. Unfortunately this powerful cultural potential is not fully used, due to the presence of a number of significant problems in this area. At present, it is worth noting a rather low level of public management in the protection and preservation of cultural objects in the promotion of cultural and recreational brand of national heritage.

One of the goals of humanitarian policy in Ukraine in the context of national security is the study and promotion of its historic past. In this context, an important factor in the consolidation of Ukrainian society is the historical memory of the Ukrainian nation.

Public policy memory should focus on the formation of citizens of Ukraine sense of common historical destiny, respect for national history, awareness of connectedness with it responsibility for the future Ukrainian nation-state; to enhance the integrative role of historical memory in the process of nation-building, the establishment of a national identity, civil achievement and consolidation of social and cultural unity of the Ukrainian political nation; to use the potential of historical memory in order to strengthen patriotism, civil engagement, values and political orientations, loyalty to the Ukrainian state of readiness, if necessary, to defend; to enhance the role of historical memory in the context of legitimization of Ukrainian statehood and sovereignty.

Public policy memory should focus on maintaining political stability absence of conflict of public relations. Among the large arsenal of forms and means of formation of historical memory leading place belongs to history education, updating national "places of memory", National Pantheon, historical and cultural heritage, museum exhibits and library collections. A powerful source of design ideas is the mass of historical works of art, media, symbolic memory space,

commemorative practices and rituals. Support the development of history, the increasing influence of professional historians in the formation of historical memory should be an integral component of public policy memory.

To ensure the development and promotion of Ukrainian culture need to develop a series of measures to protect Ukraine's information space and counter the penetration of information product that is a threat to security, physical and moral health of our nation. One prerequisite for the formation of the national information space is a complex and effective protectionist policy that aims to stimulate the creation of relevant industries and ensure their sustainability. First of all this: 1) developed and influential in the community system national public broadcasting of such industrial and technological components as national and satellite broadcasting, online internet broadcasting, producing films, television series and programs; 2) competitive system of national film production and film distribution; 3) The national system of global collection and dissemination of information, focused on active dissemination of information about Ukraine and the creation of a positive image in the world.

### Conclusion

In general, analyzing the difficult situation in the religious sphere, it should be noted that today should take a number of steps to overcome the contradictions in this area. In this context, the need to develop a balanced and yet dynamic state policy of Ukraine in the field of church-state relations, aimed at defending its national interests and strengthen the spiritual and moral health of the people.

In summary it should be noted that the solution to most of these problems in the humanitarian sector will contribute to the development of national culture, consolidation of Ukrainian society, the real acceleration of Ukraine's integration into the circle of developed countries.

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## **VECTORS OF MODERNIZATION OF THE NATIONAL SYSTEM OF HIGHER EDUCATION**

*The article considers the modernization challenges, facing the higher education system. Authors conduct the analysis and search the vectors of modernization and transformation of the educational system, and identify a number of points, without which the conceptualization of modernization of the higher education system is impossible.*

There are many challenges before modern higher education. Now education is not limited neither in space nor in time, its diversity and the universality does not imply any limitations. The University is fundamentally international community, it is a place of interaction, where there are students from all over the world, interested in different fields of knowledge. This principled spatial mobility and universality of education reflects the term in the field of educational policy – international academic mobility, what makes mature people, are able to navigate in this world that can open new horizons, create own world, and does not play once and for all memorized the algorithms. The appearance of distance, continuing education opens new opportunities, but the strategy for inclusive education (education for people with special needs) gives new obligations before society. Describing the world experience of development of higher education, it should be emphasized that during the XX century higher education systems of most countries of the world is significantly evolved. Increased their size, the increased number of higher educational institutions, teachers and students, has expanded and has qualitatively changed the range of specialties, in general became more important mission of the graduate school.

Ukrainian universities which still today, unfortunately, do not have a strong reputation, can not compete on equal terms with the West, are often the subject of political debate, not weighed intelligent discourse. Their culture, and most importantly – intellectual capital is not replenished, and wasted due, primarily, excessive centralization of higher education, the lack of legal support and recognition of moral freedom in the study, an insufficient level of funding for education in general and the latest scientific research. Under such circumstances, the university, rather than to become a factor in accelerating the modernization of higher education and the generator of development may be an aggravating factor for domestic science. One of the negative trends that are indicative of the poor state of Ukrainian education is its non-compliance with European and international labor markets.

So in today's globalized world of special importance and social time is the question of equal and equitable access to quality education, as evidenced by the emphasis in international instruments for the development of education in recent years. The development of equal access to education and its quality evaluation

contribute to the implementation of modern and future goals of transforming society in Ukraine will activate reform of higher education. Equal access is possible under two conditions: a deliberate choice by the applicant institution/field of study on the basis of understanding of their interests, motivation, self-knowledge and abilities; elimination of clan-corporate tradition in education, its "deradyanization"

Until this moment the system of higher education in Ukraine was quite complex and contradictory path of development, details of which were determined by a combination of political pressures of higher structures and pressure from below – initiative groups and leaders in higher education. It has been made a progress. The number of students increased more than twice; emerged and strengthened considerable sector of private schools; began training with many new professions; strengthened and postgraduate etc. These developments do not mean the transition of higher education in the state of stagnation and satisfaction. On the contrary, it is accelerating modernization, there is another one of the reasons which, in our opinion, was the Bologna Process.

European orientation in education and upbringing belongs to the radical innovation within higher education. Information and cultural openness of Ukrainian society, the implementation of democratic reforms, changes in foreign exchange contributed to the awareness of the need for the development of European educational space. This radically changed the social environment of higher education. Using a known model of American sociologist and psychologist William Bronfenbrenner [7, p. 13], we can say that the European choice made changes in the micro-, meso-, and macro system socialization of the younger generation, and the European idea as a complex of cultural meanings outlined the goals and objectives of education.

The development of the European idea is a long process of innovation, which apparently covers several generations of students. Each of the following will bear a visible impact to European socialization. Speaking of European socialization and its importance for the transformation of Ukrainian higher education system, should include such factors as increased mobility of young people, especially student on the European continent. Overcoming xenophobia, acquiring skills for consensus in intercultural and ethological conflict is a degree that begins to define Ukrainian youth in the twenty-first century. Increased interest in foreign languages as a means of expanding the range of scientific and intercultural communication, increased contacts, establishing new channels of communication indicates readiness adoption of Ukrainian youth deeper meanings of European ideas, the idea of the university and its related educative innovation. However, it is necessary to critically rethink and objectively evaluate the westernization of our culture as a process of cultural colonization, which not only threatens the loss of cultural uniqueness, but also brings negative trend of secularization and profanation of authentic cultural forms.

Focusing on European educational traditions should keep the positive features of the current education system. However, still a large dependence on the Soviet legacy poses a serious threat to Ukrainian society. No less dangerous is the destructive and uncritical introduction of European models. Romanticized, idealistic attitude to European integration in general, is not only contributed to Westernization and Americanization of the national culture that has brought secularization and

profanation of authentic cultural values, but also makes clear the crushing pressure on the area of Ukrainian spirituality, liberalizing it under the format of colonial, unified cultural environment. No wonder then that a number of contemporary sociologists [5, 6,7, 8], analyzing the impact of this caution against mindless, blind copying European models. Implementing changes in education policy, shall be guided primarily by what we want for the future of Ukraine as important and valuable for us to keep their own authenticity, originality, form a kind of independent development path. And so we must constantly ask ourselves the question:

- What kind of the value system are we going to teach the new generation?
- What kind of future will Ukraine be able to achieve with a particular system of education?
- What are the strategic goals of society, serving the interests of the individual in this education?
- Can such a system of education to ensure their rightful place in society, our children and grandchildren, their competitiveness not only in Ukrainian, but also in the global labor market?

Thus domestic researchers have expressed quite pessimistic views[2, 3, 4,5], emphasizing that the system of higher education in Ukraine today is in a state of deep crisis, the essence of which is that it does not match any of the new conditions of social life in all its regions, nor the global tendencies of the development of post-industrial society. The deepening crisis contributes to acute socio-economic and political problems that accompany the present stage in the development of the country. The manifestations of this crisis are varied: it is reducing the effectiveness of the high school, especially the weakening of cultural, educational and creative developmental roles in society, it is the destruction of its capacity (personnel, scientific), this widening gap between the interests of consumers of educational services, on the one hand, the interests of higher education on the other, and the interests of its government with the third, it is a violation of the interaction between higher education and the legislative and executive bodies of state administration, it is the destruction of social ties between workers of higher school, the destruction of norms and values, about their life and much more. The crisis of higher education due to its inertia, conservatism, lack of mechanism to adequately subject to conditions is requiring new social reality, adequately responding to them. Quantitative and qualitative changes in higher education do not meet either the pace or scope or depth of the changes taking place in society [5, c. 127-128].

However, for the theme of our research during identifying the role of the educational system and its apical part in the contemporary social processes with the purpose of creating the basis for the analysis of the causes, course and consequences of the reforms of higher education, it is important to emphasize, first of all, on the change of socializing tasks of the network of educational institutions. It is possible to understand that the advanced system of education must form not limited in their civil and professional and creative opportunities cohort of workers and a small group of graduates, and civilized, cultural, responsible and tolerant professionals. In this context, it is updated and educational potential of higher education, which, by definition of a number of researchers [5, s. 13] is systematically profaned by the

processes of secularization of the educational process and its shattering marketization.

We, arguing the need to develop Ukraine's own unique ways of modernization of higher education, strongly emphasize the crucial role of education the new man of the future on a fundamentally new basis. In this sense the above approval of Durkheim not only gives a visual and fundamentally sociological context of this problem, but also allows us to highlight a number of points, without which the conceptualization of modernization of the higher education system is impossible.

These are the main qualities.

1. There is no future without the past. It is therefore a critical sociological analysis of retrospective formation of modernization of the higher education system is compulsory, as it will allow to define the coordinate system, which is still on inertia continues to determine basic processes in education.

2. Future is formed from modern. The corresponding objective knowledge about what problems we have today, objective assessment of their causes and consequences, will allow to prognosticate the trajectory of current trends and adjust them accordingly.

3. There is no future without purpose. Therefore, the objective is a creative and activity image and the idea of the phenomenon is the main tool for constructing social reality of the future fabric of existence. Value and the role of education are actualized as future goals.

### **Conclusion**

Globalization has already been an objective reality that you want and need to analyze and evaluate, but to which you want to adjust. New social conditions just simply activate viewing the source of the foundations of post-industrial society and its qualitative transformation.

Analysis of past and current status of the national higher education, reconstruction of the social conditions, events and trends that define the educational sphere in Ukraine will allow us not only to see the reasons for existing, as noted above a crisis situation, but also to identify ways of improving that in our device will appear as an attempt designing an effective model of modernization of higher education in Ukraine, taking into account first of all the strategic goal of transforming the system of education of the person of the future, which in our understanding should include the challenges of globalization of the future, first of all, be based on the meaning constants of cultural traditions.

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## **SUBCULTURE AS THE AGENT OF ACTION OF CULTURAL TRADITION – THE INITIATOR OF INNOVATION AND INSTITUTIONALISATION PROCESSES**

*This paper analyzes the subculture as an agent of action of cultural tradition. It is recognized that the possibility of a modern man of the industrial society to choose their world view (picture of the world) is growing in parallel to the improvement and diversity of offers worldviews, which is a consequence of the intensification of globalization processes, massovization and internationalization of the world culture.*

According to adherents of postmodern perspectives, worldviews, and therefore the life of modern man, is less and less determined by social-class, professional, or even religious affiliation of the person. The values, needs, interests of certain social types become integral elements of personal organization, only because of its own free choice, which makes it rather relying on personality traits (as coordinator for personal worldview) than the system of socializing factors aimed at forming a human particular culture. So, at the level of general-world culture, one can already speak about the existence and constant active development of the whole market outlooks, which shows a very different picture of the world (from the most archaic cultures to the contemporary postmodern reflections), offering to individual ready holistic solution patterns of personal existential issues and global challenges.

Moreover, definitions of "world" presented usually are still active, local subculture and include: ceremonial and ritual, values and normative, status and role, and ultimately semantic-symbolic systems that organize the life of social groups of this subculture. Similar cultural formation appear stronger than the already mentioned social-class, professional and even religious subculture of social types – institutional subculture, due to the nature of the cultural patterns of inheritance members of her social group. For each individual, as a member of society, somehow, at the same time is appropriate for all types of subcultures (and socio-estate, and professional, and religious) and this ownership can wear as purely formal, formal and not formal in nature (except ethnicity, which in primordialist approach (K.Hirts, R.Hambino, A.Hrili, U.Konnora, P. Van de Berg) is conscious quality inherent nature of the individual psyche"[1].

The cultural model as a local mini-culture that has arisen as a result of socio-cultural movement of nearly new and entirely modern phenomenon, the concept of which is more voluminous than the term subculture. Although somewhere, something they intersect as cultural models also have a subculture, for our analysis is the very definition of an adequate cultural model.

Speaking of mutual intersection of these concepts should be noted that the cultural model is always a subculture, while the subculture is not always a cultural model. Thus cultural model seems certain special type of subculture, or a condition that is not just the individual marks in its membership in a particular cultural type,

and defines it as an individual in the aggregate ideological orientation and values. So, speaking of the cultural model as a local mini-culture, we primarily emphasize what it determines the individual's behavior and determines not only in terms of status-role, which is sometimes formal, do not always reflect the real social orientation of the individual and determines the ideological and vitally important individual choice as choosing a certain personality "picture of the world." Of course, highly individual, the main feature of which, following the V.V. Nalimov is spontaneity, creates its own world view, creatively synthesizing intuitive understanding of the elements sometimes different philosophical systems, but most members of the public focused mainly on imitation has "finished" version of "relation to the world." [3].

By operation of cultural models, as well as other space objects is directly related cultural tradition, placing last in the appropriate distance from the center, depending on the degree of "correlation" of myths and other cultural forms as innovations of the "charismatic content", "central zone of culture" in these social and historical conditions. It should be added that as the spatial arrangement, and actually functioning of cultural model is not complete without a cultural tradition that sets the parameters of innovation and institutionalisation processes reproducing its own discourse over sociocultural dimension objects. It is a cultural tradition and promotes the formation of new cultural models as tools to create new innovations, increasing the range of variations available under the "imminent" inner cultural requirements, which in turn is determined by the transformation of the socio-historical context.

So cultural tradition gives impetus to create, borrowing, or actualization of certain necessary for the rapid cultural situation subcultures, initiating the presentation of certain myths, as innovations it away verifies internal requirements (constants central zone) and depending on their compliance contributes to the institutionalization [4].

As the culture of the whole society and cultural model that has a certain life cycle, as development phases and forms of adaptation to external conditions. If all of these options in the culture of a society is determined by many parameters and require separate detailed analysis, in the case of a cultural model (subculture), all these parameters are mainly conditioned by the dynamics of the socio-cultural dimension.

Cultural models have very short life cycle, compared with the culture of a society, but their presence within a particular socio-historical period in the area of culture of a particular society is sometimes necessary condition for the continuation of life of the latter. Phases of the development of cultural models in general can be represented by a number of stages.

The first stage is the formation of a "core area" of cultural models that in socio-cultural dimension occurs as reference of pulse from a charismatic area in block (using the terminology of S.Eisenstadt) and looks like a creative actualization (aimed at the search and selection of innovation) part of the cultural tradition. In social terms, this process appears as a certain awareness of the society of the need for certain ideological orientations, which is the reaction of individuals to specific socio-cultural realities of life that they would like to change that and provokes spontaneous assembly of social

movements. Consolidating on the first stage, in fact, spontaneously crowd half – realizing own ideological proximity consists of an organized social group only at the stage of development of the cultural model, at a time when a leader is a spatial "center" of the community. Thus, "first observed the gradual emergence of new ideas, beliefs, creed," common vocabulary of hope and protest" over time some movements are developing their own particular worldview." [6].

The second stage in the formation of cultural patterns is associated with the emergence passionary personality, charismatic leader, who by virtue of her own creative spontaneity manifests herself most adequately capable display through himself (his outlook, creativity, social behavior, lifestyle, etc.) and to state perceived by example "charismatic content" "central zone" as values, interests, needs, ideals, etc. These same "charismatic content", the need to adapt them to ripen inner cultural processes are embodied in the ideological system of a certain cultural model.

The third phase of the cultural model can be called the phase of the operation, because it comes as a phase of life of their own cultural models in socio-cultural dimension of space and is in the constant production (creation) and the transmission of cultural forms, bearing in itself symbolic and symbolic reflection of the myth of cultural models. As a cultural model of culture exists as a socially specific contexts presentation "charismatic content" of central zone of the cultural society and cultural form is the mean of the myth of cultural reproduction model.

The fourth stage of the life cycle phase of completion of the cultural model in which the phase of destrukturizatsiya. Deprived of energy (ie the pulse of the "charismatic sphere" (in the terminology S.Eyzenshtadta) model ceases to function, and it produced cultural forms eventually lose their primary sense. In a similar elements, they can be quite a while until they come out of use (becoming memorial also has its own form of memorial model).

The fourth stage of the life cycle phase of completion of the cultural model in which occurs the phase of destructurization. Deprived of energy (i.e. the pulse of the "charismatic sphere" (in the terminology of S.Eisenstadt) model ceases to function, and its produced cultural forms eventually lose their primary sense. In a similar elements, they can be quite a while until they come out of use (becoming memorial also has its own form of memorial model) [6].

These are the phases of the life cycle of cultural models, which operation is ensured by the activity of a particular social group. All members of a social group of cultural models, with rare exception, are usually members of the same society, that is, consciously or even unconsciously have general cultural impacts to society. Although the identity of the adherents of different social cultures, institutional subcultures (religious, professional, social-class, age) diversifies options imitation of selected cultural models of every individual, but combines them in the form of the same model, first of all, as members of a society.

## **Conclusion**

Concluding the analysis of the effects of cultural patterns should be noted that all existing national social and cultural dimension of cultural space models can be classified according to their belonging to certain institutional subcultures and social movements. We are talking about such "functional field" presenting culture

models: how political, religious, social, social class and ethnic subcultures major institutional and socio-cultural movements such, creating a set of cultural models as a youth movement, the movement of "New age" feminist and ecological movement, etc., each representing an individual has a functional field.

Summing up the results of the analysis again note that the socio-cultural dimension of space among other subcultures is appropriate to allocate their special type that is both authentic to him and which we call cultural model. So the cultural model is a local social – active original mini-culture, with a unique worldview paradigm – the myth that there is energy information construct ideas, tool design social reality, means of manipulating mass consciousness. Vital activity is also provided a permanent cultural model to synthesize a variety of cultural forms, reproducing the contents of this myth in its own semantic-symbolic and ceremonial and ritual activities is due the functioning of a social group.

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## **THE HUMAN FACTOR IN THE CORPORATE CULTURE OF THE AVIATION INDUSTRY OF UKRAINE**

*The article examines the impact of human factors on the formation and development of corporate culture in Ukrainian aviation industry. Different levels of corporate culture and its role in the existence of a competitive modern business aviation sector are investigated.*

Having a long history of their own state, Ukraine today is still unable to fully get rid of the plume of its Soviet past, which, on the one hand, providing a significant conditions for the development and improvement of the aviation industry and, on the other hand, regarding civil aviation, due to the monopoly of the Central airlines significantly reduced motivation to improve the culture and conditions of customer service.

Demonopolization and transition to market conditions of doing business in the aviation industry led to significant changes in the service system, and personnel management that set the Ukrainian enterprises of this sphere before necessity of formation of new principles of corporate culture, which, of course, is based on internal cultural potential of each employee without exception. It is therefore extremely important aspect of our study will be as the establishment of the influence of human factor on the formation of corporate culture of aircraft carriers, and the influence of the already established corporate values per employee in this area.

As noted by V. N. Kuznetsov and M. O. Ivanova, "unlike such as the concept of "staff" or "human resources", "human factor" emphasizes the active role of man in the production system. It describes the diverse qualities of the subject (employee), revealed in the course of his employment and provides the development of both the organization and society as a whole. (...) In the wide sense of the word, the human factor is a number of employees of the enterprises (organizations), united for common activities. In structural terms it is, first of all, the person and the labor collective" [2, 8]. Thus, it is obvious that the human factor is the basis of corporate culture, relaying values of an individual worker, or a separate entity and the organization as a whole.

On the one hand, due to the frantic pace of scientific and technological progress much of the work that had previously served as a person, today by information technology is fully automated, but on the other hand, it does not reduce the importance of the "human factor" what about the service in the aviation sector, and provides the mechanism of air traffic. Unfortunately, we know how many tragic events occurred precisely because of the so-called "human factor", and in the sphere of service it is partly performed publicity for those or other modern airlines.

"In the 1970-1980-ies because of erroneous actions of aviation experts in the course of production functions going from 70 to 85% of all air-corruption cases, and preconditions to them, there were other reasons or on the refusal of aircraft, or due to

the impact on the people of environment "[2, 9]. Therefore, we can confidently assert that the role of the individuals in this sphere both in the past and now is paramount, and should include as a specific professional knowledge and skills, and high level of corporate and personal culture, by which ensured normal and healthy vital functions of the organization.

"The phrase "corporate culture" was first used in the XIX century in military terminology by German field marshal Moltke to determine the relationships among the officers. In the second half of the XX century began to appear the first more or less clear definition of organizational culture. The concept of corporate culture covers a phenomenon of spiritual and material life of the collective, namely dominating in it the moral norms and values, code of behavior, rituals and others. The concept of this phenomenon doesn't have a single interpretation"[1]. Thus, we see that the basis of corporate culture are, above all, values, norms and rules, of course accepted by all members of the team and become the basis for further fruitful cooperation and a common understanding of the main objectives and tasks of the organization in which they work.

It is customary to distinguish three levels of corporate culture. The upper, visible (external), level forms the visible objects, artifacts (lat. artefactum – artificial facts, the results of human creation) culture: manner of dress, behavior rules, symbols, organizational ceremonies, celebrations, office locations. The second and third levels are invisible. The composition of the second level is expressed in words and deeds, the practical behavior of employees, the organization's values and beliefs, which consciously are shared and cultivated by its members and find themselves in the stories, language, symbols. The third level consists of the fundamental assumptions and deep conviction" [4].

So, when the work of collective is evaluated at the highest level, we can talk about internal compliance and absence of conflict of all levels of the corporate culture, that for its pillars is not in conflict with the inner, deep beliefs and value orientations of the employee that feels part of a close-minded team and makes all efforts to enhance the reputation of the organization through adequate and highculture behavior and treatment of clients.

In this context, becomes particular important the following factor concerning the change of the role of the person in the organizational-production process, in which pay attention in their work "The Management of aviation staff" V.N. Kuznetsov and M. O. Ivanova. It regards the mainstreaming of the issue of self-discipline employees and increase importance of internal self-monitoring of performance of their duties in accordance with the rules of distribution of power in the middle of the organization. This is a very important moment, which is primarily based not on the idea of coercion and punishment as the main driving forces of construction the labor relations, but on the principles of internal, individual responsibility and interest in the final positive result of their own work, which involves a high level of awareness of the importance of these factors for both maintaining a highly professional image of the individual and for the image of the whole organization, consisting of a large amount of a staff and depends on the so-called "human factor."

In contrast to the Soviet period, where the employee can release only in

extreme cases that, in part, led to significant abuse and lack of return from an employee, today in a highly competitive not only employees of the aviation industry are directly interested in maintaining their image which directly depends on the level of financial support.

This issue is directly related to the following factor, which points to the constant growth of competition in the aviation services and leads to regular desire and significantly improvement the quality of services offered and the maximum orientation of companies of all industries to meet the needs of its clients.

As we already mentioned, this incentive was practically absent in the Soviet times, where the main monopoly belonged to the state, which, in essence, made a sound competition between the different structures within the same industry, and led to the standardization and unification of services offered with an automatic decrease in their quality as a result of lack of alternatives. Today the question of a permanent increase of level of service is a priority task for managers in the service sector of air transport that, primarily due to professional personnel policy organizations, due to which there is a careful selection of personnel with high level of qualification and internal culture that should be the basis and support systems are more extensive corporate culture of the enterprise. Thus, the attraction to this area of psychologists, sociologists, experts of personnel sphere is extremely important, as it affects the formation of healthy micro climate in the team and helps to minimize conflict situations, which cannot but affect the final goal, constant care of improvement of customer service by air campaigns.

In this respect, it is also extremely important the factor of motivating each employee, as well as some labor groups, teams, an organization to raise the level of their work.. In conditions of significant market the number of organizations of the aviation sector use the principles of competition between their employees or their associations (teams, changes, etc.) with a handling error material incentives in the form of bonuses, valuable gifts or extra days off to improve the culture of service output level of service the maximum possible to ensure their own competitiveness in relation to other providers of these services. In this plan very positively perceived individual proposals for optimizing customer service processes, innovative approaches, providing new services, etc. that provide personal creative initiative of the employee, the so – called creative use of the "human factor", but not its mechanical operation. These initiatives and encouragements expand connectivity creative potential of the employees, as well as the creation of the atmosphere of their involvement in the implementation of the common cause, which makes it impossible for the emergence of a feeling of alienation from the results of their activities.

But these positive developments within the organization, as well as the conditions for the creation of highly skilled and highly cultured team are directly associated with the following extremely important factor – the educational and cultural level of personnel, improvement of which is one of the priority tasks of educational institutions in modern Ukraine. The basis of the powerful competitiveness in the aviation industry are young professionals with high level of education, who has special knowledge, which take into account the specifics and peculiarities of this industry, multilingual, in our time, this is one of the main requirements for highly skilled workers in different spheres of activity, and also

have an extremely high level of internal culture that becomes the key to a smooth inclusion in more complex patterns of corporate culture. Of course that compliance with such high standards is possible only under condition of receiving an adequate level of education, continuous improvement and the elimination of the level of compliance with international standards is the main task of all the leading Universities of Ukraine and, above all, National aviation University, which is directly prepares highly qualified personnel for the aviation industry.

An extremely important factor in the modern development of our society there is an active development of democratic processes in society as a national agency as a whole, and use of these principles in the service of the airline industry. In practice, the authoritarian methods of governance lead to total reduction of motivation, lack of creativity, innovation employee participation in the labor process optimization, as well as growth processes of alienation from their work, which is extremely negative and detrimental effect on the end result for both the employee and for the organization as a whole. Therefore, the maximum involvement of both executives and employees at other levels of the hierarchical structure of the organization to address important issues of production, of course, within their competence on a democratic basis will only contribute to the improvement of the final result and strengthening relationships within the team, which has always been extremely positive factor in the presence of a strong corporate spirit, the core component of which is, of course, on the corporate culture.

### **Conclusion**

Based on the analysis of the situation in the Ukrainian aviation sector, we can conclude the crucial role of corporate culture in the organization of optimal, competitive customer service and creating the necessary conditions for bringing this field to the level of conformance to the highest international quality standards.

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## **EMOTIONAL BURNOUT AS ONE OF THE PSYCHOLOGICAL CONSEQUENCES THAT OCCUR DURING THE CONTINUOUS MONITORING OF PERSONAL PROFESSIONAL LEVELS OF QUALITY ASSURANCE ENGINEERS**

*The article considers emotional burnout and other psychological consequences that pertain to quality assurance engineers under the condition of the modern development of IT-technologies, competition, strict control, efficiency and productivity of employees, as well as the implementation of continuous monitoring of personal professional skills.*

### **Introduction**

Taking into consideration the development of technological progress, mechanization and automation technologies, and a large number of new professions, including IT specialists (programmers, system administrators and "testers" of software), quality assurance engineers (QA-engineers) face many factors which influence their psychological states and the quality of their professional activities, when working in the "man-machine system" under specific terms. Due to the incredible development of IT-technologies as well as to competition and struggle for supremacy in the world, the standards of European corporations have become extremely demanding, which led to the search for ways to not only optimize labor (comfortable, modern equipment, remuneration), but also to improve the monitoring process concerning personal and professional performance of each employee. The monitoring of personal professional competence has a positive impact on the level of achievements and failures, efficiency, activity, initiative and professionalism, by means of creating a personal monthly rating of each employee. The profession of a quality assurance engineer is extremely responsible, because a single mistake made can lead to serious consequences (if failures occur within operational systems in the area of aviation, a plane crash can happen; regarding the software, then an error of a quality assurance engineer leads to financial losses and lack of users), that is why the requirements are very strict because of the specificity of employment. The intensity of work, total oversight on personal and professional competencies, character of professional activities, and one's own mental traits lead to extreme emotional tension, stress and emotional burnout.

In the last few years of increased competition for prestigious and well-paid job, there has been a serious question how to prevent and eliminate emotional burnout that can happen to QA-engineers and its consequences, taking into account the conditions of employment and monitoring of personal professional skills.

Emotional burnout is a process that develops in time. It begins with a strong and long-term stress during the performance of one's duties when the demands on an

individual ever exceed his available resources, which causes the disruption of his psycho-physiological equilibrium. Thus, this process is determined as the gradual loss of emotional, cognitive and physical energy, which is shown in symptoms of emotional and mental exhaustion, physical fatigue, personal alienation and reduced satisfaction with the results of one's own work. Therefore, the ability to work normally is disrupted, the psycho-physiological state of individuals gets extremely worse and the efficiency and productivity of their labor decreases [1]. That is why this problem is quite relevant today.

### **Problem statement**

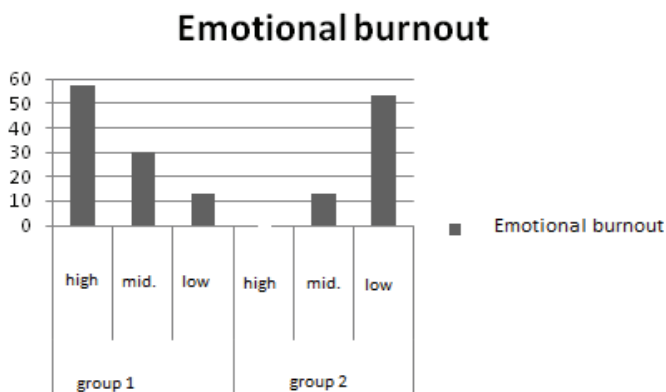
Due to the continuous development of corporations, the problems related to the efficiency and productivity of employees remain unsolved. Having to follow the strict requirements and being under psychological pressure at work, QA-engineers can lose their psycho-physiological ability to work and to demonstrate personal achievements during the continuous monitoring, so the results of this research can be used by psychologists when working with QA-engineers in order to eliminate the stress related to professional activities and to prevent emotional burnout.

Taking into account the factor of continuous monitoring of personal professional competence, lack of studies pertaining to psychological problems of IT-specialist raised the question how to optimize and harmonize the labor conditions of QA-engineers, in particular, studying the characteristics of emotional burnout.

To study the above mentioned problem, the following psycho-diagnostic methods were selected: the method of studying "emotional burnout" by V. Boyko, the method of studying "mental stress" by T. Nemchin, the method of studying "occupational stress" by D. Fontana. This study included interviewing two groups of individuals. The first group consisted of QA-engineers working in difficult conditions due to the character of professional activities (monotony, lack of time, strict requirements). This group was put through a monthly "testing" of the personal and professional level, which influenced the further situation of an employee in the company. The total number of the participants of the first group was 30 individuals. The group of QA-engineers was observed at a large foreign corporation, the name and internal processes of which could not be divulged due to its industrial secrets. The second group consisted of the programmers who worked according to an easy schedule. They did not have to follow any strict requirements and to be put through the continuous monitoring of their personal professional competence in order to determine the effectiveness of their professional activities. The number of the participants of the second group was 20 persons.

### **Results of research**

The analysis of research of emotional burnout and the specific details of its occurrence showed the following results: high levels of emotional burnout in the first group were observed in 57% of interviewers, while the percentage was very low in the second group. This suggests that personal professional monitoring accelerates the development and determines the appearance of emotional burnout. The results are shown in the diagram (see Fig. 1.)



**Fig. 1. Generalized indices of the groups in reference to "emotional burnout" according to the method by V. Boyko.**

During research, the method of studying "mental stress" by T. Nemchin was also used. Mental stress is a kind of a mental state which develops in a person who acts in psychologically difficult conditions with lack of time, information and high-level requirements [2]. All these factors prevail in the activity of QA-engineers and cause the occurrence of emotional burnout. As a result, the two groups (QA-engineers and programmers) were found significantly different pertaining to mental stress, in particular, in the first group, 63% of interviewers were experiencing mental stress, while, in the second group, only 10% of interviewers could be characterized as the ones who were supposed to experience mental stress. In addition, during research, the method of studying "occupational stress" by D. Fontana was used. The activity of QA-engineers is responsible and specific enough, so employees often experience stress owing to strict requirements. The results of studying emotional burnout are shown as follows: in the first group, the high level of emotional burnout prevails (63% of interviewers), while in the second group, only 5% of interviewers have the same characteristics. On the basis of the data obtained, it can be presumed that personal professional monitoring and excessive demands on professionals cause emotional tension and stress which, in turn, increase the possibility of appearance or occurrence of emotional burnout. Based on statistically significant differences, the mathematical and statistical analysis using the Kolmogorov-Smirnov criterion and the comparative analysis using the Student's T-criterion confirmed the results of the qualitative analysis according to which strict requirements and continuous monitoring of personal professional competence lead to increased stress and neurotic tension and accelerate the development of emotional burnout.

### Conclusion

The requirements to employees, particularly to those who deal with the area of IT technologies, are constantly increasing with the development of technologies and the intensification of production of technical means. This suggests that

temporary labor resources decrease, and high expectations of the outcome increase, that is why the intensity of work, a high level of responsibility, and lack of time cause stress and emotional burnout. Continuous monitoring of personal professional competence of QA-engineers has turned into psychological pressure and caused a variety of psychological effects. In addition, it is important to take into consideration the features of the professional environment of QA-engineers facing key factors that influence the quality and efficiency of work, as well as the development of psychological consequences as a result of the activities in similar circumstances. Monitoring of personal professional competence of employees and compliance with the established criteria determine the further situation of these employees in the company. Therefore, monitoring of personal professional competence in conjunction with other occupational factors often exceeds the capabilities and resources of QA-engineers. Labor conditions and continuous monitoring of one's personal and professional levels cause psychological pressure and do not allow one to take into account the individual characteristics and needs of employees. Consequently, this leads us to conclude that neurotic stress and occupational stress at work eventually turn into emotional burnout.

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## **TRANSFORMING GENDER IDENTITY OF STUDENTS STUDYING AT THE FACULTY «AIR TRAFFIC CONTROL»**

*It analyzes the transformation of gender identity of students who study such profession as "Air traffic control". The features of the experts "Air Traffic Control". The features of gender identity students who study at the air traffic controller.*

### **Introduction**

Activities of air traffic controllers, which depend from mental workload extent and variety of solved tasks, related to the category of the most difficult. Automated control systems require from people – operators with consuming of mental, mental, emotional resources. The work of the operator in the system "man – machine" has a number of features and is a very complex process. The intensity of air traffic is continuously increasing. Accordingly, all the time, conditions in the air has become more complicated and process of air traffic control becomes increasingly difficult. Technological advances provide continuous improvement of traffic management in the sky, which is becoming increasingly global, and very sophisticated automated system. However, in the modern management systems are as important part of working process – with responsible feature of decision making – operates air traffic controllers. Exactly air traffic controllers can be unreliable parts of system with all the following negative effects on air safety a greater extent than the technical components of the system [3; p. 21-22].

Difficult conditions for action include a range of subtle mechanisms of adaptation on the psychophysiological level, motivational, emotional and volitional. One can expect that reflection on the process of adapting to difficult operating conditions will apply, in particular, and gender factors. Studies of transformation of gender identity controllers is relevant especially when more and more women are choosing specialty "Air Traffic Control". It is important that the traditional profession "air traffic controller" was considered a male in Ukrainian culture, which is manifested in big variety ways and in terms of professional sociocultural, traditions, norms of behavior. This makes it possible to draw particular attention to the manifestation of gender identity in the profession of air traffic controllers, as well as in the training of future specialists in air traffic management in professional schools.

Gender identity depend from its worries about their conformity to gender roles, it the totality of social norms and behavior, characteristic of members of a particular sex (or such norms which refers to members of a particular sex or socio-historical socio-cultural situation). Gender identity depends more on social factors rather than biological nature of man [1; p 134]. Quite significant personality characteristics that are closely related to gender identity and determine the characteristics of an individual, by such signs of masculinity or femininity.

Masculinity and femininity – a system of personality traits that are traditionally considered male or female. These are the features of the person (first – psychological) that define the proper gender, gender-role norms and stereotypes typical of male and female behaviors, lifestyles, ways of self-realization, choosing appropriate values, attitudes, etc. It should be emphasized that the typical features of femininity and masculinity – is primarily socially imposed norms, stereotypes, and not the result of objective natural differences between the sexes. In some cases, these features really reflect the average differences between men and women. But often they are the result of education, where psychological pressure differences generated stereotypes imposed on human society. Virtually every feminine or masculine quality can occur in both men and women. The combination of high femininity and masculinity in one person (regardless of gender) was called androgyny [1; p. 139].

### **Results of research**

The aim of the research was to identify the characteristics in gender identity of students majoring "Air Traffic Control". The study was conducted at the National Aviation University. The sample consisted of 40 students of 1st and 2nd year (22 women and 18 men aged 17 to 19 years) and 50 students of 4th and 5th year (30 women and 20 men aged 20 to 22 years old) enrolled in the specialty "Service of Air Traffic". Were used following techniques: sex-role questionnaire S. Bem (BSRI) and test M. Kuhn, "Who am I" modifying TV Rummyantsevo. For statistical analysis results were used Kolmogorov-Smirnov test and Student's t-test.

As a result of processing the raw data revealed the following gender-role characteristics. Femininity is expressed in only 32% of surveyed women the 1st year and 2nd year, while masculinity – 46%, and strong pronounced masculinity – 9% of respondents. Most of the male respondents expressed masculinity (67%). Pronounced masculinity observed in 17% of the respondents androhinnist – 11% of respondents, and femininity – only 5% of male respondents. Thus, certain features of gender identity are traced in choosing future profession.

Respondents female of 4-5th year graduate is not observed the average index – it is only about the high level of pronounced of femininity, masculinity or androgyny. A growing proportion of subjects with a strong masculinity and androhinnisty. Among male respondents also increases the proportion of subjects with a strong masculinity, fewer subjects with severe androhinnisty. With the T-Student's t test, it was found that among female respondents of 4-5th year graduate great deal of subjects with pronounced masculinity.

Analysis of the data obtained through test M. Kuhn, "Who am I" modifying T.V. Rummyantsevo has shown that students' 4-5th year was significantly increased the frequency of males which refer directly through social roles and indirectly through completion (eg, student, professional). Students 1 and 2 courses almost equally often denote male and female directly. Indirectly, through the end, often denoting feminine gender. Respondents 4-5-year students choice much more general, they significantly increased the number of sentences without marking the floor. In the female respondents of 4-5 courses can observe a significant increase in the frequency designation masculinity, both directly and indirectly, as well as increasing the frequency of sentences without designation of sex (Fig. 1).

Based on the data the students of 4th and 5th year students were selected two

investigated groups, respondents with a distinct femininity and respondent's with pronounced masculinity. Analysis of the obtained data through test M. Kuhn, "Who am I" modifying T.V. Rumyantsevo by studied subgroups (using t-Student test) showed that subjects with a distinct femininity much more found use of estrangement (3.2 at  $p \leq 0,01$ ), namely close to the sentences with direct and indirect definition of sex they very often use the sentences without definition of sex. At the same time, in subjects with pronounced masculinity this is not observed, they use a sentence without marking of sex less often. Investigated students with pronounced masculinity often indicate the gender indirectly through graduation, investigated students with a distinct femininity – on the contrary, often using direct notation of sex and much less – indirect (3.1 at  $p \leq 0,01$ ).

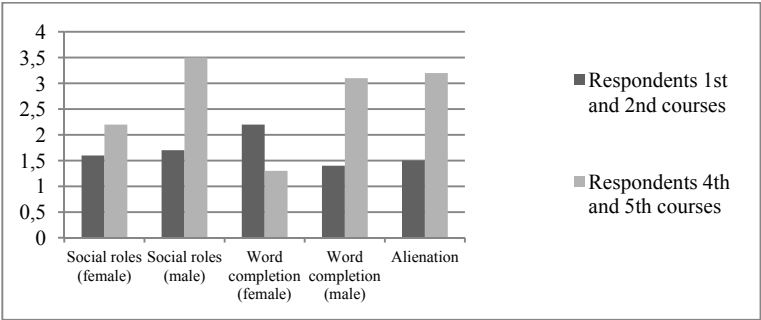


Fig. 1. Index of identity by test for M. Kuhn, "Who am I" modifying T.V. Rumyantsevo by a group of female respondents

Investigated students with a distinct femininity denote sex of female straight through social roles (3.25 at  $p \leq 0,01$ ). Investigated students with pronounced masculinity often indicate male gender indirectly through graduation and hardly use the designation male straight through social roles. Clearly expressed femininity or becomes demonstrative character or affiliation to sex, its designation is issued and is not mentioned at all. Masculinity is not expressed so clearly and directly, but indirectly refer to gender almost always present.

Analysis of the obtained data through test M. Kuhn, "Who am I" modifying T.V. Rumyantsevo of a group of male respondents (Fig. 2) showed that male students 4-5-year course decreases designation of female social roles directly and indirectly, through the end and increases the designation of male social roles, reduced index of estrangement. It should be noted that the striking differences between the groups of male students is almost there.

Obtained data with help of the test M. Kuhn, "Who am I" modifying T.V. Rumyantsevo investigated groups of 1-2-year students and 4-5-year course of men (using t-Student test) data give an opportunity us to conclude that the differences between groups were found only in marking of the designation of female social roles. Student's 1-2-year students more often designated social roles for women than

students 4 to 5 year courses.

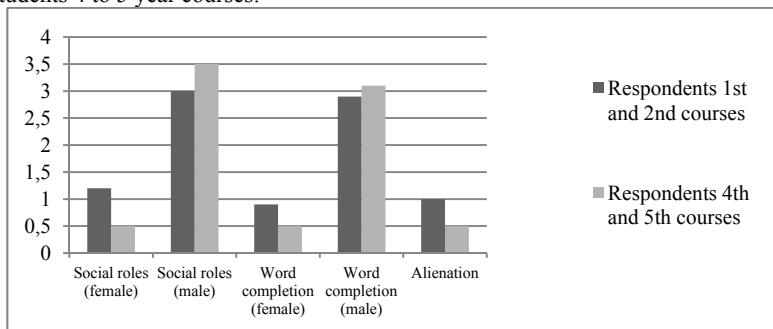


Fig. 2. Index of identity by test for M. Kuhn, "Who am I" modifying T.V. Rumyantsevo by a group of male respondents

### Conclusion

Thus, the gender identity of students Air Traffic Controllers of female gender transformed in the learning process, changing the features of her manifestations, often assuming the extremes – pronounced femininity or masculinity. At the same time, the gender identity of students-male air traffic controllers has not changed. Consequently, it is extremely interesting and topical are research performance of the students – air traffic controllers of a female, depending on the characteristics of their gender identity.

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## STRETCHING PRACTICE IN THE PROCESS OF THE STUDENTS' PHYSICAL EDUCATION

*The article considers the special features of the use of stretching in the process of physical education of students. Developed and substantiated rational structure and content stretching programs to enhance the flexibility of students in the process of physical education.*

**Statement of the problem. Analysis of the last researches and publications.** Powerful discipline aimed at stretching specific groups of muscles, ligaments and tendons are stretching (from the English. "stretching" – stretch). Stretching can be part of a health-training sessions or be used as an independent class. The main effect of stretching is to increase flexibility and improve this physical abilities of man often assess its effectiveness [2, 12].

By stretching to the muscles gets more blood, they relax and become more flexible; purchase of joint movement, resulting in increased flexibility. Classes stretching ideal for all age groups, regardless of health status. Relaxation will neutralize fatigue, relieves tension, improves mood, contributes to the disappearance of negative emotions. Particularly relevant classes stretching for girls 17-20 years old.

The literature data suggest that investigated the use of means of gymnastics in the process of professional-applied training [1, 5], peculiarities of using meditation techniques in the process of physical training [4], especially the use of stretching before and after exercise different direction [11], the influence of Pilates on development of physical qualities [6], the influence of the corrective exercises on the condition of the spine and the development level of flexibility [7, 10].

However, the diversity of ways and means to promote flexibility and ability to arbitrary relaxation of the muscles used during recreational activities, require scientific substantiation of the rational structure and content of the programmes practice stretching for students. Therefore, the study and systematization of funds practice, peculiarities of their distribution in the practice of various kinds, and also a substantiation of rational structure of the various programmes of activities aimed at developing the flexibility of students is important.

The selected area of research was carried out in accordance with the research work № 14/12.02.07 "The structure and content of training sessions on physical education random orientation with students of 1 course of the National aviation University" (№ of state registration 0110U006654, UDC 378.145:796.011.3(04731)).

**Objective:** to substantiate and develop a rational structure and content stretching programs to enhance the flexibility of students in the process of physical education.

To achieve the goal we have set the following tasks:

1. According to the analysis by the special scientific and methodological literature to explore the sports and recreation potential means of stretching.

2. To characterize morpho-functional status of girls 17-20 years old who are engaged in sports and physical activities, aimed at development of flexibility.

3. To develop and validate training program stretching for students with the aim of raising the level of flexibility.

In work were used the following **methods of research**: data analysis of the special literature; anthropometric methods; physiological methods; teaching methods; methods of mathematical statistics. In research took part 43 of the student National aviation University, engaged in programs aimed at the development of flexibility.

**The basic material of research.** The analysis of the special literature suggests that the study of stretching is the effective system of health-improving effect on the organism of the girls with the aim of improving the mobility of the individual joints and improve flexibility in General.

To assess the morpho-functional state of the students were measured body weight, body length is calculated indices of physical development, defined indicators of functioning of the cardiovascular system – variation and ad, adaptive capacity. The results of the evaluation of the Cate index indicate that 22 % of students had body weight within the normal range, 78 % – was observed overweight. By results of research of the cardiovascular system found that the average values of systolic blood pressure in students were within the age-related physiological norms. The calculation of the adaptation capacity of the circulatory system to the environmental factors was carried out by the method of the R.M. Bayavskogo. Most of the students was observed voltage mechanisms of adaptation (in 65 % of cases) and only 35 % had satisfactory adaptation.

The group surveyed students were offered a programme of activities aimed at the development of flexibility, which provides a constant and gradual increase of the range of motion of joints during a certain period. The program presents several blocks (Fig. 1).

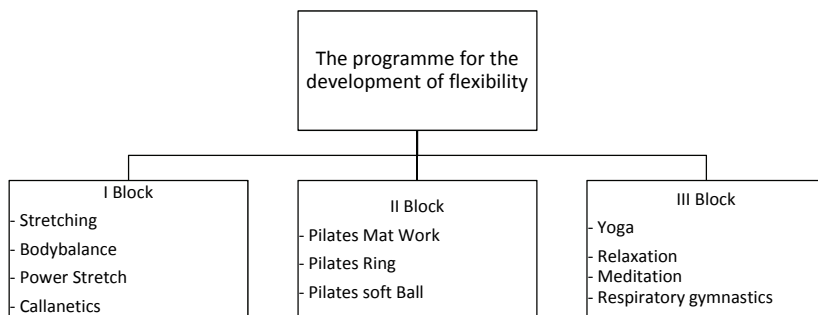


Fig. 1. The study program is aimed at developing the flexibility of students

In the first block used exercises to develop strength and flexibility: Stretching exercises for development of flexibility and relaxation of all groups of muscles); Bodybalance (dynamic program that combines the best exercises Eastern systems, series sprains, movements and certain postures); Power Stretch (stabilizing training, uses a technique directions Stretch, Yoga, Pilates, combines strength training and exercises for the development of flexibility); Callanetics (system of exercises that causes the activity superficial muscle groups).

The second block presents the system of Pilates is a system of exercises without shock, which allows you to stretch and strengthen the basic groups of muscles at the conscious relation to movements. Were offered training on the floor (Mat Work) – exercises in the original position sitting or lying down; training with special equipment – ring Pilates Ring, dumbbells, rubber shock-absorbers and balls; Pilates soft Ball – training with two levels fitball with combined exercises on the ball.

The third block was the united system of practice Yoga (integrated use of exercises for development of flexibility and normalization of psycho-emotional state, respiratory and static exercises); relaxation (complete relaxation of body and mind); meditation (observation of physical processes in the organism, study of mental States and deep contemplation, self-examination, reflection); breathing exercises.

Classes were held with minimal use of equipment or without it. The content of the classes have changed, added variations and modifications [3, 8, 9]. During the 4-month-old practice was observed a statistically significant change in results of motor tests (table 1).

*Table 1*

**The results of motor tests to assess the mobility of joints surveyed girls (n=43)**

| №  | Test  | In the beginning of the year                          | After 4 months of training                            | Me <sub>1</sub> – Me <sub>2</sub><br>(by criterion of the Mann-Whitney) |
|----|---|---|---|---|
|    |   | Me <sub>1</sub> [the bottom quartile.; top quartile.] | Me <sub>2</sub> [the bottom quartile.; top quartile.] |   |
| 1. | Forward tilt standing, cm.  | 8 [6; 13]   | 11 [7; 18]  | p<0,05  |
| 2. | Implementation of the longitudinal twine, cm.                       | 41 [38; 49]   | 30 [25; 34]   | p<0,05  |
| 3. | Abstraction in the direction of the straight leg, cm.               | 35 [29; 41]   | 46 [43; 52]   | p<0,05  |
| 4. | The extension of the hands in O.p. – standing against the wall, cm. | 18 [15; 22]   | 24 [19; 28]   | p<0,05  |
| 5. | The slope on both sides standing, cm.                               | 22 [18; 26]   | 30 [28; 33]   | p<0,05  |

**Notes:**

Me – median;

bottom quartile – (dissociates 25 % of interest with the lowest values);

top quartile – (dissociates 25 % of facilities with major characteristic value).

When you run the test "slope on both sides sitting on a chair" was observed positive dynamics of the results. Classes stretching positively influenced the development level of flexibility in the various joints. So, the students improved the mobility of the joints of the spine (by results of tests "tilt forward standing", "the slope on both sides standing"  $p < 0.05$ ), and increased mobility of the hip joints (by results of tests "longitudinal twine" and "abstraction in the direction of the straight leg"  $p < 0.05$ ), as well as the mobility of the shoulder joints for extension of the hands (on test results "extension hands in Op. – standing at a wall"  $p < 0.05$ ).

When you run the test "slope on both sides sitting on a chair" was observed positive dynamics of the results. Before the start of classes 40 % of surveyed students have performed this test on 1 point (the distance to the floor more than 3 cm), 26 % – on 2 points (fingertips touched the floor), 17 % – by 3 points (the fists touch the floor) and 17 % by 4 points (palms touch the floor). After 4 months of classes 1 score for the quiz and received 17 % of the surveyed, 2 points – 35 %, 3 points to 22 % and 4 points 26 % of girls.

Thus, during the 4-month training of students involved in group activities, stretching programs Bodybalance, Stretch, Power Stretch, Yoga, Pilates, Callanetics there was an improvement in the level of development of flexibility, as evidenced by the statistically significant differences in the results of motor tests to assess the level of flexibility.

### **Conclusion**

1. Stretching is a popular, accessible and effective means of correction of the level of development of the flexibility of students. Significant popularity of programs aimed at development of flexibility, due to the simplicity of execution, the possibility of a combination of stretching exercises with other exercises aimed at the development of flexibility, relaxation, to master the technique of relaxation of muscles.

2. With the purpose of development of flexibility in General and improve the mobility of the individual joints girls 17-20 years developed a program of exercise stretching. The exercises were aimed at training technique of training in combination with the technique of breathing exercises with a partner, exercises with the content poses in end position, exercises with arbitrary tension and relaxation of muscles, exercises on stretching muscles in combination with strength training and relaxation.

3. Effectiveness of the elaborated programme of activities stretching with the use of elements of programs Stretching, Bodybalance, Power Stretch, Yoga, Pilates, Callanetics proved by positive dynamics of indexes of physical preparedness (development level of flexibility), which is the basis for its use for the development of mobility of the hip, shoulder joints and joints of the spine students in the process of physical education.

In the future it is planned to develop individual programs of exercise stretching for independent work of students.

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## **PRACTISING STANDARD STATISTICAL AND GRAPHIC DATA PRESENTATION LEXICON AS A FACTOR OF SAFE AIR TRAFFIC COMMUNICATION**

*The article deals with the problems that cause difficulties in transmitting statistical data from the addresser to receiver resulting in linguistic misunderstanding, distorted perception of numeric information in pilot-controller communication. It offers the relevant statistical and graphic data presentation lexicon to be practised in order to gain an adequate level of language competence as a factor of safe and efficient air traffic communication.*

When studying the problems that cause difficulties in transmitting information from the addresser to receiver it is understandable that the barriers may arise due to various factors, one of which being semantic: the usage of unsuitable words, lack of comprehension and clarity, improper formation of a sentence. These factors tell on the quality of translation. And since English as the official language of aviation is spoken today more by non-native speakers than native ones, the speech of the participants of radio communication, for whom English is not their native tongue, is always based on translation techniques, which has become a serious problem.

A complex combination of factors from multiple sources can cause misunderstanding in Air Traffic Communication. "Incorrect or incomplete pilot-controller communication is a causal or circumstantial factor in 80 percent of incidents or accidents...."[1].

Therefore, any discussion on communications should focus not only on the intelligibility of non-native speakers to native speakers but on the interaction between non-native speakers as well. As in many circumstances pilots and/or controllers have to resort to the use of higher level English to convey a message, even when both pilots and controllers speak English fluently, there are pitfalls in the nature of the language. Ineffective air traffic communication can be caused by casual irregularities or unprofessional violations of special language rules including irregular omissions, ignoring the tendency to abbreviating utterances (e.g. CAVOK → clouds and visibility o'key – висота нижньої кромки і видимість у нормі; CAVU → clouds and visibility unlimited – висота нижньої кромки хмар і видимість необмежені) and changes in phonetic mounting of close or identical phonetic forms to avoid their confusion (e.g. for [fɔ:] – four [fauə]), incorrect abbreviations, misunderstanding of lexical and morphological forms. Linguistic problems can arise, in particular, in presenting or exchanging numeric information and data in graphs and charts. The distorted perception of numbers belongs to most serious errors in radio talk resulting in aviation incidents. Linguistic misunderstanding appears in most cases as an after-effect of skill-based errors

caused by the lack of language competence.

The following *lexicon review* is an attempt to show the ways and methods for presenting statistical and graphic data since readings of instruments (gauges, sensors, indicators, pickoffs, pickups, detectors, transmitters and transducers), electronic devices, radio-navigational and other equipment, statistical checks, statistical data manipulation and statistical modelling as part of statistical observations are intended to make comments on the condition and the causes of different kind malfunctions in aircraft units operation. Graphic data presentation uses graphs or similar images to represent statistics of figures or graphic maps. The relevant lexicon review goes as follows:

*map* – *карта*: *large-scale map* – великомасштабна карта, *small-scale map* – дрібномасштабна карта, *to consult / read a map* – звірятися з картою, *to draw / trace a map* – креслити карту, *weather map* – метеорологічна карта; *drawing* – малюнок; креслення; *line drawing* – креслення;

*exploded form* – представлення (наприклад, механізму) в розібраному вигляді; *exploded view* – зображення по частинах, покомпонентне зображення, форма виведення на екран, при якій структура показується у вигляді окремих пов'язаних одна з одною частин; *isometric drawing* – креслення в ізометричній проекції; *orthographic drawing* – креслення в ортогональних проекціях (*orthogonal* – ортогональний, прямокутний); *cut-away* – даний в розрізі; *graph* – графік, діаграма, схема; крива; *bar graph* – стовпчаста діаграма, стовпчикова діаграма, гістограма; стовпчастий графік (syn.: *diagram*); *exploded pie graph* – розчленована кругова діаграма, розірвана кругова діаграма, *graphics* – графіка; графічний та ілюстративний матеріал; *analytical graphics* – аналітична графіка, підготовка діаграм і графіків, що допомагають аналізувати, розуміти та інтерпретувати (комп'ютерні) дані; *histogram* (*histos* – стовп) – гістограма, графік, що складається з вертикальних або горизонтальних смуг, висота і/або ширина яких представляють значення конкретних даних; *chart* – графік, діаграма, схема, таблиця, креслення; *line chart* – лінійчастий графік; *column chart* – стовпчаста діаграма; *pie chart / pie graph* – секторна діаграма, кругова діаграма; *flow chart* – блок-схема, структурна схема; *charting* – 1) складання діаграми, карти, таблиці; викреслювання графіка; нанесення на карту 2) планування; *channel* (*horizontal division*) – рядок, горизонтальна лінія (у таблиці); *column* – стовпець, колонка, графа; *axis* (*pl. axes*) – вісь, осьова лінія; *time axis* – вісь часу; *symbol* – знак, позначення; *signal* – знак, сигнал; *geometrical figure* – геометрична фігура; *shape* – форма, контур; *circular* – круглий, дуговий, круговий; *square* – квадратний; *triangular* – трикутний (syn: *three-cornered*); *rectangular* – прямокутний; *oval* – овальний, у формі яйця; еліптичний; *cylindrical* – циліндричний; *conical* – конічний, конусний, конусоподібний; *T-shaped* – Т-подібний; *coding* – кодування, шифрування, індексація; маркування, *figure* – цифра (syn: *digit*, *number*, *cipher*, *numeral*, *numerical symbol*); etc.

Topical listings of words should be studied thoroughly and presented as necessary vocabulary.

The numeric information is presented in flight directions, navigation equipment readings, statistical graphics, digital diagrams, visualization of technical

information drawings, as well as airport diagrams in airport development, taxiway and airport apron information, engineering, design and construction, showing quantitative data about decreases or increases in the runway incursions and overall safety on the runway, depicting runway weight bearing capacity, meteorological charts, plans and projections, etc. [2, 3, 4].

When speaking about numeric presentations, statistics, technical materials, drawings etc. which are collectively called 'visual aids', or 'visuals', extensive use is made of relevant verbs and adverbs. Words and phrases to be used when describing charts and graphs are as follows:

- **verbs:** *rise* – підніматися, підвищуватися; *grow* – зростати; *fall* – падати, знижувати(ся); *increase* – підвищувати(ся), збільшувати(ся); *decrease* – зменшуватися; *drop* – падати; *go up* – йти вгору, підвищувати(ся); *go down* – йти вниз, знижувати(ся); *remain stable* – залишатися стабільними, не змінюватися; *be the same* – бути такими ж; *amount to* – дорівнювати, доходити до якоїсь кількості, складати; *account for* – складати;

- **adverbs:** *slightly* – трохи; *sharply* – різко; *dramatically* – сильно; *drastically* – круто; *considerably* – значно; *gradually* – поступово; *slowly* – повільно; *about 5%* – близько 5%; *approximately* – приблизно; *roughly* – приблизно; *exactly* – рівно, точно; *precisely* – точно; *just over / under 1,000* – трохи більше/менше тисячі; *well over / under 1,000* – набагато, значно більше / менше тисячі.

Great attention should be paid to teaching the correct standard forms of *fractional numerals (decimal and common fractions)*, such as 1.5 – one point five; 2.35 – two point three five; 0.2 – oh (ou) point two / nought point two / zero point two / point two; 2/3 – two thirds, 1/4 – a (one) quarter, a (one) fourth, 1/5 – a (one) fifth, 3/5 – three fifths, etc.

Knowing *numerals in measurements* is also of primary importance in graphic presentations: 1/2 mile – half a mile / a half mile – півмилі; 2/3 ton – two thirds of a ton – дві третини тонни; 3/4 km – three quarters of a kilometre – три чверті кілометра; 0.25 ton – nought point two five of a ton – чверть тонни; 4'2" – four foot two inches – 4 фути 2 дюйми; 3m x 2m – three metres by two metres – три на два метри, etc.

Aviation jargon, especially the use of numbers, can lead to confusion and errors because of its complexity and often overlapping or ambiguous use of numbers. The numbers used in pilot-controller communications are used to indicate multiple aviation parameters (e.g., flight level, heading, air speed, airline flight number). The overlapping number ranges can lead to misunderstanding, especially in high workload or time-pressured situations. A common mistake occurs when changing heading or flight level. This issue is more prevalent when an ATC message includes two or more sets of numbers that apply to separate actions. In the recent Eurocontrol survey it is recommended that the number of instructions per call be limited and that a frequency change be issued by itself. As investigations show the communications error rate can be lessened by reducing ATC message length, and by training native English language speakers to take responsibility for the success of communications in English [5].



## **Conclusion**

Thus, in connection with the seriousness of problems of recognition of authentic information and prevention of speech errors in air traffic communication, great attention should be paid to the linguistic aspect of misunderstanding or hindered understanding and the level of language competence in general. The above material testifies to the necessity of regular practising presentation of numeric, statistical and graphic data standard lexicon.

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## TRAINING HUMANS FOR AN AUTOMATED AIR TRAFFIC

*The article deals with issues concerning ATC training, Automated working environments and human factors programme. Much attention is paid to the International Federation of Air Traffic Controllers Associations as an independent, non-government, non-political, professional organization that has gained universal recognition from other aviation – related organizations as being “the voice of the air traffic controller”.. The author analyze the work of IFATCA system and their considerable difficulties in developing automated systems and including the maintenance of essential skills and controller awareness.*

The first part of my report will be a short introduction to IFATCA, followed by a look at the relation between the federation and ICAO's Human Factors Programme. I hope to point out some interesting differences compared to pilot-training, and will use some examples to indicate the role of Human Factors in ATC training. Finally, of course, there are a number of conclusions that will be subtly brought to your attention. The International Federation of Air Traffic Controllers' Associations was founded 32 years ago by air traffic controllers from 12 European countries and has since grown to a body with over 80 Member Associations worldwide. Among its objectives are: “the promotion of safety, efficiency and regularity in international air navigation», and «to render assistance and advice in the development of safe and orderly systems of air traffic control”. It will be no surprise that there exists a healthy relation between IFATCA and ICAO; a relationship that may well be illustrated by our involvement in ICAO's Human Factors Programme. Spired by by the ICAO Programme, IFATCA has further more begun an internal campaign to increase awareness of the importance of Human Factors in Aviation in general., and in ATC in particular. It is felt there is a need for such a campaign, for in traditional ATC training very little attention is given to subjects other than those dealing directly with ATC procedures, separation criteria or aviation-background (like meteorology and aerodynamics). To be fair to ICAO, I hasten to say that recently the licensing criteria for air traffic controllers have been reviewed, and that one of the changes is the inclusion of a requirement to have knowledge of the human performance and limitations relevant to air traffic control, so it looks like things will get better in the future.

Let's have a closer look at ATC training in general. As with pilot training there is normally an extensive programme to bring abinitio trainees up to licensing standards, although even here it is probably correct to say that in pilot training more use is made of simulators. Please don't think that air traffic controllers are against the use of simulators for training. The reason they're not used is far more basic: it involves money, as usual.

When a manufacture of simulators builds a simulator for, say, a Boeing 737 he has a wide range of potential customers. Every B 737 – operator in the world can use

that simulator to meet his demands, give or take a few minor modifications. But try selling a simulator for Heathrow Tower to an ATC school in Japan. ATC simulators are by nature very site-specific, and therefore expensive to buy. Furthermore they usually require a lot of manpower to operate them (fake-pilots/ blip drivers), including updating of the training exercises, which adds to the operating costs. For those reasons there are still many ATC agencies that do not have the simulation capabilities they require.

So what training is done in ATC after qualifying for the licence? In the more advanced countries with simulators, some refresher training is conducted, and regular proficiency checks take place. But this is the exception rather than rule, when looking at it on a global scale. Usually the post-licence training consists of no more than seeing changes in procedures (including major changes) on paper, after which experience on how to use these new procedures is gained while working – in an operational environment with real aircraft. And when new equipment is installed, their traffic controllers usually receive an introduction on how to operate the hardware (i.e. what the buttons are for), but not how to use it. That again is left for the individuals to discover while working, using live traffic as part of the learning process. In that process, interesting discoveries are sometimes made. For example, in a new system that was about to be implemented somewhere in Europe, one of the more spectacular items that were automated was the traditional Flight Progress Strip – the rectangular piece of paper used by controllers to keep track of the whereabouts of an aircraft. Normally, annotations concerning estimates, heights and speeds are made in pencil or pen on the strip, but in the new system every input goes per keyboard and electronic strips appear on monitor. Controllers do not have to sort the strips anymore – the computer does it all, based on the estimates. The interesting discovery however was, that people using keyboards do tend to hit a wrong key every now and then. Well, maybe this was known already, but the discovery that if an estimate – time is wrong by one hour or more, the computer will sort the strip straight to a part of its memory where it cannot be retrieved until that time comes up, surely was a new one. Was just one example, and more could be quoted here. The bottom line is: if the design of ATC systems is left solely to technicians, and the controllers receive little training before using the system operationally, the Latent Failure-phase of the reason-model is entered without a second thought and guess who are in the last line-of-defence? Is automation as beneficial as many engineers and managers seem to believe, anyway? It is tempting for them to think that by introducing a high level of automation in air traffic control there will be a spectacular increase in capacity, in other words, that because of automation more aircraft can be handled by less controllers. I would like to label this “a popular misconception». I will even explain why. No matter how state-of-the-art the automated systems that become available for ATC are, there is not going to be one that is absolutely fail-safe. So, when the system fails, it is the air traffic controller on whom everybody relies to handle the problem. And since his automated system has failed, he will be required to use a back-up system, which will usually be automated to a lesser degree. This implies a higher workload for the controller, so he shouldn't be overloaded with too high a number of aircraft to handle. In other words: even in an automated environment a controller should never be responsible for more aircraft

than he can safely handle without the automated equipment – which is equal to the number of aircraft he handled before automation was introduced.

But surely the number of controllers required can be decreased with automation, you say? I'm afraid the same argument as before applies: you need sufficient controllers to take over when the system fails, so you probably need the same number as before. Worse even: you might require more than before. Although I maintain that there is no such thing as an absolutely fail-safe automated ATC system, I will concede that today's systems are pretty fail-safe. (Which in ATC is just not good enough). Therefore, just like pilots, 999 out of 1000 times an air traffic controller will work a shift without experiencing any problems with the automated system – or even better odds. It is that one time occurring that makes people really appreciate having pilots on board, or controllers on the ground. For that reason, pilots go through regular training – programmes where the special skills required to handle emergency-situations are practiced and sharpened. It should not be different for air traffic controllers working in highly automated environments. If their old-fashioned or manual skills are relied on to keep disasters from happening when ever the system breaks down, you'd better make sure they haven't forgotten how to use them. So, when automation is introduced, this doesn't cancel the need for training the controllers in the old methods – it enhances that need, while at the same time adding the need for training how to operate the new system. If all that is done conscientiously, it may well imply that because of the introduction of an automated ATC system there are more controllers required than before.

Having arrived at this point, it is interesting to note that in many areas of the world there is a serious shortage of air traffic controllers, a shortage that many politicians and other people responsible for ATS expect to solve by automation. See why I called it “a popular misconception”. But now you may get the impression that IFATCA (or controllers) are completely against all forms of automation in ATC. If you do, you are wrong. IFATCA feels there are genuine needs for automation to assist controllers, to improve performance and reduce workload, to increase efficiency, to remove non-essential tasks, and to enhance job-satisfaction and the safety element of the controller's task. But there is also a need for air traffic controllers to be involved as an essential part of any future ATC system. The man-machine interface needs to be examined closely so that the system fits the human, rather than have the human fit the system. Therefore, IFATCA has always urged that controllers be involved from the designing phase onward in the development of new equipment. The human factors aspects of automation must be fully considered when developing automated systems and should include the maintenance essential manual skills and controller awareness. It is our (IFATCA) belief that the controller must remain the key element of the ATC system and must retain the overall control function of the system. Safeguards must be established to ensure that the controller remains an active, rather than a passive, user of an automated system. The preceding statements are examples of IFATCA policies that I referred to in my introduction to the Federation earlier. They are the result of many meetings in which controllers from all over the world endeavour to formulate statements on subjects that concern them all. Another such policy is that before a new system is implemented, controllers should receive adequate training in operating the system. This should

seem obvious but is not always done. IFATCA is also in favour of regular refresher-training and proficiency checks; always with the aim to keep the professional standard of the controllers as high as required.

Air transport will continue to grow. It has a good relative safety record but public perception focuses on total accidents rather than relative safety. This has led to the setting of ambitious new safety targets for air transport, whose attainment will require improved knowledge of causes of accidents and better understanding of the effects of new technologies and procedures. Human factors and operational environments are key elements while aircraft design, construction and maintenance, together with ATC operations and accident mitigation, also play important roles. During the Aerodays a variety of projects relating to these matters were presented. Based on statistical data on fatal accidents, it can be concluded that civil aviation is very safe.

### Conclusion

Coming to the end of my presentation, in which you first were briefly introduced to how IFATCA works, and what the relation is between IFATCA and ICAO's Human Factors Programme, it is my hope that the main part about ATC training, Automated Environments and Human Factors has given you an insight into our Federation's concerns in this field. Don't get carried away by technological possibilities when considering automation in ATC. Remember that the human element – the air traffic controller – remains the heart of the ATC system, and that the system is there for the controller, not the other way around.

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## **DECISION-MAKING IN STRESSFUL COGNITIVE CONDITIONS AS A PSYCHOLOGICAL PROBLEM**

*The article analyzes the scientific approaches to the problem of decision-making, highlights the basic psychological mechanisms of this process, presents analysis of decision-making process in stressful cognitive conditions in the total structure of action.*

The term "decision" in the scientific literature is considered in two contexts of meaning: as a result of certain processes (conclusion, a choice made), and as the process that leads to a particular result (decision). Psychological dictionary of A.V.Petrovsky, M.H.Yaroshevsky indicated that in psychology the decisions are considered as a process of formation of thinking operations that reduce the original uncertainty of the problem situation. During the decision there are the stages of search, adoption and implementation of decisions. Decision assessment is made on the parameters of its quality and efficiency, psychological and logical complexity.

Similarly, in a large psychological dictionary of B.H.Mescheryakova and V.P.Zinchenko is stated that in psychology the decision-making is traditionally considered as a stage of an act of volition related to the choice of a target and a mode of action. Productive decision-making process involves the emergence of new goals, evaluations, motivations, settings, meanings. In a large psychological encyclopedia the decision-making is reviewed in both the act of volition and activity-aspects, as an act of will, aimed to create a series of sequential actions in an uncertain environment to achieve the goal, which is based on the transformation of the information available. Thus, any purposeful activity originates in the decision-making.

Decision-making process begins with the selection or separation of the necessary information for decision, then the various alternative decisions are considered and compared, and a subjective selection of the most optimal of them is performed, then the perfect hypothesis of the ways of achieving goals is built, or a program of specific actions is created [11].

The term "decision-making" in the technological literature and documents has a quite specific meaning and a space-time definition: the decision-making considering departure, take-off on the runway during the running start, the landing on the final stretch of glide path, a change of the route at the destination airport during bad weather, and so on. The decision-making means the evaluation of the situation and a choice of the one of available options of action [2, p.100].

Thus, the "decision-making" means to choose the purpose and mode of action.

To determine the psychological content of the concept of "decision-making" in stressful cognitive conditions" may also be appropriate to consider it in the context of the overall structure of action developed by H.O.Balom, that summarizes

views at the nature of action of O.H.Asmolov, T.Herhey, E.I.Mashbyts, V.A.Romenets, S.L.Rubinstein, etc. [1]. The decision-making is a component (phase) in solving a particular problem, in the implementation of a certain action. Decision-making as a determinant of action has a persuasive function, which is reflected both in the initiation of action, and in support of its motion until a desired result (a target setting in the theory of O.H.Asmolov). Realizable goals that have a persuasive function are described as intentions. So this is the first feature of action in the decision-making concerning its determination.

The second feature concerns the mode of action, i.e., the procedures for its implementation. The mode of action can occur by the following successive operations: "start", "targeting" (cognitive and motivational phase), "completion" and "implementation" [1, p.42-49]. "Start" – an event that serves as a reason for the beginning of the action. In case of decision-making in difficult stressful conditions this can be determined by realization of the subject the need to define its own action algorithm, including the decision-making.

"Cognitive orientation phase" – a procedure, the main function of which is to form a signal of mismatch, i.e. a model that carries information about the differences between the actual and desired state of the situation, or the absence of such differences. This phase can also perform the function of forming the models of information about possible ways to overcome the mismatch between the actual and desired state of the situation. In the case of intense cognitive situations it may be the beginning of formation of the motivation of individual to meet the needs of decision-making, and also the beginning of searching for information considering achieving this (implementation plan).

"Motivational orientation phase" – the operation, the main function of which is to set up the current system to perform certain consecutive operations (in the case of intense cognitive situations – consciously made choice by individual from the alternatives known to him). In the case of implementation of varying capabilities, i.e., if the individual has made a choice and he complies with it, then the decision-making happens and the motivational phase completes with the transition to the phase "completion". Otherwise – the motivational phase may also provide a model for the formation of a planned model for "implementation" of decision, that means, the model of such transaction execution that is initial, and takes part in its determination.

Phase of "implementation" – an operation that provides a transition from the current state of the situation to the right (desired). Here may occur a question: as about the mode of action, taken as a whole, it can also be said, that it provides a transition. H.O.Ball interprets this uncertainty as follows: "... implementation operations transform the object from the current state to desired on condition that the operating system is ready for implementation of such transfer; operations, prior to implementation in the way of action, provide appropriate training "[1, p.45]. So, it is a relevant individual's willingness to implement action (decision-making) in the intense cognitive conditions.

Procedure of "completion" – an operation that provides the formation of a signal about the completion of action. In our case, we can talk about the moment of decision-making, and as it is talked about decisions that are made in the lack of time,

the precise wording is: a decision-making at this time. It is clear that with the emergence of new information that the individual will consider as new alternatives, the cycle of steps can be repeated.

Decision-making depends on the actualization of certain psychological mechanisms. In particular, the psychological vocabulary of A.V.Petrovsky and M.H.Yaroshevsky indicates that there are volitional, intellectual and emotional mechanisms. V.K.Kalin determines that the most important are the volitional, intellectual and emotional mechanisms, in particular, highlights, that in the process of decision-making, the volitional regulation is always connected with emotions that change in the first place, depending on the content and activity of reasons of purposeful activity and its performance, volitional regulation starts with the intellectual act – understanding of the problem situation [4, p.33]. T.V.Kornilova highlights the intellectual mechanisms on the basis of the research of intellectual human strategies during the decision-making under uncertainty [6].

Several researchers (I.Dzhanis, O.I.Larychev, L.Mann, S.B.Rebryk, Yu.K.Stryelkov, etc.) [2; 10] consider the decision-making as an emotionally intense cognitive process. They wanted to uncover the deepest psychological mechanisms of decisions that they associate with motivational conflict, a clash of emotively colored tendencies and emphasize the gentle shades of emotional human processes. They are worried why not all people are able to make decisions.

Decision-making in the context of mental activity of a pilot was considered in the works of D.N.Zavalishyna, B.F.Lomov, V.F.Rubahina etc. Scientists are of the opinion that to solve the most of the tasks required, a pilot needs not the memorized movements, hard logic, but the ability to perform a flexible mental activity. R.Dzhensen, Yu.P.Kondratenko believe that this activity is included in the system of motor processes, but "the cognitive professional mental ability allows to think some time before you perform a reaction". An important aspect of decision-making theory also is the prediction of results [5, p. 47-67].

Because of this, for further disclosure of the psychological mechanisms of individual's responsible decision-making it is appropriate to consider this process in the context of the theory of psychic turn that developed by the founder of Ukrainian psychology M.Ya.Hrot. The scientist defined the structure of psychic turn as the unit of human psychic activity in which he distinguished four phases [7, p. 51-52]: external impressions on the organism, or a moment of objective susceptibility, which corresponds to sensations as initial formations and representations, the concepts or idea as complicated psychic phenomena; processing of this external impression into the internal, or a moment of subjective susceptibility – the feeling of pleasure or pain, satisfaction and excitement; caused by this internal impression the same internal movement, or a moment of subjective activity – desire, wish, want; external movement of the organism toward the object, or a moment of objective activity – movements, actions, acts [7, p. 440]. The fundamental principle for M.Ya.Hrot is that any human activity is based on completing a full psychic turn through perception, emotions and feelings, thinking and volitional action. As the decision-making process is a psychic activity, the psychic turn can be considered as an important psychological condition, when at the end of the choice of alternatives a person takes a preliminary decision, then while getting additional information



implements reflection, again considering new alternatives, compares and refines previous decision. This cycle can be repeated, occurred in a circle until a decision has been determined by a final, that becomes the basis for the behavior and actions of the individual. Thus, the decision-making process by individual in general takes place on the basis of a unit of a psychic activity (psychic turn), can be cyclical in nature, actualizing psychic functions such as perception, emotions, intellectual and volitional activities.

Analyzed model of action (decision-making) by H.O.Ball relates to reviewed earlier "psychic turn" by M.Ya.Hrot and can be the basis for the development of a methodological approach to the study of the problem of decision-making in stressful cognitive conditions.

Thus, the decision-making in stressful cognitive conditions is based on a psychic turn as a unit of the psychic activity, provided by the actualization of volitional, intellectual and emotional mechanisms, and is mediated by an appropriate level of personal readiness of an individual.

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## DEVELOPMENT OF PROFESSIONAL RESPONSIBILITY OF CIVIL AVIATION PILOTS

*The article presents an analysis of current approaches professional responsibility of specialists, are defined psychological indicators of professional responsibility civil aviation pilot, brightened study of professional responsibility civilian pilots at different stages of professional activity.*

One of the components of the human factor is the professional responsibility. Systematizing the existing definitions of the category of "responsibility" and "professional responsibility," we have determined that the professional responsibility of the pilot – it is an integral indicator of awareness and predictability of action when performing a professional job, installation of survival in special and emergency situations, as well as the response to the catastrophic situation caused by the actions of professional aviation expert. In order to diagnose a professional responsibility, we relied on indicators that reflect the emotional, cognitive and behavioral components of responsibility. Namely, the process of life scale (meaning technique-life orientations of A.Leontiev), which displays the comfort, the richness of life and reveals deep motivational component needs to survive; overall personality of self-regulation (self-regulation technique Style Morasanovy), reflecting a manifestation of behavior control in professional activities; satisfaction with professional responsibility – contains indicator of emotional comfort influence on the psyche of the load for which the person responsible; reflexivity – both mental and mental state of the property, providing the ability to predict, analyze and understand the actions performed during the execution of professional tasks.

The study involved 57 civilian pilots, age from 25 to 47 years working in different airlines, with different seniority. Since the objective of our study was to determine features of the development of professional responsibility, the respondents were divided into three groups, depending on the length of the work. Group 1 included pilots with experience up to 3 years (15 people) in a 2 – respondents with experience of 3 to 5 years (26 people), a group of 3 – respondents who have worked more than 5 years (16 people). Percentage distribution data shown in Table 1.

*Table 1. The distribution of these indicators  
by groups of professional responsibility*

| Indicator of professional responsibility |         | High level, % | Medium level, % | Low level, % |
|--|---------|---------------|-----------------|--------------|
| Reflexivity                              | Group 1 | 12            | 24              | 64           |
|  | Group 2 | 19            | 29              | 52           |
|  | Group 3 | 25            | 33              | 42           |

|   |         |    |    |    |
|---|---------|----|----|----|
| Process of life                                 | Group 1 | 19 | 27 | 54 |
|   | Group 2 | 27 | 30 | 43 |
|   | Group 3 | 33 | 39 | 28 |
| Satisfaction with professional responsibility   | Group 1 | 18 | 21 | 71 |
|   | Group 2 | 24 | 31 | 45 |
|   | Group 3 | 35 | 29 | 36 |
| Overall indicator of behavioral self-regulation | Group 1 | 16 | 34 | 50 |
|   | Group 2 | 27 | 43 | 30 |
|   | Group 3 | 29 | 47 | 24 |

As can be seen from the table, on a scale of severity indicators reflexivity in group 3 than in group 1 and 2. This is because the awareness and predictability of professional actions depends on seniority and has been developed in professional activities. Also, we can talk about the influence of age on the characteristics of the personality development of the ability to reflect. In terms of the process of life observed dynamics in groups, which suggests that the older the respondent, the more professional experience is, the more you get out of life, and therefore, increases the motivation to be included in the process of life. Pilot for the profession the value of life is a priority. Satisfaction on a scale of professional responsibility, it should be noted that the majority of respondents have a low level at the beginning of a professional career, compared to group 2 and 3, it shows great psychological stress experienced by pilots experiencing internally responsible for passengers who are on board the aircraft apparatus for error-free execution of the flight mission, etc. Indicator of the general level of activity in the group 1 self-regulation detects insufficient shaped locus of control their behavior. And in group 2 and 3, we observe significant changes in this index. This can be explained not only by age characteristics that influence the development of emotional and volitional, and professional activities and structures and helps to organize themselves and the space around.

Using mathematical methods for data processing of our study (Mann-Whitney test), we found a significant difference in scores on reflexivity, the process of life, satisfaction with professional responsibility and overall self-regulation in groups. This indicates that the professional responsibility begins its qualitative development since 3 year professional pilot activities continues throughout the entire process of professional growth. Expressed in a high awareness of their professional activities, caution in situations of decision-making at a high level of self-control and self-control, understanding the value of life. Proper division of responsibility in professional activity that causes a degree of comfort and personal development of the individual.

### Conclusion

There are defined indicators of professional responsibility civil aviation pilot, which include emotional, cognitive and behavioral components.

There are defined indicators of professional responsibility civil aviation pilot, which include emotional, cognitive and behavioral components.

Further research, we have identified in the definition of the development of psychological condition of professional responsibility civilian pilots.

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## OPTIMIZING NON-TECHNICAL SKILLS WITHIN THE WORKPLACE

*This paper investigates a number of techniques which can be used to achieve the re-invigoration of a Crew Resource Management (CRM) program through targeted Non-Technical Skills (NTS) training within an aviation organisation. The success to ensuring a NTS training package is maintained with relevant global standards and involves a number of core objectives. Executive management is held accountable and committed to non-technical skills training. The identification of non-technical skills training needs within the organisation. The development of awareness training. The improvement of training thought collaboration with similar organisation, and the development of training schedule to implement the Crew Resource Management training within the organisation (Civil Aviation Safety Authority, 20011). This paper outlines and elaborates on these core phases using relevant current day literature and examples to assist in the implantation of an up to date training package within an organisation in the aviation industry today.*

### Introduction

Aviation organisations in today's industry see Crew Resource Management (CRM) and Threat and Error Management (TEM) as an essential component to ensuring the safety and efficiency of all stakeholders within the organisation. Crew Resource Management (CRM) can be defined as, "...a team training and operational philosophy with the objective of ensuring the effective use of all available resources to achieve safe and efficient flight operations" (Civil Aviation Safety Authority, 2011). Many of the world's aviation regulators agree that emphasis should be placed on the management of threat and error (Maurino, 2005), with inclusion of individual's human factors such as stress and fatigue as well as group processes such as communication and leadership in order to ensure all available resources are used to achieve this safe flight (Merritt & Helmreich, 1996). These human factors, or Non-Technical Skills as they are more commonly referred to, denotes the social, mental and individual capabilities that contribute to safe and efficient flight. The term, Non-Technical Skills (NTS), was first used by the European Joint Aviation Authorities (JAA) as complementing the technical skills of the crew and contribute to reliable and effective performance in the complex works systems typical of the aviation industry (Flin, O'Connor & Crichton, 2008). This paper is designed to investigate a CRM and TEM program within an organisation and identify potential areas for improvement in order to ensure optimal non-technical behaviours within the workplace.

One of the aims of efficient NTS training is to ensure three distinct developmental phases have taken place on the completion of the program. **Awareness** looks at the development of basic knowledge of Human Factors and the formation of attitudes to promote safety awareness and behaviours within the organisation (Civil Aviation Safety Authority, 2011). **Knowledge** outlines the development of applying the knowledge learnt in NTS training and making it to relevant skilled performance within the workplace (Civil Aviation Safety Authority, 2011). This includes using tools such as pre-course readings, presentations, practical

exercises, and case studies. The **Skills** component looks at on the job performance evaluation through practise and feedback with the use of simulation exercises and reinforcement through refresher training (Fletcher et al., 2004). Ensuring maximum knowledge retention is achieved through different instructional methods such as cross-training, mixed employee groups and modular training are all possible avenues which should be investigated to ensure the organisation targets NTS training to their employees.

Five broad steps are essential to re-invigorating NTS training. **Identifying the training needs** within your organisation to determine the requirements for training to enhance the safety and performance in the workplace. This is achieved through the evaluation and assessment of skillset within the employee group with a training needs analysis (Alvarez, Salas & Garofano, 2004). **Developing training content** to address the training needs within the organisation. Researching whether standard off the shelf training would be suitable for the organisation or defined and catered training is required to meet the organisation's goals. **Implementing the training** using proven methods and techniques from around the world. This requires an implementation strategy which defines training methods, objectives, and resources, and should outline theory along with proven evidence. Issues such as the choice of instructors, and their style and technique are all factors which need to be determined before the implementation of NTS training. **Assessing the skills learnt** where necessary and evaluating the effectiveness of the training in order to improve for further training and recurrency. **Evaluation of the NTS training program** is vital in order to ensure the success in continuity of the program. All too often we see a great implementation of a training package, yet we see its failure due to no succession planning on completion.

Ultimately NTS training is an area of the organisation which is vital to the overall success and safety of the operation. Ensuring management commitment is essential in ensuring the success of the program. Management must be accountable for the program and overall commitment of NTS training within the organisation (Banks, 2012).

## **Discussion**

The motivation to implement CRM training within the industry was attributed to a number of aviation accidents in the 1970's which identified, "low assertiveness, leadership, fatigue, decision making and communication" (Weick, 1990), as causal factors to these accidents in the industry. It is essential for an organisation to maintain a highly structured and responsive training program which incorporates human factors and the management of threats and errors within the workplace. NTS are not just important for managing emergencies or critical situations, but also for the optimisation of performance and safety during routine working conditions (Civil Aviation Safety Authority, 2011). The identification of abilities and aptitudes of the workforce is the initial step required to designing an updated NTS package for an organisation.

A **Training Needs Analysis** considers all aspects of resources, safety measures, and research techniques in order to assess the state of training as well as gaps in theory and practice (Moore & Dutton, 1978). A variety of diagnostic tools

exist to examine information readily available within the workplace as well as generating new information to assist in determining the training focus within the organisation. The effective training needs analysis, “will pay dividends when it comes to designing the training. There is no point in developing a training course that does not address the needs of a given job and ultimately the needs of the organisation, because it was based upon a poor training needs assessment.” (Flin, et al, 2008).

On completing this analysis the organisation will have the ability to identify areas of deficiency which can be focused on within the NTS training course. It is recommended to use a number of techniques in an effort to identify training needs (Civil Aviation Safety Authority, 2011). The detail of this analysis is directly proportional to the available expenditure of the organisation. Those with a higher allocation of resources available have the opportunity to go into greater depth with their analysis.

Event based analysis examines various safety reports to identify potential issues or patterns within the workplace. The aim of this analysis is to identify potential high-risk situations and working environments, to help change those systems, and ultimately reduce the potential risk. This feedback will allow for improvements in the design of interventions to improve safety (Wu, Pronovost & Morlock, 2002).

Various questioning techniques gives both the organisation and employer the opportunity to seek information and feedback information with the overall goal of improving safety within the organisation. Interviews, focus groups, questionnaires and surveys are all possibly questioning techniques which can be employed to obtain this information (University of Newcastle, 2014).

Observational techniques are becoming more common place within organisations today. Direct observations such as through Line Oriented Flight Training (LOFT) and Line Operated Safety Audits (LOSA) allow observation by an individual who is not directly involved in the task to analyse the effectiveness of NTS (Hamman, 2010). Participant observation such as peer to peer assessment is also another method used whilst also remote observation through video and audio recordings have also been found to be useful as they can be kept for future reference to analyse trends of improvement or deterioration in safety. By identifying issues of special importance through a training needs analysis, the currency, credibility and value of refresher training is greatly increased (Civil Aviation Safety Authority, 2011).

The next phase of re-invigorating the NTS program is through the **Development of training content** from the results of the training needs analysis.

The use of an analysis tool such as the GAP analysis allows the organisation to determine the difference between what the organisation currently delivers in terms of training and what the ultimate goal of NTS training is within the organisation. The main two questions that should be asked when starting a GAP analysis are, “Where are we?” and “Where do we want to be?”. There are multiple GAP analysis methodology’s available through various organisations around the globe. Transport Canada (2010), a leading authority in Aviation Safety around the world has a GAP analysis tool available for use in any organisation as a benchmark within their

organisation.

On completion of this phase of the program an implementation workshop should be developed with relevant personnel to inform the organisation about the NTS training program and results of the Training Needs Analysis.

Relevant stakeholders could include but are not limited to:

- Managing director
- Chief Executive Officer
- Quality and Safety Manager (Facilitator)
- Head of Maintenance
- Chief Pilot
- Base Manager
- Flight Crew
- Head Cabin Crew

(Civil Aviation Safety Authority, 2011)

The aim of the workshop should involve a review of relevant legislation and subsequent publications such as CAAP SMS-3(1) and its implications and potential benefits for the organisation. A summary of relevant findings from the training needs analysis and subsequent GAP analysis whilst also developing a consensus on the implementation of the NTS training plan. One of the fundamental benefits of an implementation plan is the requirement of employee group involved in various parts of the developmental phases of training. This can be aligned with the CASA CAAP SMS-3(1), “Occupations this CAAP applies to” preamble.

Three key developmental phases must be achieved in order to ensure individuals are armed with the correct skills to undergo their operations safely and efficiently.

The CASA CAAP SMS-3(1) Appendix A provides a sample NTS developmental phase plan.

|   | Comment  | Awareness | Knowledge | Skills |
|---|--|-----------|-----------|--------|
| Flight crew                                 | This group would include licensed crew members charged with duties essential to the operation of an aircraft during a flight duty period.  | +         | +         | +      |
| Flight operations officer/flight dispatcher | These roles include persons designated by the operator to engage in the control and supervision of flight operations, suitably qualified in accordance with extant regulations, who support, brief and/or assist the pilot-in-command in the safe conduct of the flight. | +         | +         | +      |



|                       |   |   |                             |   |
|-----------------------|---|---|-----------------------------|---|
| Cabin crew            | A crewmember who performs, in the interest of safety of passengers, duties assigned by the operator or the pilot-in-command of the aircraft, but who shall not act as a flight crew member.   | + | +                           | Not required but encouraged                             |
| Other personnel       | Through the use of a SMS, should any unacceptable risks be attributed to the nontechnical skills (e.g., fatigue, stress, communication, decision making etc) of other staff performing safety-related work (e.g., safety management personnel, flight operations senior management, ramp staff etc), it may be necessary to develop non-technical skills training programs as controls to manage this risk. | + | Not required but encouraged | Not applicable at this stage; will monitor SMS outcomes |
| Maintenance personnel | Noting that aircraft maintenance staff are subject to existing human factors/non-technical skills training requirements (refer to CASR Parts 66, 145 and 147), it was decided to attempt to include these staff in an integrated non-technical skills training program where feasible.  | + | +                           | +   |

(Civil Aviation Safety Authority, 2011)

Investigation into what topics should be covered in the program is also very important. Comparison between a numbers of regulatory authorities in various countries is highly recommended (Shuffler, Salas & Xavier, 2010). The FAA, the JAA, and CASA all have valuable topics which should be included in an NTS training program.

| FAA (2004)   | Australian Aviation Operator (2005)   | JAA (2006)  |
|--|---|---|
| <ul style="list-style-type: none"> <li>• communications processes and decision behaviour:</li> <li>• briefings</li> <li>• safety, security</li> <li>• inquiry/advocacy/assertion</li> <li>• crew self-critique (decisions and actions)</li> <li>• conflict resolution</li> <li>• communication and decision-making</li> <li>• team-building and maintenance:</li> <li>• leadership/followership/concern for task</li> <li>• interpersonal relationships/group climate</li> <li>• workload management and situation awareness</li> <li>• individual factors/stress reduction</li> </ul> | <ul style="list-style-type: none"> <li>• human behaviour</li> <li>• human performance limitations</li> <li>• communication</li> <li>• threat and error management</li> <li>• leadership/followership</li> <li>• team coordination</li> <li>• situation awareness</li> <li>• judgement and decision making</li> <li>• stress management and fatigue management</li> <li>• workload management and automation</li> <li>• mission analysis and planning</li> <li>• mission briefing and debriefing</li> <li>• organisational and safety culture</li> </ul> | <ul style="list-style-type: none"> <li>• human error and reliability, error chain, error prevention and detection</li> <li>• company safety culture, standard operating procedures, organisational factors</li> <li>• stress, stress management, fatigue and vigilance</li> <li>• information acquisition and processing, situation awareness, workload management</li> <li>• decision-making</li> <li>• communication and coordination inside and outside the cockpit</li> <li>• leadership and team behaviour synergy</li> <li>• automation (for type of aircraft)</li> <li>• case-based studies</li> </ul> |

NTS topics in use around the world today. (Civil Aviation Safety Authority, 2011)

**Implementing NTS training** should be bolstered by a strategy that outlines the training methods, objectives and available resources (Civil Aviation Safety Authority, 2011). The strategy should incorporate sound theory practises along with proven evidence from case studies or research papers. Other pertinent issues are also vital whilst implementing the training program to ensure staff receive the most valuable information available at the time. Choice of instructors is paramount to effective training. The option of training your own staff as NTS instructors allows the context to apply to their own operations. Within the aeromedical industry it may be worth a flight nurse and an aeromedical pilot to be trained, in order to use content relevant to staff. The option also of contracting an outside professional is also valid to emphasise technical knowledge of human factors. Style of instruction is also important as it allows the enforcement of the self-assessment, social and cognitive skills of personnel who are already technically proficient in the field (Civil Aviation Safety Authority, 2011). ‘Adult education’ has been seen to be a valuable approach where the past experience of individuals is recognised and used in a practical setting during training. Ensuring a range of varying instructional techniques allows individuals to learn and train in various settings in order to maximize retention of new information. Self-paced learning such as pre-course readings and computer-

based training are seen as valuable but have a tendency to be over used due to not having any strain on company resources. Individual instructional feedback is a valuable tool post simulator session debriefs where proficiency checks have been assessed and evaluated (Helmreich, et al., 1999). This is similar to Event based training where learning objectives and feedback are combined simulation sessions for training. Team facilitation and coordination allows for learning through a team environment commonly seen in regular CRM training. Team self-correction allows the promotion of behaviours within the team to identify and remediate errors. This is a valuable method of learning that we are seeing in LOFT. Cross-training can be achieved in an environment where CRM or TEM training is conducted across a number of groups. This is beneficial in seeing what each other's human performance limitations are. From experience, engagement of staff in NTS training is more likely when Management support is obvious. An in-person welcome from senior executives, or even a recorded video message to use before training is a valuable way of showing commitment from management and their support of safety within the organisation (Taggart, 1993).

Reinforcement of training should be completed in form of assessment either during or shortly after official training is completed. This allows for consolidation and retention of skills and knowledge. This should be justified with evidence of how skills and knowledge erode over time (Civil Aviation Safety Authority, 2011).

### **Assessing NTS training**

Any training must be assessed to confirm that tangible improvements in safety and knowledge retention are occurring. Different phases of training require different forms of assessment.

The awareness and knowledge phases are easier to assess through direct assessment such as feedback, examinations, discussions, and so on. With respect to the skills phases of learning, specific assessment techniques for NTS have been developed and continuously evolve. This includes LOFT which require simulations and subsequent decision making due to a simulated event. However, there appears to be increased regulatory pressure for their formal evaluation (Klampfer, et al., 2001). Behaviour rating systems or behavioural markers are commonly used in training and assessing NTS. They are observable, behaviours that are present in groups of individuals which contribute to the overall performance within the environment. Although this is only one method of assessing behaviours amongst many, it has won the credibility within the aviation industry and used widely (International Civil Aviation Organisation, 2001). Another method is Competency Based Training (CBT) which places emphasis on what an individual can do within the workplace once completing the training. These standards are industry determined and focuses on the development knowledge, attitudes and skills to achieve those standards (Civil Aviation Safety Authority, 2011). A benefit of CBT is that the individuals is assessed against a standard and not against other individuals. CASA encourages the use of CBT for NTS training as they are considered to be core competencies for safety-related occupations (Civil Aviation Safety Authority, 2011). These results and assessments must be stored and maintained in an efficient manner. Online computer assessment tools are used widely today and are a valuable resource as it allows for assessment throughout the year.

### **Evaluation of NTS training programs**

There are a number of reasons why the evaluation of NTS training is valuable to an organisation. Most importantly, it allows to organisation to see if the goals of the NTS program have achieved the desired outcome (Salas & Cannon-Bowers, 2001). Donald Kirkpatrick's (1994) book, "Evaluating Training Programs", published his original ideas of 1959. His theory is the most widely used model for the evaluation of training within the workplace. Kirkpatrick's four-level model is now considered an industry standard across training organisations around the globe.

Reaction of students – their overall thoughts and feeling about the training (O'Connor et al., 2008). This can be completed via a simple questionnaire which assesses the interest of training in relation to its relevance, quality, and materials and so on.

Degree of Learning – the overall increase in knowledge. This could be done by a pre and post course knowledge quiz (Kraiger et al., 1993). Another possible method could be through the presentation of case studies to identify strengths and weaknesses in a less formal way such as through a Flight management Attitude Questionnaire (FMAQ) (Flinet al., 2008).

Behaviour change – the extent to which the applied learning was taken back to the job (Goeters, 2002). This could be in the process of Behaviour rating systems as mentioned previously.

Organisational Results – the overall effects of the working environment due to training.

The ultimate aim of NTS training is to produce evidence that an overall improvement in safety and productivity has occurred at an organisational level (Grubb & Morey, 2003). A common approach is to undertake a trend analysis of incidents over a time period before and after training has occurred and notice any improvements in change.

### **Conclusion**

Non-technical Skills Training is a necessity in any organisation involved in complex environments such as the aviation industry. Crew Resource Management programs designed at identifying and mitigating threats and errors need constant evaluation. As the aviation environment evolves, so too does NTS training need to evolve in which an organisation's employees are trained. Re-invigorating the organisation's CRM/TEM training program involves careful and continuous monitoring and review to ensure all employees are kept current on latest practises and methods to ensure their Non-technical Skills allow for safe and productive activities within the organisation. Deficiencies in this type of training increases the chances of individuals being exposed to threats and subsequent increase in error occurring (Civil Aviation Safety Authority, 2011).

The organisation must ensure three distinct developmental phases are achieved within the organisation. Awareness allows individuals to grasp the basic knowledge of NTS and gives the organisation the opportunity to promote safety behaviours within the workplace. Knowledge provides an advanced understanding and implements various teaching methods into the training through case studies and

presentations. Whilst the Skills developmental phase can be split into two components. Practise and feedback through the form of on the job performance such as LOFT and LOSA and reinforcement through refresher training. This is done to ensure the training and knowledge has been retained and kept up to date. The development of an effective and re-invigorated CRM/TEM training program can be distinguished into five broad steps as outlined in this paper. First the identification of training needs in the organisation is required. This is done by completing a thorough training needs analysis to identify the current state of the workplace and where possible areas for improvement are possible. Various techniques include event base analysis, questioning and observational techniques to obtain the information required to fully assess the state at which the organisation currently stands.

Second, the development of training content. A GAP analysis allows the organisation to address, “where we are at the moment” and, “where do we want to be in the future”. The analysis is an abrupt assessment as to the current situation on NTS training. Through the use of a phased implementation plan, a timeline of milestones can be created for regulatory authorities such as CASA to use for the organisation to be held accountable. NTS topics can be selected through the comparison of other regulatory bodies around the world and those which may be specific to the organisation today. The training should be conducted in phases which allows the use of behavioural markers in assessing the ability of individuals completing the training.

Third, Implementing NTS training also requires various considerations. Internal or external instructors both have positives benefits to training with the organisation. Their style and instructional techniques also need to be considered when looking at the aims of the organisation and the individuals involved. Pilots learn different to Cabin Crew and Engineers where some are more goal oriented and others are project oriented.

Fourth, Assessment of NTS training determines how the knowledge and skills have been absorbed by individuals. This is also important for recurrent training to ensure knowledge is retained for a longer period. In this instance, Behaviour Rating Systems and Competency Based Training are both valid methods in various environments and areas of the developmental phase.

Finally the evaluation of the NTS training program is vital in ensuring the individuals or participants of the program can provide feedback the course and what could be improved. Kirkpatrick’s (1998) method for program assessment allows a thorough review of training programs to allow organisation improve on materials for future use.

It has been proven through experience that the success of any NTS training relies heavily on management support. Without enabling the correct resources to the implementation team, a successful NTS program is difficult to run (Broad & Newstrom, 1992). Similarly without the support from management, employees are less likely to participate to a full extent in the program without the belief that management find it a useful exercise.

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## **HUMAN FACTOR AND PSYCHOLOGICAL ASPECTS IN FLIGHT SAFETY PROVISION**

*The article deals with the flight safety issues aviation industry faces today. It gives an overview of human factor in aircraft accident rate including psychological aspects in the nature of human errors. It focuses also on the impact of linguistic, cultural and environmental barriers on the safety of civil aviation operations. Some recommendations are offered as for improvement and modification of aviation staff professional capabilities via exercising, training and continuous education.*

One of the most important public issues in the air travel industry today is the issue of safety. Although air travel is among the safest ways to travel that grows continuously safer even as air traffic increases, a number of problems still remain. Their solution requires cooperation of international civil aviation organizations and authorities, governmental and regional aviation bodies in implementation of applicable regulatory structures and appropriate statistical analysis of the safety hazards. Besides, a constant collaboration with aviation psychologists as well as specialists from other scientific areas is no less important in solving problems connected with psychophysiological differences, language and cultural barriers which appear in civil aviation operations.

As recent surveys show, the accident rate in commercial jet aircraft for the last 50 years has declined sharply from approximately 5.0, to 0.35 per million departures. With reliability and structural integrity having been improved, the number of accidents resulting from engineering faults have reduced dramatically [1]. Obviously flight safety does not depend solely on airplane and its navigation systems condition but at the same time it relies heavily on human factor. The majority (about 80%) of air accidents in 2012 were caused by human factor and 20 % by engineering failure [2]. Human error is considered to be the principal threat to flight safety. It has long been known that some three out of four accidents have resulted from performance errors made by healthy and properly certificated individuals. "Error is the product of design, procedures, training and/or the environment, including the organizational environment" [1] as aviation psychologists state. However, it would be oversimplification to suggest that any accident is caused by "human error" or "system failure" along. Advance in this field of research can be expected to have a significant impact on the improvement of flight safety.

This was recognized by the ICAO Assembly, which in 1986 adopted Resolution A26-9 on Flight Safety and Human Factor [3]. Human Factor, like most activities, is multidisciplinary in nature. Psychology tries to understand how people



process information and make decisions. From psychology and physiology comes an understanding of sensory processes as a means of detecting and transmitting information, biology is needed to understand the nature of the body's rhythms and sleep, and their effects in night flying, and time-zone changes. Environmental tolerances are defined by temperature, pressure, humidity, noise, time of day, light and darkness and influence the performance and well-being. Heights, enclosed spaces and a boring or stressful working environment can also be expected to influence behaviour and performance[ibid]. Proper analysis is possible only with data presentation from specialists' surveys or studies.

To limit human error, we must first understand its nature. There are basic concepts associated with the nature of human error: the origins of errors can be fundamentally different. While some errors are due to carelessness, negligence or poor judgment, others may be induced by poorly designed equipment or may result from normal reaction of a person to a particular situation. Individuals differ in their responses to stress. The same stressor, for example thunderstorm, produces different responses in different individuals and resulting damage can be referred to the response rather than to the stressor itself [3]. Being aware of psycho-physiological possibilities and resources of individual it is possible, taking into account received information about the type of a person, to achieve professional reliability of a pilot mastering by practice pilot's skills.

Based on the analysis of psychophysiological characteristics of a pilot, the current research has revealed 5 major groups of professionally essential qualities: 1) personality; 2) intellectual; 3) psychophysiological; 4) physiological; and 5) physical [4].

Personality qualities determine motivation, goal orientation, steady interest to work, ethics, character, ability to interact effectively in a team, to overcome professional challenges and other personal qualities which make the core of vocational fitness while intellectual ones characterize the capacity to learning, information processing and generating, which enables the pilot to act in challenging situations. The pilot is required to have highly-developed cognitive processes, namely: sensation, perception, representation, intelligence, memory and attention.

In the process of training, it is memory, capacity to image operating and profession-oriented thinking that should be spotlighted by teachers, psychologists and flight instructors in the first place. These three emphasized qualities of intelligence determine sense of flying, span of attention, its switch and stability, capacity to orientate and make decisions at lack of time in challenging environment or unpredictable situations.

It should be recommended first of all to work out and implement the plan of pilots' training, to focus attention on human factor and crew resource management, and to define the chief aviation authority that could be able to make practical solution of vital problems. Then to introduce such type of training in all airlines and give information on the reasons that hinder a pilot in changing his decision and the ways to prevent the effects they have on him as well as other psycho-physiologically dangerous facts [3].

Speaking about the role of psycho-emotional endurance that influences pilot's professional reliability, judgment and operative thinking should be mentioned. The first assures problems solution in flight and the second provides

quick adequate decision making at lack of information. ICAO gives the following definition of a faultless pilot: Faultless is a pilot who, due to his sound thinking, does not find himself in situations that call for his perfect skills. Omission of critical actions or undertaking a wrong action has been observed to be the primary factor in many accidents [1].

Any investigation of aircraft accident without medico-psychological examination does not give possibility to find out the cause and effect of event in evolution and thus to work out efficient recommendation in taking preventive measures. As the result the investigation is not effective. To reduce the errors it is necessary to know the “How” and “Why” of error happening and then try to eliminate them [2].

The control of human error requires various approaches. First, it is necessary to minimize the occurrence of errors by: ensuring high levels of staff competence; designing controls so that they match human characteristics; and reducing noise, vibration, temperature extremes and other stressful conditions.

Three of the many factors which may tell on the well-being of crew members are fatigue, body rhythm disturbance, and sleep deprivation or disturbance. Other factors affecting physiological or psychological well-being include temperature, noise, humidity, vibration, workstation design and seat comfort. The proper layout of displays and controls in the flight deck can promote and enhance effectiveness [3].

Training pilots for modern sophisticated, highly automated aircraft is an expensive and time-consuming task, and major airlines start competing with each other in attracting experienced pilots from other countries. The increase in the number of low-cost operators has crucially changed the nature of airline business. As they operate at a wide range of airports, including foreign ones where maintenance is often provided by third parties, they may not even own their aircraft, or employ their own pilots or ground and check-in personnel. This arises another problem – the professional reliability of flight crews staffed by representatives of different nationalities and cultures.

Barriers in communication, sometimes referred to as “language barriers”, are the other factor, which is, according to ICAO, NTSB and other reputable agencies, pivotal in the common threads of incidents and accidents in airline operations [5]. This problem is still being solved. It is extremely complicated, because it appeared not only due to great number of languages spoken all over the world, but due to diametrically opposed outlook of people from various parts of the world as well. It has been revealed that various airlines’ organizational cultures influence flight crew members’ views toward training and aviation safety within the flight deck environment [ibid].

In addition, the multilingual environment and insufficient English language proficiency, may affect crew workload. The FAA reported that 48% of pilots highlighted an increase of workload as a result of multilingual communication challenges, 37% informed that the increase of workload was related to tasks they had to complete (not to multilingual communication), and 15% stated it required added attention to understand the language relating to performing a task [5].

The International Civil Aviation Organization has decreed that from 1

January 2008 all Air Traffic Controllers and Flight Crew Members engaged in or in contact with international flights must be proficient in the English language as a general spoken medium and not simply have a proficiency in standard ICAO Radio Telephony Phraseology. Amendment 164 to Annex 1 has introduced strengthened language proficiency requirements to flight crew members and air traffic controllers when they operate internationally [6]. Currently there are no effective aviation-specific language tests for pilots. Commercially available English knowledge test such as TOEFL is not appropriate for the purpose of testing English competence for pilots and air traffic controllers as it has not been designed for testing “speaking and listening ability” required by Annex 1. Efforts to develop appropriate and available aviation testing instruments have already begun and it is expected that more test options will soon be available [ibid].

Training programs aimed at improving co-operation and communication between crew members will reduce the number of errors though the total elimination of human error is an idealistic goal. Training is a process aimed at developing specific skills, professional knowledge or attitudes to a job or task. Proper and effective training cannot take place if there is no foundation for the development of those skills, laid by educational background. Two major types of training devices are training aids (slides, video-graphs, blackboards, wall charts) that help the teacher present a subject, and training equipment (flight simulators) providing for active participation and practising by the trainee. The development of simulators is based on the need to provide practical training in as realistic environment as possible, at low cost and risk, and with a high degree of efficiency. Training in the course of professional activity should be done continuously and adequate training skillful teaching staff should be employed [3].

The other task of Human Factor training is to prevent communication errors. This task includes the explanation of common communication problems as well as reinforcement of a standard of language to ensure the error-free transmission of a message and its correct interpretation. Ambiguous, misleading, inappropriate or poorly constructed communication combined with expectancy have been listed as elements of many accidents. The quality and effectiveness of communication is determined by the degree to which the intended message is understood by the receiver [6].

As it is universally recognized that teamwork has an advantage over a collection of even highly skilled individuals, flight crews should coordinate actions as a team determining their behaviour and performance which is critical in case of emergency. Personality interactions are of great concern. Application of group interaction principles increases the managerial role of the captain, whose leadership is essential for effective crew performance. A leader is a person whose ideas and actions influence the behaviour of others, understanding of the goals and desires of the group through the use of personal examples as well as persuasion. Leadership skills should be developed through proper personnel training; such training is essential in aircraft operations where junior crew members are sometimes called upon to adopt a leadership role. Skilled leadership may be needed to understand and handle various situations. For instance, personality and attitude clashes within a crew complicate the tasks of the leader and can tell both on safety and efficiency.

Since most errors occur in abnormal conditions, it is necessary for individuals to control themselves and analyze the problem through concentration and efficient time management. Aircraft accident and incident investigations have demonstrated that personality differences influence the crew members behaviour and performance. Motivated individuals perform with greater effectiveness than unmotivated individuals. Lack of attention to individual needs causes demotivation. According to statistical data, negative influences on motivation such as dissatisfaction with salary, frustrations over slow promotions or management etc. can destabilize the flight crew work [2]. This testifies to the necessity of deeper research into desirable and undesirable personality characteristics of crew members, and the significance of an effective assessment of personality in crew selection by testing.

### **Conclusion**

It can be concluded that despite the advancement made in technical resources, sufficient studies have not been done yet on Human capabilities. Improvement and modification of personal, technical, psychological and physical capabilities of aviation staff via exercising, training and continuous education should be done so that the necessary matching of the individual with hardware, software, environment and other people come about.

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## **CELLPHONE USE ON AIRLINERS: AN ATTEMPT AT NEWSPAPER DISCOURSE ANALYSIS**

*The article highlights a number of issues related to the cognitive schemes of integrating mobile gadgets, the cellphone in particular, into one's private space in the public place on board aircraft.*

Currently various gadgets present an indispensable group of thing for the vast majority of airline passengers. Airlines take steps to make wireless Internet connection available and allow mobile phones on planes, so the cellphone-free space is shrinking. Strategizing on how to control social contacts has been increasing and widely debated for the recent decade with a special focus on the limited public space of an aircraft.

«Passengers are taking an increasing array of devices on board planes – cellphones, tablets, GPS units and more. Many of these devices transmit a signal, and all of them emit electromagnetic waves, which, in theory, could interfere with the plane's electronics. At the same time, older planes might not have the best shielding against the latest generation of devices, some engineers said» [2]. Meanwhile many passengers ignore the request to turn off all electronic devices, and there are various reasons they do not comply with the restrictions, providing explanations like the following:

*“In my head, I imagine it not being a problem,” she said. “The whole airplane is filled with electronics that are constantly on. Is my little cellphone going to make that big of a difference?” [7].*

Similar statements both in favour and against using cellphones on planes present the material for the current newspaper discourse analysis. All the discourse fragments on cellphone use etiquette on planes are taken from The New York Times of recent years. In the study we focus on mental schemes of conceptualization of the cellphone as a personal thing in the public space on board aircraft. The aims pursued include the following:

- through the passengers' statements to outline the basic opportunities the cellphone provides vs the hazards / nuisances it creates;
- to elicit mental schemes of integrating the cellphone into one's private space in a public place of an aircraft;
- to decode the basic values passengers associate with their mobile gadgets.

Among the most meaningful aspects to characterize the situation of using the cellphone on board are the persons involved, the time and space parameters, and figurative expressive means.

The passengers' statements under study highlighting people on the phone fall into pros/cons categories. The gadgets enthusiasts provide their arguments, referring to the following factors:

1) parental and household responsibilities: *With more women working, both parents have to rely on constant connectivity to balance their household responsibilities with their work life;*

2) rational time management: *the last time I flew across the country I chose the only airline that was offering wireless Internet. I figured that I'd do some research, catch up on 30 Rock (since I don't have a TV), keep up with email, and check in periodically with my family. And that, in fact, is what I did. On the airplane, a wireless computer was part entertainment center, part work station, part connectivity tool. The one thing it wasn't, was annoying to the people around me. (Skype was disabled.)*

The 'cons' comments on egotistic talkers are vivid, with a strong bias towards labeling the cellphone users on planes as people

1) with little or no self-control, addicts: *most cellphone users behave like addicts, and each one is sure he or she deserves to be the exception to the rule; all we'll have left are a bunch of cellphone addicts crashing their cars on the ground and driving people crazy in the air,*

2) lacking for mental adequateness: *Would you, could you in the rain? / Would you, could you on a train? / Would you, could you on a plane? / Not in the rain / Not on a train / Not on a plane / You're just insane.*

3) The comparisons of wireless chatters to the ultimate violators of public order, such as smokers, and even terrorists are in the favour of the latter. *I would rather sit next to a smoker. We finally got rid of smoking. Let's not start catering to some other obnoxious compulsive habit on commercial aircraft; allow cellphone calls during flights and you won't have to worry about terrorists. Even they will stop flying.*

In her influential monograph *Always On* Naomi S. Baron points out: «Mobile phones are just one technology of many that can signal 'Keep Out'. But contemporary communication technologies also facilitate our becoming public exhibitionists» [1, 214]. The people, who suffer from talkative strangers in public places, tend to picture themselves as victims to somebody else's inappropriate behaviour with control being taken from them and the strangers' private life being imposed on the happpenstance listener:

*When you're on the cellphone, strangers sitting next to you have no choice but to listen. The last time I took the train, I brought my computer, too, hoping to do some work. The person in front of me was on the phone. The person next to me was, too. I learned a lot about their dinner plans, dating habits, and child-rearing philosophies, not that we talked. They chatted and I had no choice but to listen. We like to be connected, but not, typically, to strangers. And we like to feel that we're in control of our lives, but not controlled.*

Deprived of this type of control passengers associate the phenomenon they have to deal with with elements and even impending force majeure:

*You can't stop the tide, cellphone use is here to stay, it may take longer but eventually it will be used on board airplanes as it is already on trains, cars, ships and any transport media (including bikes). Thankfully, the F.C.C. commissioner has the brains and courage to halt the slide into the abyss. Bravo!*

No matter how limited one's private space is on board, it is viewed as a

territory worth defending from acoustic, voice intruders. The time and space continuum of the flight is featured as stressful, unnerving, and unpleasant. *It's a terrible idea – bound to lead to rage among already stressed passengers. Why not allow (silent) Internet use, including instant messaging? Is the intention to make air travel even less appealing than it already is? Because allowing cellphone use would achieve that goal!* The improvements suggested include certain modifications of the very time and particularly space parameters of the environment, ranging from

- realistic suggestions, such as *look for balance, folks: restrict most cellphone use during flights, but allow text messaging and emergency calls; the idea that cellphone use could be confined to certain times or certain areas of the plane is wishful thinking,*

- up to highly unrealistic and next to impossible: *if there must be cellphones on airplanes they should be in designated walled off areas. Please! An airplane cabin is a bad enough environment, and does not need mindless and intrusive phone talkers to make it worse. A separate section for those who feel they must be on the phone constantly? How about the cargo hold?*

The supporters of cellphones on planes base their arguments on mutual politeness and formulating of certain *unspoken rules*, as well as the ideas of safety. *I guess everyone has forgotten that cellphones saved the day on 9/11/01. They are the reason that the White House is still standing, psychological comfort, sense of belongingness etc.:*

*Mobile phone calls from a plane are hardly intimate, ...but they seem to make us feel that we're not alone. With mobile phones, we imagine we're safe and never alone; Moreover, cellphones allow us to meet at least three of the human needs on Maslow's hierarchy of needs: 1) Safety, since they make us feel more secure; 2) Belongingness, since we never have to be totally alone with ourselves; and 3) Esteem, since for many cell phone conversations are a means of announcing one's importance to everyone in hearing's range.*

John Ratey, a professor of psychiatry at Harvard, coined the term *acquired deficit disorder* to describe the condition of people who are accustomed to a constant stream of digital stimulation and feel bored in the absence of it [2, 219]. Many people confess of being addicted to having constant mobile connections to others, even resenting it at the same time.

This controversial addiction often leaves the interlocutors exhausted, inefficient, but unable to give up the mutual relentless access and private talks even in the public space of an aircraft: *an aircraft is one of the few places left on earth where you can actually escape from mobile phones, if only for a few hours. I hope it stays that way.*

People emphasize their strong negation of cellphones on board through

- repetitions, intensification, mild irony: *No, no, never. Flying is my last refuge from the cellphone. It's the only redeeming virtue of six hours in economy class;*

- sarcasm: *As long as the cellphone users have to step outside to use their phone I have no problem with it;*

- heart-felt interjections, like pleading for mercy: *Never, never, never ever allow cellphones on planes. It's bad enough on earth to hear people babbling all*

day, no matter where they are. Flying is miserable enough without those added egotistic talkers. Have a heart;

- vivid figurative style. The opportunity to be out of reach [by cellphone] is a precious gift. *Don't take it away.* On the other hand, sitting next to a person on the phone is repeatedly compared to the Underworld: *My idea of Dante's seventh ring of hell – squashed between two fat, sweating people talking on cellphones while a child kicks the back of my seat the whole trip – no, no, no – I'll take a boat first.*

The advocates of cellphones speak about the gadget as a means to improve the flight: *Having wireless access to do work, stream movies, read a blog and answer email while flying offers more control over your time than sitting there without those options... In that, flying is no different than being on terra firma.*

They do admit the possible negative consequences of using cellphones and other gadgets on planes, but the option is often portrayed as irresistible, though with a slight irony: *It's simple to blame this "connectivity trap" on techno-addiction – that if offered the chance to login, we simply cannot resist, as if Wi-Fi were a slice of chocolate cake. But as we see ever more people plugging in on planes, it's easy to miss the forces that push them to violate their own stated preferences for flights full of trashy novels, \$5 cocktails and time to stare at the clouds.*

### Conclusion

On board the passengers choose certain typical ways to conceptualize the cellphone and integrate it into their personal space in the strictly limited space of an aircraft as a public place.

Gadgets enthusiasts are apt to draw an analogy between the cellphone and a tool to considerably improve the flight, while their opponents associate the gadget with a tool to dramatically deteriorate it. In their newspaper statements the former focus upon using the gadget and the opportunities it provides. In the metaphoric construction CELLPHONE is a TOOL, on the recipient zone they project its following functions:

- 1) a communication tool (which correlates with the basic value of **belongingness**);

- 2) 24/7 connection (the value of **safety** correspondingly);

- 3) business tool (the value of **efficiency**); an unlimited digital stimuli provider (the value of **pleasure**).

These passengers are gadget – rather than people-oriented, they admit the controversies of the 'connectivity trap' and tend to sacrifice their **privacy**, which belongs to the key values in the English linguistic world-image, to meet certain current needs through the listed above values. Their verbal references to the use of cellphones on planes are well rationalized and less emotional and categorical, compared to the statements of their opponents.

The former focus on the users of cellphones rather than the gadget and the options it provides. In the metaphoric construction CELLPHONE is a TOOL the focus is shifted on the user, and their verbal references project the following characteristics on the recipient zone:

- 1) strong addiction;

- 2) being of a considerable nuisance;



- 3) force majeure;
- 4) the Underworld themes.

This category of passengers views their basic value of privacy as rudely violated through acoustic interference. Their language style is featured as highly categorical and emotional, with numerous examples of irony and sarcasm.

The complexity of the phenomenon of the instant 24/7 connection, the 'connectivity trap', the 'unspoken rules' on the use of cellphones call for further study in the cross-cultural context as language communities develop considerably different schemes of integrating the cellphone into one's private space in public places.

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## **THE RATIO OF BODY WEIGHT AND LENGTH OF THE NAU FIRST-YEAR STUDENTS**

*Results of researches of anthropometrical indicators of 410 first-year students of National aviation university are given in article. A significant amount of students with insufficient and excess body weight is established. The received results taking into account gender factors and depending on specialty of training are analyzed.*

**Introduction. Communication of researches with scientific and practical tasks.** The state of health of youth is a necessary condition of wellbeing of society and its progressive development [6, 8, 10]. Thus in HIGHER EDUCATION INSTITUTIONS of Ukraine the steady tendency to increase in number of the students having deviations in a state of health is observed that as a whole leaves a mark on quality of assimilation by them of knowledge of specialist subjects [1, 2, 5].

It is known that one of indicators of health of the person is the ratio of weight and body length as both surplus and a lack of body weight are equally hazardous to health, being the reason of many diseases [3]. In our opinion, application of methods of an assessment of a ratio of weight and length of a students' body at the initial stages of training in a higher educational institution will give the chance to receive objective information about level of physical development of students, to reveal existence of risk factors of accompanying diseases and to define prospects of introduction of corrections in process of physical training that is very actual. Work is performed according to a cathedral research subject of National aviation university "Improvement of Pedagogical Technologies of Formation of Fitness Culture of Students in the course of Physical Training" (number of state registration 0113U000586).

**The purpose of researches** is the assessment of indicators of a ratio of weight and length of a body of first-year students of National Aviation University different specialties of training.

**Material and methods of researches.** The 410 first-year students of National Aviation University of the different directions of preparation took part in researches. According to classification of the directions of the training of specialists offered by Pilipey L.P. [7], specialties of training of students at National Aviation University are distributed on groups: technical specialties; the data-logical; creative-figurative and natural-agrarian. Technical specialties master students in the Aerospace Institute, the Institute of air navigation and the Institute of airports. For data-logical group includes students majoring institute the Informational diagnostic systems, departments of computer science and computer systems. By creative-figurative and natural-agrarian group includes specialty Institute of Economics and Management, Law Institute, Institute for the Humanities, Institute of International

Relations, Institute of environmental safety. All surveyed students are engaged in physical training in special medical group.

For achievement of a goal the following methods of researches were used: analysis of data of scientific and methodical literature, questioning, anthropometrical measurements, method of indexes, methods of mathematical statistics. During anthropometrical measurements defined indicators of length and body weight of students. Method of indexes by means of Quetelet's body weight and length index counted a ratio of body weight in grams to body length in centimeters. Quetelet's index is determined by a formula:  $IK = m/L$ , where  $IK$  – an index, g/cm;  $m$  – body weight, g;  $L$  – body length, cm. The standard for men the size of an index equal to 370-400 g/cm, and for women – 325-365 g/cm [4].

**Results of researches and their discussion.** The analysis of average sizes of the studied indicators showed that values of an index of Quetelet are in norm at the majority of students, except for young men of creative and figurative and natural and agrarian specialties, at which its value above of norm (tab. 1).

*Table 1.*  
*Average Mean of anthropometrical indicators*  
*of students of different specializations ( $\bar{x} \pm m$ )*

| Data                | Specialization of study |             |                |                |  |               |
|---------------------|-------------------------|-------------|----------------|----------------|--|---------------|
|                     | data-logical            |             | technical      |                | creative-figurative and natural-agrarian |               |
|                     | Boys                    | Girls       | Boys           | Girls          | Boys                                     | Girls         |
| length, cm          | 180 ± 0,8               | 165,2 ± 1   | 180,1 ± 0,9    | 168,8 ± 0,8    | 180,4 ± 1,2                              | 167,2 ± 0,4   |
| Weight, g           | 72050 ± 1721            | 55834 ± 115 | 70730 ± 1577,3 | 58756 ± 1280,3 | 72649 ± 2661,9                           | 57583 ± 682,7 |
| Quetles Index, g/cm | 399,2 ± 9               | 337,5 ± 6,6 | 392,2 ± 8,6    | 347,3 ± 7,2    | 401,6 ± 14                               | 343,6 ± 3,8   |

However the carried-out detailed analysis of individual anthropometrical data allowed establishing that deviations from standard values of an index of Quetelet have a significant amount of students. So, within standard of value of an index of Quetelet are at 21% of young men and 39% of girls while the majority of students have either the insufficient body weight, or its surplus (tab. 2).

*Table 2.*  
*Ratio of students, having deviations from normal values of Quetelet's Index (%)*

| Sex            | Normal | Abnormal | Less of norm |
|----------------|--------|----------|--------------|
| male (n=149)   | 21     | 38       | 41           |
| female (n=261) | 39     | 23       | 38           |

*Table 3.*  
*Ratio of students of different specializations of study,*  
*having deviations from normal values of Quetelet Index (%)*

| Specialization of study                  | Sex       | Normal | Abnormal | Less of norm |
|--|-----------|--------|----------|--------------|
| data-logical                             | М (n=60)  | 22     | 38       | 40           |
|  | ф (n=41)  | 42     | 17       | 41           |
| technical                                | М (n=50)  | 12     | 40       | 48           |
|  | ф (n=43)  | 40     | 28       | 32           |
| creative-figurative and natural-agrarian | М (n=39)  | 31     | 36       | 33           |
|  | ф (n=177) | 38     | 24       | 38           |

Thus the greatest percent of the students having deviations from indicators of norm, is established among young men of technical specialties – with the insufficient body weight of 48%, with an excess weight – 40%. Among girls the greatest number of students with low values of an index of Quetelet is noted in group of examinees of data-logical specialty of training (tab. 3).

During the conducted researches the big percent of students with low body weight attracts attention. However, without looking at it, by results of the carried-out questioning it is established that 90% of all interrogated students note desire to grow thin and only 10% of girls are satisfied with the weight. For the purpose of correction of a figure of 60% wishing to grow thin girls use a diet and physical exercises, 27% use only a diet, and 23% apply only physical exercises. In our opinion, one of the reasons of a large number of students with low indicators of an index of Quetelet is the desire of girls to have harmonious parameters of a body. However it is necessary to remember that considerable deficiency of body weight is the main prerequisite of development of dystrophy, can lead to a delay of puberty and the termination of menstrual function that health of girls is negatively reflected on reproductive [9]. Among those surveyed youths satisfaction with their appearance express 58% of the students, but 60% of respondents expressed a desire to correct its own weight. In this case, unlike girls, most boys (88%) expressed a desire to get better, increasing the amount of muscle mass. However, among the students, wishing to change body weight, only 25% of young men apply for this purpose physical exercises.

### **Conclusion**

1. Deviations from standard values of a Quetelet's body weight and length index have a significant amount of students of special medical group of the first course of National Aviation University. 41% of young men and 38% of girls have insufficient body weight, excess weight is noted at 38% of young men and 23% of girls.

2. The greatest percent of the students having deviations from indicators of norm, is established among young men of technical specialties – with the insufficient body weight of 48%, with an excess weight – 40%.

3. The received results need to be considered when planning classes in physical training, selection of means and the methods necessary for increase of level of a physical condition of students.

**Prospects of further researches in this direction.** Further development of recommendations about use of differential approach by drawing up programs of independent classes in physical training, studying of level of physical development of students and its interrelation with level of physical readiness is planned.

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## RECREATING WALKING CLASSES IN THE PROCESS OF THE STUDENTS' PHYSICAL EDUCATION

*Optimal effect of walking training is achieved if it's focus, intensity, load volume, training frequency per week are selected individually, considering the physical condition's level (PCL) of the students.*

The main instrument of the professional activity of teachers of physical education in high school is conditional training as a system of physical training methods, which is used for PCL's achievement and maintaining.

As shown in the results of studies of Ivashchenko, K. Cooper, R. Paffenbarger, S. Rosenzweig the important instrument of conditional training is walking. Walking has physiological effect for the human body and is an effective cyclic aerobic exercise. Training can be used for increasing of motional activity and for correction of the risks of cardiovascular diseases, for improvement of respiratory and circulatory functions, musculoskeletal, metabolic. Along with that walking is an affordable and effective instrument of adaptation of the teenager's organism to the jogging classes [1, 2, 5].

For getting the training effect of walking its intensity and volume should correspond to the level of physical condition. For the persons with low and lower than average level of physical condition the intensity should be below the threshold of anaerobic metabolism (ANSP), for the persons with average and above average levels the intensity should be above ANSP [3,4].

**Heart rate at the same time is calculated by the formula:**

$$HR = (195 + 5 \times N) - (A + t),$$

N – ordinal number of physical condition (1 – low level of physical condition, 2 – below average, 3 – average 4 – above average, 5 – high) ;

A – Age, the number of full years;

t – Duration, min.

For example, at 40 – minute walking of a student, 20 years old with low physical condition, the training effect will be achieved, if the walking causes the increasing of heart rate to the following level:

$$(195 + 5 \times 1) - (20 + 40) = 200 - 60 = 140 \text{ bpm. min.}$$

To determine the level of physical condition of those who do recreational walking nowadays can be widely used special motional tests. One of the most famous one is proposed by K. Cooper (Table 1) and is recommended to be done not earlier than after 6 weeks of training.

*Table 1.*  
*The test of 3-mile walking (after K. Cooper)*

| Note of level of physical condition |                   | Time (min, sec) for 3-mile walking (4800 m) |                                    |
|-------------------------------------|-------------------|---|------------------------------------|
|                                     |                   | Age (years)                                 |                                    |
|                                     |                   | 13-19                                       | 20-29                              |
| Very bad                            | (male.) (female.) | more than 45.00<br>more than 47.00          | more than 46.00<br>more than 48.00 |
| bad                                 | (male.) (female.) | 41.01-45.00<br>43.01-47.00                  | 42.01-46.00<br>44.01-48.00         |
| satisfactorily                      | (male.) (female.) | 37.31-41.00<br>39.31-43.00                  | 38.31-42.00<br>40.31-44.00         |
| good                                | (male.) (female.) | 33.00-37.30<br>35.00-39.30                  | 34.00-38.30<br>36.00-40.30         |
| excellent                           | (male.) (female.) | less than 33.00<br>less than 35.00          | less than 43.00<br>less than 36.00 |

The level of physical condition is the most important factor that determines the content of the various recreational walking programs, developed on the basis of recommendations of K. Cooper and adapted for classes with students. The desired result of the program is getting 30 points during week microcycle. (Table 2).

*Table 2.*  
*Walking programs for people with low PCL*

| Week   | Distance,<br>km | Time,<br>min | Multiplicity,<br>times | Points during<br>week |
|--|-----------------|--------------|------------------------|-----------------------|
| 1  | 1,6             | 17,30        | 5                      | 5                     |
| 2  | 1,6             | 15,30        | 5                      | 5                     |
| 3  | 1,6             | 14,15        | 5                      | 10                    |
| 4  | 1,6             | 14,00        | 5                      | 10                    |
| 5  | 2,4             | 21.40        | 5                      | 15                    |
| 6  | 2,4             | 21.15        | 5                      | 15                    |
| <b>Walking programs for people with middle PCL</b> |                 |              |                        |                       |
| 7  | 2,4             | 21.00        | 5                      | 15                    |
| 8  | 3,2             | 28.45        | 5                      | 20                    |
| 9  | 3,2             | 28.30        | 5                      | 20                    |
| 10   | 3,2             | 28.00        | 5                      | 20                    |

|    |           |             |           |    |
|----|-----------|-------------|-----------|----|
| 11 | 3,2 и 4,0 | 28.00 35.30 | 3 2       | 22 |
| 12 | 4,0 и 4,8 | 35.00 43.15 | 3 2<br>2  | 27 |
| 13 | 4,0 и 4,8 | 34.45 43.00 | 3 2<br>2  | 27 |
| 14 | 4,0 и 4,8 | 34.30 42.30 | 3 2<br>2' | 27 |
| 15 | 4,8       | 42.30       | 5         | 30 |
| 16 | 6.4       | 56.30       | 3         | 33 |

Along with this the physical education teachers should pay extra attention to the morphofunctional constitutional peculiarities and health conditions of the students. One of the most effective options for pre-dosed walking, which loading amount is mainly the passage of gravity, is terrenkur – passage of route enriched with the natural raises and slopes, as well as in artificial obstructions every 150-250 m.

The following motional modes are used:

- Gentle mode is recommended for medically fragile and people with poor health, as well as the elderly people, which are not adapted to the physical loading. By Gentle mode are used so-called "light" routes up to 600-700 m;

- Gently training mode is appointed for people with satisfactory functional level, persons of middle age and older, previously went in for sports or physical labor, as well as poorly trained young people. By Gently training mode are used routes of "middle" intensity up to 1500 m ;

- Training mode is for healthy young and middle-aged persons. Training mode uses routes up to 3000 m, classified as "difficult".

Terrenkur's dosage intensity is regulated by:

- changing the angle of ascent;
- quantity of stops for rest and its duration on each " position " standing, sitting, with the implementation of the general physical and breathing exercises;
- rapidity (tempo) of motion (slow – 70-80 steps per minute, medium – 70-100 steps per minute, fast – 100-120 steps per minute).

The most affordable way for self controlling of the intensity of recreational walking is oral test, which does not require any special skills and equipment (Table 3).



*Table 3.*  
*Usage of oral test for determining the intensity cost*  
*of recreational walking exercises*

| Level of intensity | Oral reaction during performance of exercise                  | Action                              |
|--------------------|---|-------------------------------------|
| very high          | Capability for pronouncing one or several words               | immediate decrease in the intensity |
| very low           | Capability for pronouncing the whole sentence                 | increase intensity                  |
| optimal            | There's visible light short wind by pronouncing two sentences | maintaining this level of intensity |

To check the possibility of changeover to running one should use 6 km distance. Person's ability to walk this distance within 45 minutes indicates the body readiness to run non-stop more than 3 minutes.[ 3].

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## INDEPENDENT WORK OF STUDENTS FOR PHYSICAL EDUCATION

*The features of the organization of the students' independent work of special medical group on discipline "Physical Education" were researched. The structure of the incidence of students studying engineering and the humanities was presented. Content of curricula, job training programs for students from different areas of training at the National Aviation University were analyzed. The students' independent work in the preparation of modular exams disclosed.*

### **Statement of the problem. Analysis of recent research and publications.**

Self-study is one of the most important components of the educational process, during which the development of skills, abilities and knowledge, and further provided the student mastering techniques of cognitive activity, interest in creative work, and finally, the ability to solve technical and scientific problems. In this regard, planning, organization and implementation of student work in the absence of the teacher is the most important task of training students in high school [1,4].

The basis of each student's learning needs based on the systematic self-learning (self-taught), as it is the most flexible approximation to the individual needs of the future and can quickly respond to progressive changes in various fields. Independent work – a method of teaching students that provides creative mastery of specific knowledge and skills [3]. In the process of self-study student must actively perceive, interpret and deepen the information, solve practical problems, to acquire the necessary professional skills. Independent student work is very diverse and rich in content, it helps to build a creative approach to their future profession, most fully reveals the personality traits and abilities of the person, includes various forms of organization [2, 3].

Independent work of students in the discipline "Physical Education" involves obtaining knowledge about healthy lifestyles, the hardening of the body, food habits, modes of learning and recreation, use of various types of motor activity for health promotion and disease prevention. [2]

However, questions remain unexplored, concerning the organization of independent work of students with disabilities in the state of health in the process of studying the discipline "Physical Education".

**The purpose of research** – to determine the characteristics of the organization of independent work of students of special medical group 1 rate of the National Aviation University of discipline "Physical Education."

**Methods Research Organization.** To achieve the goal following methods were used: analysis of data scientific and methodical literature, legal documents, programs on physical training for higher education institutions, the generalization of experience of best practice teaching method to the copy of medical records, methods

of mathematical statistics. The studies were conducted during 2011-2012 academic year at the National Aviation University students 1st year, are engaged in a special medical group.

**Results and discussion.** According to the curriculum and work curriculum to study discipline "Physical Education" at the National Aviation University allotted 216 hours, including 140 hours. make practical exercises, and '76. allocated to the individual work of students. 2 more hours per week (1-4 semester) and 4 hours (5-8 semester) assigned to classes in the sections on various sports, health groups, and so on.

Technical disciplines for 2011-2012 academic year enrollment of 1219 students. Among them, 134 people. (10.9%) had variations in health status. Liberal arts education at the National Aviation University students received in 1060, of which 252 (23.7%) attended classes in physical education in special medical group. Thus, more than 16.9% of students in 1st year of the National Aviation University have deviations in health and physical education classes require special medical group.

Students with disabilities in the state of health need theoretical knowledge about the content of recreation and health and preventive and improving employment, the development of general endurance, strength qualities, flexibility, coordination among students, basics of methods of use of jogging and walking, stretching, physiotherapy in the process practical training in various types of diseases. Get these special knowledge they can when performing independent work on discipline "Physical Education". The major objectives of physical education in special medical group are: health promotion, reduction or elimination of the consequences of an illness; elimination of functional abnormalities and deficiencies in physical development, promoting good physical development and hardening of the body, increased activity of organs and systems weakened by disease; development of basic motor skills, the formation of the correct posture, and, if necessary, and its correction, learning proper breathing.

While performing independent work of the student must learn how to think, analyze the problem, consider the conditions set tasks, solve problems, ie work should gradually turn into a creative process. This can help the new information technologies. Student with great interest solves tasks when using modern methods or programs itself a solution to a problem. In the decision, he knows the deeper essence of the subject "Physical Education", studying the literature, looking for the best ways to resolve the issues. If you stimulate the interest of the student, it will have an incentive to acquire knowledge.

The volume of required classes and the required knowledge on the subjects defined curriculum. Each school determines the norms loads independently taking into account the specific conditions, the complexity and the complexity of the discipline. According to the working of the curriculum for the discipline "Physical Education" amount of independent work of the student 1st year NAU is 38 hours (Table 1).

Table 1.  
*The content and volume of the student's independent work*

| №                             | Contents of independent work of the student | The volume of IWS (hours) |
|-------------------------------|---|---------------------------|
| 1 term                        |   |                           |
| 1.                            | Preparing for a practical training          | 17                        |
| 2.                            | Modular control work                        | 2                         |
| Total for 1 term              |   | 19                        |
| 2 term                        |   |                           |
| 1.                            | Preparing for a practical training          | 17                        |
| 2.                            | Modular control work                        | 2                         |
| Total for 2 term              |   | 19                        |
| Total for academic discipline |   | 38                        |

Evaluation of certain types of student academic work performed and acquired the knowledge and skills provided in points according to the table. 2.

Table 2.  
*Evaluation of selected types of the student's education*

|  |                      |
|--|----------------------|
| 1 term   |                      |
| Module № 1   |                      |
| Type of educational work   | Max number of points |
| Performing the control norms, test (6x5 points, 1x4 points)  | 34                   |
| Performing the volume of motor activity (practical classes 14 × 2 points, 2x3 points)                          | 34 (totally)         |
| <i>The student must score at least 41 points for admission to the implementation of a modular control work</i> |                      |
| Modular control work   | 20                   |
| Total for module № 1   | 88                   |
| Graded Test of semester  | 12                   |
| Total for 1 term   | 100                  |
| 2 term   |                      |
| Module № 2   |                      |
| Type of educational work   | Max number of points |
| Performing the control norms, test (6x5 points, 1x4 points)  | 34                   |
| Performing the volume of motor activity (practical classes 17x2 points)  | 34 (totally)         |
| <i>The student must score at least 41 points for admission to the implementation of a modular control work</i> |                      |
| Modular control work   | 20                   |
| Total for module №2  | 88                   |
| Graded Test of semester  | 12                   |
| Total for 2 term   | 100                  |

Obligatory part of the educational program of work on physical education for students I NAU course is theoretical and methodological material, which forms the content of modular exams.

During the execution of the control module in one semester, students should describe the disease; specify the factors that contribute to disease manifestations of the disease symptoms during the day, week, month, identify challenges in physical education classes in special medical group in this disease, specify the indications and contraindications to exercise in this disease. Relevant is the issue of control and self-control of the physical condition and state of health in physical education classes in special medical group with individual diseases. Particular attention was paid to the selection of physical rehabilitation exercises for students in various types of diseases.

In semester 2 students during the execution of a modular control work should consider yourself on the needs, motivations and interests in physical culture and sports students, healthy lifestyle factors boys and girls, ways and methods of recovery. Also provides self-service set of exercises to build and reinforce the skills of correct posture, exercises to strengthen the muscles of the back and arms, exercises to strengthen the abdominal muscles and legs, and its further implementation in practical classes. Also, students should independently to monitor the heart rate during the day and the week and present the results in the form of graphs.

Estimates obtained as a result of the modular examinations are an important component in the overall evaluation scoring students and encourage them to self-examine these issues in the literature and the Internet.

An equally important element of self-study is to participate in scientific research department, institute, to discuss various issues at student conferences and competitions of student work. So, students have one course an opportunity to demonstrate independent work when making presentations at the annual scientific conferences and postgraduate students of Physical Education of the National Aviation University "Modern fitness – technology in physical education students."

### **Conclusion**

1. Diversity and complexity of modern knowledge, working conditions require higher education making significant adjustments to the process of training. The most important part of this process – independent work of students. Graduate School of gradually but steadily moving from the "transfer" of information to students in the final form to their self-management training and cognitive activity, forming their experience of independent creative work.

2. Contents independent work of students should be the choice of tasks for independent work, planning for its size, complexity and labor, the effective management of this work and the use of advanced technology training, testing and evaluation of students acquired knowledge, skills and experience levels of formation of independent activity on different stages of their development as professionals.

3. Specificity of modern educational system at the university requires a change in a practical organization of independent work to optimize the mental activity of a student that would allow him not so much "soak up" knowledge as yourself "create" them for yourself.

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## PHYSICAL PREPARATION OF AIR TRAFFIC CONTROLLERS

*The article contains recommendations about formation of physical and psychophysical qualities, which determine stability of organism to negative factors of professional activity.*

**Relevance:** The process of air traffic control is the most complex in operator activity, associated with receiving, processing and analysis of a large number of diverse information, branched by interaction with various services, issuing instructions at high responsibility for made decisions with severe lack, and in extreme conditions, deficiency of time. Therefore, to prepare dispatcher staff, knowledge and consideration of psychological mechanisms and patterns of its activity in non-conventional situations. It follows, that the process of professional preparation is constructed taking into account professional activity of a student, its structure and components.

The profession of an air traffic controller belongs to such type of operator professions, the main feature of which is uninterrupted monitoring of air situation and control of air traffic within the confines of his responsibility to provide safe, regular and ordered aircraft movement. His workplace is equipped with monitors to display air situation, meteorological situation, various signal tables, additional information, communication means etc. The control over aircraft movement is carried out from the moment of its apron leaving prior to takeoff from departure aerodrome to taxiing to apron after landing at destination aerodrome. Such work requires instantaneous attention switching, fast and precise instruction giving to coordinate greater or lesser number of executors that are located at great distance from one another.

**The purpose of the study:** Determination of features of valued orientations of students during physical education classes.

**Methods of the study:** Theoretical analysis and generalization of literary sources

**Results and discussion:** Based on the fact, that professional activity of aviation field has clearly expressed collective character, that not only provides function distribution, but full cohesion of actions in work, psychological compatibility becomes a big problem. That is, together with professional skills, it is important for future air traffic controllers and pilots to have collective psychological orientation, because frequently the success of the entire system can depend on one person.

Therefore, physical and psychophysiological preparation of air traffic controllers is a complex formation process of high reliability of organism, skills and abilities, especially important in complicated, extreme activity conditions. The aim of this preparation is the formation of physical and psychophysiological qualities,

which determine academic success, firmness of the organism to negative factors of professional activity, high performance and dynamic health that means professional durability.

On the grounds of conducted research, it was discovered that to successfully master air traffic controller profession there is a complex of professionally important psychophysiological, physical and personal qualities, which were divided by system characteristics of general physical preparedness and specific physical preparedness. Characteristics of general physical preparedness include basic physical qualities and related abilities: general endurance, strength, speed, flexibility and agility; coordination and accuracy of movements; special muscular (static) endurance of neck, back, muscles of abdominal wall; joint mobility; reaction speed etc.

General physical exercises include:

- Athletics, which is based on human natural movements – walking, running, jumping, that facilitate the perfection of vital skills and abilities. Furthermore, athletics increase functional capabilities of all organs and systems, especially neuromuscular, cardiovascular, respiratory, and also increase robustness to unfavorable factors of professional activity: overwork and sedentary lifestyle. It trains a person to have such important physical qualities, as speed and endurance, agility and strength, and also moral-volitional qualities: persistence in attaining goals, ability to overcome difficulties, strong will etc.

- Execution of exercises with a partner (with and without an object), with the load;

- Physical exercises (aerobics, step aerobics, yoga elements), that give the possibility to use class time with maximum benefit, combining the formation of a number of important qualities: endurance, strength, flexibility, motor coordination, spatial orientation, attention, memory, and hearing.

A group of specific physical preparedness is determined by reaction to a moving object, observation, motor responses, overcoming of complicated non-standard situations, ability to solve logical tasks with spatial orientation, readiness to take urgent action at a time deficiency, self-control ability and self-regulation of emotional state, improvement of motor technique in the conditions of emotional pressure, mastering of applied skills to use means of sports and recreational orientation in the mode of educational and professional activity.

Special exercises include:

- Sports games (volleyball, football, basketball, handball). During these exercises optimal motor reactions to various irritants (light, sound, touch etc.) are developed. Furthermore, special qualities of controller direction are formed: spatial orientation, distribution and switching of attention, operational memory and attention, which have great importance in adaptation of a person in modern conditions, which bring forward certain requirements to reaction speed and accuracy of specialists' movements;

- Combined exercises and relay races with the use of sports game elements;

- Table tennis, badminton that facilitate the development of fast motor and sight reaction, coordination and agility.

- Swimming, that is directed on the formation of reliability of cardiovascular, respiratory and nervous systems, training of endurance and self-



control, development of strength, speed, general endurance and endurance of trunk muscles, agility, and spatial orientation. Plunge, diving promote training of courage, emotional stability, aim achieving will;

- Mountain climbing (extreme sport). The usage of its particular training means sharply increases physical reliability and preparedness of professionals to conditions of extreme factors influence. Substantially decreases professional and professionally driven morbidity, work failure by the human factor fault. Increases performance and stress resistance. Promotes the development of emotional stability, courage, resoluteness.

By predominant direction of influence on functioning and reliability of certain organs and system of development and improvement of professionally important qualities, applied means and sports were divided in a full accordance with the task of PAPP (Professionally Applied Physical Preparation) and represented in table 1 (see Appendix 1).

Therefore, system of professional preparation of air traffic controllers presents a complex of specially selected effective means (disciplines) of preparation, integrative impact of which is directed on the formation of reliability result of a future air traffic controller in the regular and extreme modes of activity.

*Appendix 1.*

*Means, used for the development of psychophysiological qualities*

| <b>Psychophysiological qualities</b>               | <b>Means</b>   |
|--|--|
| Sensorimotor reaction                              | Running by signal, with unexpected obstacles; basketball, handball, volleyball, football; big and table tennis; badminton; throwing and catching of the ball from unexpected positions; game tasks; relay races.   |
| Stability, switching and distribution of attention | Volleyball, basketball, table tennis, handball, football, badminton, running between uprights, gymnastic exercises, aerobics, agile games, attention tasks (forbidden movement, to do the opposite), psychological games and tasks, psychophysical exercises, psych regulation.  |
| Emotional stability                                | Overcoming obstacle lines; jumps from a height, through barriers; athletic relay races; performing of motion tasks at height (gymnastic log, wall); team sports games; exercises with elements of competition; rolls from various positions; diving; climbing with safety on steep walls; sports games with elements of competition and presence of viewers. |
| Operative thinking                                 | Exercises directed on the solution of algorithmic and heuristic tasks at strict limit of time; badminton, volleyball, tennis over closed net; sports games with ball on reduced playgrounds; place orientation; overcoming labyrinths and lines with obstacles; test tasks, tactical tasks in sports games; drill exercises: fast chess.                     |
| Courage, resoluteness                              | Exercises that contain elements of risk and require fear and hesitation overcoming: running from the top with obstacle overcoming; walking, running and exercises with the eyes  |

|        |  |
|--------|--|
|        | closed; overcoming lines of obstacles; acrobatics; attack in sports games; competitive tasks; diving; climbing with safety on steep walls. |
| Memory | Tactics in sports games, chess, free exercises in gymnastics, aerobics, tennis, psychological tasks, games.                                |

## Conclusion

### *Conducted research allows us to make such conclusions:*

1. Modern aviation activity yields extreme character, therefore to successfully master a profession of an air traffic controller, there is a complex of professionally important psychophysiological, physical and personal qualities, which were divided by system characteristics of general physical preparedness and specific professionally-applied physical preparedness.

2. Implementation of it in the process of physical education, carried out in an institution of higher education, allows to efficiently prepare students to their future professional activity from the physical point of view.

3. As a result of conducted research, the introduction of

- Fitness exercises (aerobics, step aerobics, yoga);
- Handball exercises;
- Swimming facultative exercises;
- Usage of separate training means of mountain climbing;

into the structure and content of educational program of physical education for future air traffic controllers.

From the above follows the necessity of interconnection of model, aim, task, means, and method development as physical education as well as professional preparation of future air traffic controllers.

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## THE STRUCTURE OF PSYCHOPHYSICAL POTENTIAL PROFESSIONAL DEVELOPMENT OF STUDENTS OF AVIATION INDUSTRY

*The article is based on an analysis of psychological and educational literature and current practices of training structure substantiates the potential professional development needs of the student in close relation with the content of teaching in high school.*

**Problem.** Psychophysical features of future careers largely determine the direction of the professional-applied physical training of students. In recent years the trend has been to develop various kinds of professional models designed to illustrate and adequate representation of his future professional activities, effective training.

**Analysis of recent research.** Many scholars have conducted research on the training of students in higher education to the profession. Among them we should mention the labor Anan B., S. Vitvytskoyi, G. Kodzhaspirova, Z. Kurlyand, A. Leontiev, AN. Moyseyuk, A. Piechota, S. Rubinstein, A. Semenov, M. Fitsuly, L. Friedman, X. Hekhauzena, R. Hmelyuk and others. The problem of formation of professionally important qualities that should have graduates not to lose yourself in the world of market relations, are devoted B. Bezrukov, V. Ilyinicha, S. Kanishevsky, R. Raevskogo, J. Chernova, A. Shelton, B. Shiyan. However, no specific research on the mental and physical characteristics of the professional activity of future engineers – mechanical maintenance and repair of aircraft.

**Purpose of this paper** is the theoretical justification and analysis of the major components of the structure potential psychophysical professional development of the student.

**The main material research.** Theoretical analysis of the structure of physical readiness for professional activity, research the specifics of engineering – technical activities of specialists in maintenance and repair of aircraft and aircraft engines have identified the need to form the components of physical readiness, among which are invariant with qualities that contribute to the development of certain activities and operations functions potentially possible in professional activities and feasibility of operating the term " psychophysical potential professional development of students" (PFPPRS), which is defined as an integrative property of the individual, which includes motivational and evaluative, reflective, creative, operational and technological components and activity, the content of which are expression of physical, physiological, psychological, practice – theoretical commitment to the profession.

When considering the structure of mental and physical capacity of the professional development of students are the following main components:

- motivational value (the system of motives, interests, attitudes, beliefs that form the focus of the individual);
- cognitive (knowledge necessary for professional activities, methods of intellectual activity and intellectual qualities);

- operating and Technology (special abilities and skills that address professional tasks);

- active (practical activities to develop the values of physical education, development of physical abilities and qualities, including professional and meaningful transfer of existing knowledge, ways of life and professional skills in a particular situation);

- reflexive (self-identity as a developing "Z") components.

Expand the content components psychophysical potential professional development of the student.

Motivational-value components. Driving force of human activity is the motive. In a large glossary of Ukrainian motif is treated as a base, an occasion for which – any action, action [3]. N.YE Moyseyuk, referring to the dictionary of the Ukrainian language says that the motive – is something to aspire to, which is trying to achieve [6]. A. Leontiev believes that "the object of activity is its true motive" [5]. Motive psychological category, and so it is logical that the most accurate is the psychological interpretation of A. Petrovsky, M. Jaroszevska "motif – a call to the activities related to the needs: a set of external or internal conditions causing activity of the subject and determine its direction."

Zasadovoyu to understand the motive is the theory of S. Rubinstein. According to this theory, human activity has a conscious nature : that it is done with the psyche (mind) of man and at the same time forms the psyche. This is reflected in the fact that every human activity is characterized by the goals and motives."Any act of man proceeds from certain motives and aims at a goal," – said S. Rubinstein [8].

So tune – it's something that can cause a person to act. Thus the main role of motive – the choice orientation activities. The motive is always acting as a subjective attitude towards the activities that a person intends to perform. It indicates the name of what this activity is that while the objectives pursued. Motive may be directed to a specific object emotions instructions. The desire to improve the results achieved dissatisfaction, persistence in achieving our goal is personality, which largely affect professional activities.

The focus of the student's personality brings out the relation of the individual to the goals of its activities on the emotional, cognitive (cognitive) and behavioral levels [1], which shows its commitment to the development and application of athletic values (including vocational and applied). Professional orientation as the quality of the individual, which is a set of properties that determine the choice of activities associated with high levels of cognitive and operational and technological components, the optimum result of professional readiness. Thus, the criterion of formation of motivational value component psychophysical potential professional development of students can be considered a professional orientation that integrates specific indicators (information-cognitive, evaluative, motivational, realistic and activity, value orientations (TSOO) in the area of physical activity).

Another component of the mental and physical capacity of the students are cognitive, in the form of knowledge. Formation of student knowledge – the most important goal of the educational process. In a large explanatory dictionary of the Ukrainian language knowledge is defined as knowledge of what is – or, the availability of information about someone – that – ever [3]. In Ukrainian

Pedagogical dictionary S. U. Goncharenko knowledge is treated as a special form of spiritual knowledge assimilation results, process reflection of reality, which is characterized by the knowledge of the truth [2]. Moyseyuk N.YE. believes that knowledge is a key element of education. They reflect the general experience of understanding reality, mankind has accumulated in the socio – historical practice. Without knowledge can not be any purposeful action [6]. M. M. Fitsula treats knowledge as a generic human experience, reflecting the different branches of reality as facts, rules, opinions, patterns, ideas, theories held by science [10]. In philosophical encyclopaedia of knowledge is defined as a proven social – historical practices result of the process of understanding reality, adequately reflected in the mind of reality in the form of ideas, concepts, opinions, theories.

We agree with M. M. Fitsuloyu that knowledge is a key component in particular and higher education. In their entirety distinguish the following types: basic terms and concepts which are essential to understand any text, no expression; facts of everyday reality and scientific facts, without which knowledge can not understand the laws of science, to form beliefs, and prove to advocate ideas; the basic laws of science, revealing the connections and relations between different objects and phenomena of reality; theory containing the system of scientific knowledge about a set of objects, methods explanation and prediction of phenomena a particular subject area; knowledge of the ways of working, methods of learning and acquiring knowledge of history (methodological knowledge); knowledge of the rules of relationship to the phenomena of life (evaluative knowledge). Among the knowledge that students should learn in the learning process, a special role belongs to those who express ways and activities used in practice [10].

As a general objective, the knowledge contained in scientific texts and teaching materials in the process of assimilation transformed into subjective knowledge. Thus, the cognitive component of mental and physical capacity of the professional development of students should integrate such factors as the level and amount of certain research – subject knowledge, the ability to quickly and accurately identify events and objects, analyze and operate successfully displayed images. In view of the criterion of the cognitive component of the theoretical training, which is the main terms of cognitive activity. Its structure distinguish such factors as body of knowledge of the main sections of Physical Education: Healthy Lifestyle (HLS), Theory and Methods of Physical Education (TiMFV), professionally applied physical training (PPFP).

The structure of the mental and physical potential future professionals belongs operational and technological components. Choice means mastering the knowledge of reality, to a accumulation of new knowledge, methods and activities (invariants), different from his earlier assist in operating technological component. In this specific aims, forms, methods and ways of working can be subjected to continuous correction. We believe that operational and technological components PPFP not appropriate to equate it with the activity-component. Separation of operational and technological components and activity is rather arbitrary: they are interconnected and interdependent. But to achieve the objectives of this study operational and technological component is the link between cognitive and activity components, its content is formed mainly on methodological and practical exercises

that involve exploration, self expanding and creative play students basic techniques and methods of forming the educational, professional and life skills and skills by means of physical culture.

Operational and technological component of a thorough functional load and promotes intellectual assimilation of a changing professional environment through the generation of new knowledge (health, recreation, health care, communications and other technologies, ways of life) and transform them into real activity that provides virtually unlimited opportunities for self-correction self and personality traits most pressing modern social and cultural conditions.

According I. P. Podlasoho "theory into practice is implemented by means of technology. In this sense technology – a system of algorithms, methods and tools, comprehensive application of which leads to a pre-set performance, product guarantees a given amount of money" [7]. In a large explanatory dictionary of the Ukrainian language, the term "technology" is interpreted as "a body of knowledge, information about the sequence of certain manufacturing operations in the production of something – anything" [3]. In this sense (more acceptable to us) is not determined by the projected goals, consider the source data set resistance to impacts apply. We posluhovuvatymemosya in their work and the term "educational technology", which also presents operational and technological components. A. Piechota, A. Kiktenko, A. Lyubarskaya underneath understood set of tools and methods of teaching process.

Proposed above material helps us to justify the criterion by which the determined formation of operational and technological components. He is the degree of adaptability of physical activity. Its parameters are: the level of formation of specific skills (including Physical Education and Recreation Technology) ; method of application (reproductive, creative); divergent thinking ability as manifested in readiness to put forward a lot of the right ideas about the same object [ 1].

Compulsory part psychophysical potential future professionals are activity-component. The ability to express themselves in the activities of the profession – the basic needs of the individual as a subject that is different from individual and specific reasons. Under the terms of O. M. Leontief, activity – a form of activism. She is a set of activities united by a common goal, which perform a social function [5]. In a large explanatory dictionary of the Ukrainian language activity is defined as the use of their work to something – anything [3]. Activity – a way of being human in the world, its ability to make change a reality [4, 10]. That whole diversity of classes of man, all that it takes [6].

Activity in engineering psychology is considered as a subject of objective scientific knowledge. It opens and plays in a theoretical framework and models according to the methodological principles, depending on specific tasks. This is a complex, multi-level, dynamic structure with significant opportunities to move from one level to another. Each time a particular action is characterized largely adequacy of objects, tools and working conditions at the expense of efficiency subjective image that acts as a regulator of the same actions. Thanks operative images of individual movements of the human body are organized into a single system – effect [9].

Activity is systematizing factor that unites all components of Physical Education students (including vocational and applied physical training). It focuses

on his physical perfection, where the concept of "activity" and "physical perfection" is the key to the understanding of physical culture, the internal mechanism of its functioning, the impact on the intrinsic strength. An important task in this case – determining the place of physical perfection in the structure of the whole person, which is only possible when considering it as a consequence of all motor activity. It's a deliberate overall activity, which is a method of display of various forms of social relations. This approach allows us to consider physical fitness as personal characteristics, to reveal its formation during sports – sports activities, and ultimately discover its place and role in the full and harmonious development of personality.

Activity-component psychophysical potential professional development of student physical activity is characterized by students, aimed at the development of basic and special mental and physical qualities.

Previously proposed material is the basis for determining activity-forming component. He is the "physical fitness", which represents the performance achieved in the existing motor skills, contributing to the efficiency of the target activity. Physical fitness integrates the following indicators: quantitative and qualitative changes in the development of basic physical (speed, strength, endurance, flexibility and coordination) and professionally significant mental and physical qualities

Also in Structure psychophysical potential students is reflective component. An important component in the structure of mental and physical capacity of the professional development of students is a reflection of how knowledge and analysis of the student's own understanding of events and activities (look to their own opinion and coming from). Reflection – introspection, meditation rights over their own internal state. Reflection in this context – a system of individual attitudes to himself and to the activity. As the B. G. Ananov, in all activities, these attitudes are found based on the attitude to the situation, object, means activities other lyudyey [2]. Reflexive properties most closely associated with the life goals, values, self-regulation and function of self-control. The need for reflection occurs under the influence of both external and internal factors. Due to the changing external environment there is a need to re self-determine, that is to compare internal and external, to make adjustments to the goals, contents, methods and activities. New information, learning new ways of contributing to the new self which in turn leads to new standards activities, new ways, all of which the unity and integrity – a new result indicates V. M. Vydryn. Awareness of changes in external conditions and evaluation of this change causes the student prospects and development opportunities. Reflection allows the student to reflect on their experiences and samokontrolyuvaty themselves in the name of a particular purpose. The criterion for forming reflective component can be regarded as the capacity for self-assessment. It integrates such factors as the capacity for self-determination, self-control, the presence of subjective readiness for independent in various areas of physical education.

### **Conclusion**

Thus, psychophysical potential professional development of students is an important prerequisite for effective targeted professional activity, its regulation and stability. The structure belongs PPPR student motivation – values, cognitive, operational – Technology, active, reflective components that are closely related to

the content of training and education of students in higher education, is the result of a thorough professional-applied physical training facilities professional training.

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## **FACTORS AFFECTING NAU STUDENTS MOTIVATION TO REGULAR EXERCISE**

*The results of studies of factors that affect the motivation of students to regular independent exercise. We consider the ratio of students to the factors such as competition, comparison, imitation. Obtained data on self-assessment of the physical health of students of NAU, and attitudes to regular exercise in the families surveyed.*

In today's information society, there are negative trends in mode of life of students. Adverse environmental conditions, lack of adequate amount of physical activity, the spread of bad habits, stress, conflict – all this affects the health of the modern student, drastically compromising on quality characteristics [1, 2]. Sedentary lifestyle is inherent in "virtual society" affects primarily the biological potential of human beings creating conditions for disease generally low and limiting perspectives person. Movement (long, regular and fairly intense) – is a major component of normal life that is laid by nature. Thus, the involvement of the young man perceived to regular motor activity causes the method, quality, performance and style of life.

Modern students are quite aware of potential physical and cultural consequences of neglecting regular exercise [4], but most of them formed needs (need) to worry about health and have no desire to engage in physical self. As a result of public opinion polls conducted by a number of regions of Ukraine in 2005. the rating of values in the first place (almost 80% of respondents) is health [1]. But regularly, or almost regularly, will the physical training and sports, according to Behan I.D., a small portion of the population – 18-19%.

Matter of fact (with physical imperfections of man and the personal physical weakening) vytyskuyetsya distorted reality of the virtual world of the modern student or student within consciousness. So there is a need to search or updating the factors that will encourage students to self-study physical education. In this sense, the study of factors affecting the ratio of human to physical exercise is very timely, they should be treated as individual motives, but by a number of characteristics (age, gender, graduation, and so on) you can combine both general for the contingent.

We set a goal – to give a detailed interpretation of a number of push factors that affect the motivation of students to regular classes of motor activity;

The study used the following methods: analysis and synthesis of the experience of modern scientific and methodological research; analysis of best teaching practices; questionnaire; methods of mathematical statistics.

Considering man as an activity and, in this context, using the accepted definition in psychology, we can characterize motor activity as conscious and unconscious, as the case (with the usual periodization of this description). Thus, we can assume that when we face circumstances arise related to the unsatisfactory state of our motor function and require selection strategy or a new way of optimizing the physical condition, these factors fall into the zone of clear consciousness. But once the decision is made, the strategy is found, the situation changed when the board passed in the unconscious, consciousness is released to address newly emerging problems or find new challenges. We assume that a regular balanced understanding of motor activity occurs in the "zone of clear consciousness," when the human mind is confronted with the need to address certain issues or challenges. It was at this time laid the foundation to a stable, long-term motivation.

Some scientists believe that motivation is based on biological and social factors, as well as the factors why taught, or that promotes or has maintained a purposeful behavior [8, 11]. According Zh.Hodfrua (1992), and other professionals [10, 12] motivated a set of factors that support and direct, that determine human behavior. According Zanyuk S. (2002), a collection of incentive motivation factors that determine the activity of the individual. These are the motives, needs, incentives, situational factors that determine human behavior. According Prysiashnyuk SI (2013) motive is always a subjective factor, which is marketed as an individual and specific, it is influenced by the environment as well as in the implementation and training. In terms Kelysheva I. (2007) can be divided into 6 main content types motives for physical activity: physical self, united solidarity zabov'yazennya, competition, imitation, sporting achievement. We believe that this scheme is not quite perfect, because they do not take into account the impact of gender-specific education, training, and some social and domestic factors.

In order to obtain preliminary information on a number of factors that influence the attitude and motivation of students as to the scope of individual motor activity in the 2012-2013 academic year the National Aviation University conducted the survey. The proposed questionnaire included questions on self-assessment of the physical health and their ability to compare results of the motor tests with the results of others (which can be seen as an element of comparison, and as a manifestation of competition), the ratio of parents surveyed in regular exercise, the ratio of students surveyed physical development and physical improvement of others (3 questions). By questionnaire was drawn 40 students and 40 students of the second year of NAU, had as "excellent", "good" and "satisfactory" in the discipline "Physical Education" and the course of study.

Surveyed students – boys over 27% consider their health as satisfactory, 63.5% – well, more than 9% – very good. Among girls, there are some who consider their health poor – 6.1%, 30.3% – satisfactory, good – 51.5%, very good – 12.1%. Therefore, it may be noted that among girls are those who see negative trends in the state of their health, youth, even in an anonymous survey does not suggest ideas for possible defects or deficiencies in their physical condition. At the same time, awareness of personal physical imperfections – the first step to understanding the need for regular exercise independent.

The next question is illuminated landmarks resorted to second-year students performing software standards for physical education. Under 6% by performing motor tests (standards) set itself the next landmark – "I am better than others"; more than 21% believed that the important thing is not to be "worse than others"; more than 15% of standards performed only in order to earn ranking points; 57.5% of respondents tuned to show off your best score. Among women there was no such standards for performing the installation "I am better than others"; only 12% were afraid of not being "worse than others"; 27.5% were working to "earn" points; 60.6% were prepared to reveal its best result. Thus, most students (57.5% boys and 60.6% girls) carrying a maximum strain specific physical standards focus their thoughts on the most effective implementation of the exercise.

Factor competition – a comparison ("I'm better" or "I'm no worse") is present in more than boys – 27% (6% + 21%) and significantly lower in girls – 12%. In turn, the impact assessment of the future (as selfish factor), ie, rating scores, the more it encourages girls – 27.5%, and less than boys – 15%.

The influence of the family is an important factor in shaping the attitude of the young man to the various forms of life. So, according to parents about the availability of regular exercise in life has a corresponding meaning. It is significant that the question "How do your parents belong to a regular exercise routine?", One of the students gave no answer – "negative." Almost 75% of students with gender differences reported positive attitudes of parents to exercise continuous use. At the same time, quite a few students (about 25%) do not even have a clue about the attitude of their parents to exercise, or consider it a neutral attitude. That is, in the family every fourth student despised physical development of the child and avoided talking about the need to monitor their own physical condition and regularly used in the mode of life exercise.

Three questions were to determine the presence or absence of the possibility of imitation specific individuals and in this context, the probability of an aesthetic influence on beauty and perfection of the structure of the human body. When asked "Do you feel envy people who have a perfect physique or athletic?" Received the following relevant:

- boys – "yes" – 0%; "No" – 70%; "Sometimes" – 30%;
- girls – "yes" – 15,1%; "No" – 57,6%; "Sometimes" – 27,3%.

We slightly changed the question for the audience. Later in the questionnaire, it was: "Do you like to consider people who are physically developed and trained?". The answers were distributed as follows:

- boys – «yes» – 36,3%; «No» – 9,2%; «Don't care» – 54,5%;
- girls – «yes» – 81,8%; «No» – 0%; «Don't care» – 18,2%.

The question "Do you consider physically developed people – actors, athletes, friends, as an example to follow?" 36.4% of boys answered "yes", 63.6% – "no." The girls, on the contrary, the answer is "yes" – 70% "no" – 30%.

Thus, imitation factor in students has shown enough gender predisposition. Based on the responses received can be assumed that girls still thought about these issues. There is also a suggestion that the girls filling anonymous questionnaire more candid in their opinions. Guys, perhaps unconsciously turning a blind eye to such question or reject them.

## Conclusion

Answers to questions are analyzed indicate the presence of priorities which focus on students. These priorities are largely associated with features of family education, mentality different populations and gender differences in approaches to motor activity and physical education in general. Analysis of the survey suggests that most women with age have appointed their own guidelines, canons in the context of physicality, physical beauty and health. Also found that the majority of students, regardless of gender affiliation, when performing separate motor tests – standards of discipline focus their thoughts on the most effective exercises.

Prospects for further research in this plane is to determine the other push factors to encourage students to regular exercise and in-depth study of the most significant of these.

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## **EMOTIONAL INTELLIGENCE AS A DETERMINANT OF SITUATIONAL PSYCHOLOGICAL READINESS OF AIR TRAFFIC CONTROLLERS**

*This report shows the role of emotional intelligence as a key determinant in formation of situational psychological readiness of air traffic controllers. The psychological content of professional tasks of air traffic controllers was analyzed. The role and the definition of situational psychological readiness was presented.*

The improvement and maintenance of aviation safety is the common goal of all activities within the area of aviation psychology. Any type of aviation accidents can have a huge impact on ecological, social and economical spheres, which can lead not only to significant monetary costs and time inputs with the involvement of a wide range of specialists to investigate the specific case, but also can cause injuries of human beings and fatal outcomes.

Traditionally, most of the interventions are designed to accomplish this goal on the development of more useful and reliable equipment. Unfortunately, the role of the human operator has not always been considered when systems were developed or procedures were changed. According to the latest ICAO reports, at least 80-85% of aviation accidents were caused because of the human factors. Considering that the in-flight safety is determined by the level of functioning of both work structures and aviation human – technological systems, each of its elements (air traffic controllers, pilots, aircraft, computers etc) relates with each other and work together to enhance system safety, productivity and efficiency. Air traffic controllers (ATC) serve as a key component in this complex interaction, whose mental workload frequently brings to changes in performance, well-being and health of specialists. Correspondingly, the maintenance of reliability of ATC becomes a key question that need to be studied.

The mental processing and psychoemotional capabilities of air traffic controllers are one of the most important determinants of their ability to deal effectively with the task demands of their environment. An air traffic controller's environment is filled with an overabundance of physical and symbolic information presented in visual, tactile, and auditory form or modality. The research conducted on the job analysis of en-route controllers by Ammerman, Bergen, Davies, Hostetler, Inman and Jones (1987) showed that there's six main activities such as situation monitoring, resolving aircraft conflicts, managing air traffic sequences, routing or planning flights, assessing weather impact, managing sector/position resources, which also involve 46 sub-activities and 348 distinct tasks. Another important feature of ATC job is communication and coordination between the ATC specialists and the other crew members as one of the requirements for successful ATC performance.

As a result, ATC are expected to make decisions and solve problems in a changeable situation within a short period of time following the operational

standards and expecting no errors to be occurred. As a result, the job of ATC requires not only the appropriate skills, professional knowledge and experience from its specialists, but also the specific personality variables and individual factors, which could help to form the psychological readiness to perform efficiently in high risk and safety sensitive environment that may prove to be a daunting challenge.

The phenomenon of psychological readiness has been researched by several scientists. Psychological readiness can be defined as an integral dynamic state, which facilitates the internal disposition to the effective job performance and mobilization of inner resources. According to the studies that been made, there are two approaches to define psychological readiness: functional and individual. The functional approach is based on the assumption that readiness is a certain mental state of a human, which appears to be either short-term or long-term. It can be generally characterized as the ability of a human to mobilize the mental and physical resources. The individual approach considers psychological readiness as a manifestation of the willingness of a human to express his/her personal traits, which can be explained by the natural predisposition of a human to perform effectively.

The state of readiness is influenced by the specific conditions in which the professional activity takes place. Dyachenko and Kandybovych (1976) distinguish long-term and situational forms of psychological readiness. In general, the long-term readiness includes: a positive attitude towards the profession and professional activities, adequate professional traits which correspond to job requirements, temperament, motivation; professionally important features of perception, attention, emotional and volitional and mental processes; knowledge and skills that are required for certain activities. Situational readiness is constructed by such factors as: an understanding of a specialist task, awareness of personal responsibility for his/her decision, the desire to succeed and develop a clear plan of action. Thus, situational readiness depends on long-term and determines its performance.

Situational psychological readiness - a dynamic state of personality, characterized by internal disposition on certain activities and behaviors through the mobilization of inner resources for its coherent, purposeful implementation.

Considering that air traffic controllers must maintain up-to-date assessments of the rapidly changing location of each aircraft (in three-dimensional space) and their projected future locations relative to each other, along with other pertinent aircraft locations (destination, fuel, communications, etc.) situational psychological readiness serves as a preconditioned state of the air traffic controller to perform in the demanding ATC environment. Some researchers quite often use a term situation awareness (SA) which is commonly defined as a the perception of the elements in the environment within a volume of time and space, the comparison of their meaning and the projection of their status in the near future (Endsley, 1988; p.97). We offer to distinguish situational readiness and situation awareness by highlighting that situation awareness is based on a cognitive mechanism of assimilation of relevant information (e.g., aircraft locations, altitudes, destination, etc) while situational readiness includes emotional regulation of a specialist in accordance with the current ATC situation.

To sum up, the role of situational psychological readiness in professional activities of ATC can be defined by the following features:

- 1) Emotional disposition on professional work;
- 2) Identifying and understanding the action plan in accordance with the goals and objectives of the turn-based programming;
- 3) The ability to control your own emotional state;
- 4) Ability to understand and separate the elements of ATC situation; keep the track of its current position and make predictions about future development.

The key point in the formation of situational psychological readiness of ATC lies in the emotional competence, which is expressed in the ability to deal with emotional experiences, manage the emotional state, being empathetic towards the people around. All of these characteristics are related to emotional intelligence, which has become an important body of research over the past decade.

The phenomenon of emotional intelligence (EI) was presented in several studies (e.g., Bar-On, 1997; Goleman, 1995; Mayer & Salovey, 1990). Emotional intelligence is associated with multiple successful outcomes in the domains of mental health, social relationships and work (e.g., Lyubomirsky, King, & Diener, 2005; Mayer, Roberts, & Barsade, 2008). According to the definition of EI by Mayer and Salovey (1990; p.185) it is a set of skills, hypothesized to contribute to the accurate appraisal, the effective regulation and expression of emotions in oneself and in others and the use of feelings to motivate, plan, and achieve in one's life. Goleman (1995) explained concept of emotional intelligence by highlighting that rational and emotional types of minds coexist and relate with each other, indicating that emotional intelligence serves as an inspiration to act for the rational mind, and the rational mind, in turn, refines the emotions and in some cases prevents their expression.

There are several theoretical approaches to define the structure of EI, among which the most notable are the ability-based and mixed models.

The ability-based model by Mayer and Salovey consists of the following components of EI :

- 1) perceiving emotions - the ability to be aware of emotions, identify them and to distinguish adequately express;
- 2) using emotions to improve thinking and intellectual activity, the ability to use emotions as an incentive to action / solve certain problems;
- 3) understanding emotions - understanding the causes of emotional experiences;
- 4) managing emotions - their ability to control and regulation, the ability to stimulate the expression of positive emotional experiences.

According to the Golemans mixed model, there are the following five components of EI:

1. Self-awareness – the ability to know one's emotions, strengths, weaknesses, drives, values and goals and recognize their impact on others while using gut feelings to guide decisions;
2. Self-regulation – involves controlling or redirecting one's disruptive emotions and impulses and adapting to changing circumstances;
3. Social skill – managing relationships to move people in the desired direction;

4. Empathy - considering other people's feelings especially when making decisions;

5. Motivation - being driven to achieve for the sake of achievement.

There are different views on the possibility of developing emotional intelligence. Mayer and Salovey stated that emotional intelligence is a relatively stable state. Goleman suggests that emotional intelligence can be developed at any age starting from childhood and significantly improved in adulthood.

### **Conclusion**

The task of air traffic controllers is largely one that involves emotional stress, high responsibility and working conditions in the high risk and safety sensitive environment, which requires from the specialists to be mentally and psychologically prepared for it. Situational psychological readiness facilitates the psychological disposition of ATC to perform mainly thought the emotional self-regulation. One of the main determinants of situational psychological readiness is the level of emotional intelligence, which leads to understanding of one's own emotions that are based on the differential assessment of the current working situation. The measurement and understanding of EI and its role can help to select ATC personal and also can be used to create the appropriate and effective training for current controllers which could be further implemented into their professional development in order to maintain effective performance.

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## **PSYCHOLOGICAL CONCEPTION OF MAN-MACHINE VERBAL INTERACTION IN THE INTELLIGENT COCKPIT**

*The paper discusses the possibility of creating on-board voice informing systems aimed at issuing messages which help identify hazardous scenarios and correct flight crew strategies. The concept of adaptive voice support system for flight crew activities is described.*

**Introduction.** In the current context automation is characterised by the brand new features which bring about changes in approaches to the man-machine interaction management. Information technologies expansion led to the automation of the most complicated control processes traditionally subject to being managed by human beings only. Under the conditions of the controlled object and environment being highly infinite, automation systems get the artificial intelligence characteristics somehow approximating to the human abilities. Nevertheless, the exceptionally high potential of a human being in the process of heuristic problems solving makes it necessary to construct such a man-machine interaction system which could be optimal in the context of on-board systems intellectualisation still having a human being as an active control manager.

**A review of recent papers** shows that current man-machine systems and interfaces construction concepts reflect approaches aimed at providing a human with information of general nature as, for example, in a brand new multimodal avionics cockpit called “intelligent cockpit” [1]. The idea of intelligent cockpit finds its implementation in the construction of “Intelligent Situation-Aware Crew Assistant System” and a man-machine interface ASAP (Anticipation Support for Aeronautical Planning) [2].

In many cases when human factor is a cause of an emergency we can admit a lack of quality of a human heuristic activity (scenario forecasting, understanding of a flying situation in general, working out new patterns of behavior, making decisions feeling lack of information). This is an activity which a human performs better than a machine but airborne systems can assist them. It goes not only about unloading a human giving them more opportunities to solve heuristic problems but providing human beings with a direct help in the process of their tackling. Low grade tasks elimination may be very important at certain moments, but it is not a goal in itself. In particular, placing the human in the role of low level manager may be useful for a human being as for keeping the best control of possible changes and being ready to react immediately to any deviation of the controlled process (Paul Schutte). Nevertheless, under the conditions of technologies and automation systems becoming more and more reliable and correct, the main safety threat results from the human assessments, priorities and strategies system. Against this background, the intelligent cockpit seems to be a natural problem-solving technique, but the question is what kind of tasks such a cockpit must perform.

There are researches which make it possible to impose a task of monitoring and considering of a current human operational abilities on the on-board systems. A good sample of such type is Cognitive Adaptive Man-Machine Interface (CAMMI) [4]. These developments allow flexible redistribution of the control tasks among crew members taking into account each human being individual status, as well as setting aside of low grade tasks reducing information stream intension with respect to the operational situation priorities.

A number of researches comprehends changes not only of a person's activity nature while interacting with equipment, but also of operator teams and crews functioning nature while working in the specific environment of the intelligent technological systems. This refers, in particular, to the "hybrid team" [5], as a significant phenomenon, when a machine becomes a symbiotic partner of a human and is perceived by them as another crew member or as an extension of their own mind. It was shown that working successfully in highly automated Human-Machine-Interfaces (HMI), i.e. in a "hybrid team", demands different aspects of personality and attitudes than working with a human partner [5].

As we can see, all above-mentioned approaches build bridges to brand new changes in the crews professional activity process structuring and transformation of their activity operational nature. This can be summarised as follows: future belongs to such man-machine interaction construction approaches which allow means of this interaction and nature of the problems solved in the process of this interaction to be in harmony with each other. But nowadays the problem of the optimal human and intelligent on-board systems resources interaction cannot be considered as the solved one.

To our opinion, speech as an exclusively human interaction modality may become one of the most important human-intelligent cockpit interaction operating channels. Thus, **the aim** of the presented research is to conceptually work up approaches to the man-machine verbal interaction system construction as part of coordination problem solving as for the human abilities and those of the up-to-date highly automated control systems.

**Adaptive Voice Support System.** Voice information reporting system available performs the task of issuing a message of a clearly defined nature and timepoint. Typically such message contains information on the event or an important parameter value which requires corresponding actions to be taken, as well as a prompt about necessary current action to be applied. In all these cases the choice of a voice modality for information submitting is determined by considerations of immediate important command performance, urgency, data collection time-saving, information processing visual channel saturation and switching to the less loaded information channel, signal correct acceptance provision, information perception provision under the conditions of multitasking activity.

The analysis of both the crew activities in the context of the highly automated cockpit and new intelligent cockpit possibilities connected with achievements in the IT field allows to emphasize new different aspects of the voice information reporting system usage ideology relying on the role of speech for the human activities.

Ability to speak is a key feature of a human being. It is the speech that corresponds best to all represented as highly polysemious and infinite because it's connected with the human intelligence ability for abstract thinking. Speech has large information capacity. It meets the requirement of submitting highly generalised information to the best advantage.

Speech properties allow its successful usage for the human consciousness meta-structures control. The sample of such a meta-structure is a generalised flight image which contains a number of interrelated components including motivational and emotional ones. Speech makes it possible to represent a generalised event forecasting or describe preferable acting strategies, form a correct decision quickly or direct the data collection process to the necessary way.

Speech also has a great suggestive potential owing to which a spoken message is able to run through the mind dominance. Speech can help in stereotypes coping and liberating from illusion. Thus, automated *voice* instructing may be helpful while executing the complex manoeuvre when the sensory component of immediate perception within the multicomponent acting image can interfere with a pilot activity, especially in nontypical situation. Conceptual element integrated to the acting image allows its rational correction when necessary.

Speech is also connected with the adaptation to the social structure. It is considered that the need in such adaptation is one of the Homo Sapiens language abilities actualisation factors, and social and psychological adaptation is connected with finding a common language in a team. Ability to speak is also the way for a human to identify a speech partner of a like nature. That's why the usage of speech in man-machine interaction is expected to promote the process of a human integration into the "hybrid team".

The foregoing affords ground for giving more thought to the creating of a brand new man-machine verbal interaction systems being different from the voice information reporting systems available and realising perfectly the speech capacities in man-machine interactions. The essence of the difference is seen in using voice modality not just as one of the alternative channels for the reliable single information signal deliverance but as specific means of transmitting of highly generalised capacious information which reflects the combination of the current situation aspects and tendencies.

Development of such systems presents severe difficulties. Speech capacities when deal with polysemous notional units run into the problem of possible information understanding distortion risk. There arises the task to overcome controversy between need to use complex notional units and provision of the sense distortion elimination.

The problem of a correct message understanding in the "human-human" interaction is solved due to the process of dialogue when the ambiguity can be eliminated in the context of the discourse. If the message is generated by the on-board system, the approach to the providing of the accurate meaning transmission, to our mind, may involve issuing several alternative meaning-like statements outlining the conceptual field.

The voice informing of a human in the intelligent cockpit should be fulfilled taking into account the human being state. It obviously deals with both message

meaning and form. Creating of the adaptive voice information reporting systems suggests using message construction algorithms based on the situation pattern processing and a human being state data in the aggregate.

Interaction suggests two-way communications. There naturally arises a question on the expedience of uniting of the voice information reporting system and the crew voice messages perception system.

Poll held by us showed that psychologically to a greater extent airline pilots are ready to work with intelligent voice information reporting systems rather than with voice control systems [3]. Another common factor represented the correlation between the positive attitude to the opportunity of verbal interaction with on-board systems and positive attitude to the cockpit automation. Sceptical attitude to the prospects of possible verbal interaction with on-board intelligent systems was expressed only by 27% of the pollees.

Greater degree of readiness among pilots to work with intelligent voice information reporting systems rather than with the voice control systems can be explained by the fact that for the operator the voice reaction task is more difficult than the task to react to the voice. This fact was confirmed in the process of our laboratory study when the multitasking voice-inclusive operator acting conditions simulator was used. Differential voice information processing was experimentally followed by errors of 8% of the testees whereas differential voice commands issuing errors were made by 20,6% of the same testees.

It's obvious that the active voice function is more effort-taking for a human being and in an extremely tense situation it the one which would suffer more than the voice perception function. It affords ground to view the voice information reporting systems as the top-priority means of the man-machine verbal interaction assigning a support role to the crew members voice processing systems with no need for the crew to issue any specific voice commands.

It seems possible for the whole crew voice activity to be specifically processed. Its analysis will allow to assess the crew members functional state and their subjective perception of the situation urgency. This speech analysis is informative in terms of tempo, intensity, intonations, frequency spectrum as well as content and conceptual harmony (speech act completeness, clarity, timeliness, adequacy).

Analysis of the crew verbal interaction actual implementation correspondence to the regulations of standards and current circumstances allows to consider the beginning of the professional experience deformation process as the breakdown presage. Here we can refer to the professional experience deformation model empirically confirmed [6]. According to this model, the professional experience has a multilayered structure and in tense acting situations the process of this structure deformation spreads from the outer layers to the deeper ones. Furthermore, the very first to be destructed is the outer layer, the one of the crew members interaction experience including its immanent speech component, then the cognitive, voluntary and motor layers as follows. It would seem that the depth of occurrence of this or that professional experience substructure is connected with its place in the consequence of the professional training periods which provided sustainment training, and the depth of the stage when appropriate potential abilities

arose in the process of a human development. As a side note, the harmonization of these two factors may be considered as the professional training process adequacy indicator.

Figure 1 shows the adaptive voice support system (AVSS) implementation model offered by us. It consists of two units, namely flight hazardous scenarios recognition unit and voice correcting transactions generating unit.

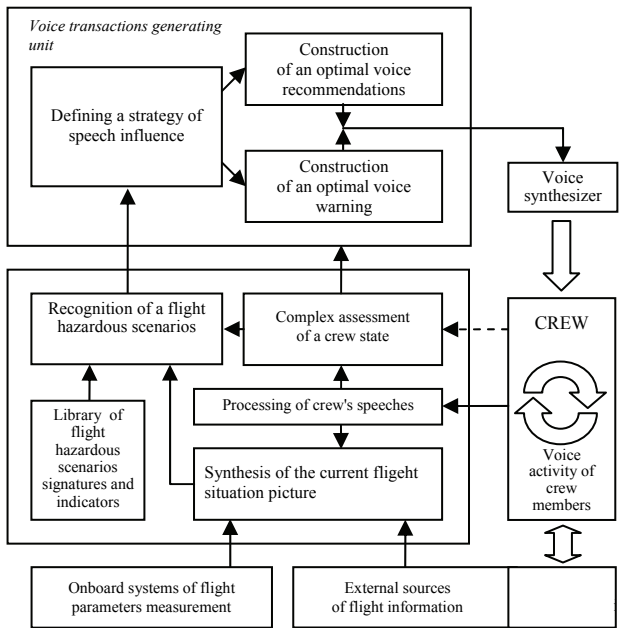


Fig.1 Flowchart of Adaptive Voice Support System (AVSS)

For the flight hazardous scenarios recognition the current flight situation picture is compared to the library of flight hazardous scenarios signatures and indicators. The fundamental distinctive feature is that among hazardous situation features and hazard assessment criteria along with flight parameters and conditions the indicators of crew members functional state and performance quality are represented.

The voice correcting transactions are generated in accordance with the peculiarities of the negative scenario which is to be prevented. For this purpose first the voice correcting strategy is determined, and then according to the strategy chosen, speech acts packages are generated in the form of warnings or recommendations transmitted further to the voice synthesizer for issuing to the crew.

In our opinion, such a system allows to solve one of the most important problems of working with a human factor in the context of the highly automated

cockpit. Here the task is to prevent choosing dangerous and unreasonable strategies for the crew performance, as under the conditions of various situations and circumstances they can provoke rise of inadequate attitudes and stereotypes, faulty assessment of its abilities by the crew, etc., and lead to violation of the set principles, rules and standard operational procedures endangering the safety.

For the purpose of setting the requirements to the construction of the on-board voice support system messages which are able to help crews to recognise and overcome the flight hazardous scenarios, at the present time we launched an empirical investigation involving in it a sample group of pilots of different flight performance experience. It is expected that this investigation results would allow to take a step closer to understanding of the main principles of the voice warning and recommending transactions generating.

**Conclusion.** In the context of aircraft cockpit intellectualisation prerequisites for the voice information reporting system functions transformation appear. IT state-of-the-art allows on-board voice information reporting systems to use speech specific properties connected with high information capacity, polysemous notional units representation possibility and highly generalised information representation. These properties application may play an important role in activation of a human consciousness meta-structures which provide forecasting quality, choice of strategies and taking decisions under the conditions of uncertainty and incomplete information. The voice information reporting is able to help overcome stereotypes and mind dominant states. What is more, a voice modality can promote harmonisation of the man and intelligent cockpit interaction when the latter becomes a virtual team member in the context of its actual hybridisation. All this demands further investigations for determination of the scope of distinct possibility for the man-machine voice systems development, though it is obvious that they are to play an increasingly larger role.

In the current context synthetic speech may be used not just as one of the alternative information delivery channels but as the highly generalised capacious information transmission specific means reflecting the various current situation aspects, its tendencies and assessment approaches. The purpose of such voice information reporting systems creation is prevention of dangerous and unreasonable strategies of the crew performance. The strategies mentioned cannot be explained by the man-machine interfaces drawbacks or activities regulation flaws. More often than not, they are connected with sociotechnical system properties in general, and man-machine verbal interaction system development can influence these properties.

For the voice message issuing to the crew the Adaptive Voice Support System concept (AVSS) is offered. It includes flight hazardous scenarios recognition unit and voice correcting transactions generating unit. Among hazardous situation features and hazard assessment criteria along with flight parameters and conditions the crew members functional state and performance quality indicators are included. Voice information reporting is considered to be a top-priority means of the man-machine verbal interaction assigning a support role to the crew members voice processing systems with no need for the crew to issue any specific voice commands addressed to the machine.

When the voice correcting transactions are generated first the voice correcting strategy is determined, and then according to the strategy chosen, speech acts packages are generated in the form of warnings or recommendations in the wide range of their verbal implementation. One of the approaches to the provision of a human correct understanding of the highly generalised voice machine information consists of the set of messages package issuing allowing to outline conceptual discourse scope for a human perception.

We note finally that the focus on the complex concepts operated by the professional in their activities means eventually the focus on their professional *weltanschauung*, understanding of their personal role and limits, personal ambitions, etc. This affords ground to consider the intelligent adaptive voice support system construction as a forerunner of a human factor control new ideology formation in aviation. The idea is focused on the personality of the professional, not on the individual with a number of cognitive abilities. Though it is easy to say, hard to do, we hope “hard” involves its being of great interest.

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## **PSYCHOLOGICAL WORK WITH PILOTS IN COMBAT CONDITIONS**

*The article discusses the features of the organization of psychological work. Psychogenic factors highlighted in situations that carry a direct emotional impact on the individual pilot and depend on its professional capabilities. The definition of psychological support of combat operations, and psychological work in combat conditions. Define the objectives and main tasks of the psychological support of combat operations, methods of psychological work.*

The constant threat to life of the man, his health, fast change of combat conditions, prolonged quite often exceeding loading, loss of the combat friends – all this has a significant pressure on physical and spiritual potential of the military man, derives a rich palette of emotions, spirit, state, feelings [1-5].

Difficult and dangerous conditions of life lead to certain excitation which causes sharpening of all organs of sense, attention, memory, thinking. Under influence of negative emotions in battle the sensitivity can be reduced, reaction on external irritants can be slowed down, coordination of movements and actions can be raised, attention and memory can be weakened which reduces or puts under threat productivity of their activity.

The man which gave way to strong influence of negative emotions, in particular, to feeling of horror, confusion sometimes loses the control above himself, does not arrange self-defense, is badly guided in conditions and can be seized by a panic.

The analysis of battle activity different categories of the military men shows that the basic psychological difficulties called by the factors of real fight, cause oppressing influence on mentality or lead to its excitation, and further to failure of activity. In military psychology it is accepted to distinguish: two basic groups of psychogene factors which create complication in activity of the military experts: group "A" – factors which have direct emotional influence on the military person; group "B" – factors which mediate emotional influence [1].

Group "A": danger, unexpectedness, novelty (unusual uncommon conditions), uncertainty, responsibility, negative emotional reactions, monotony caused by surplus of time, group isolation, tiredness (exhaustion), discomfort – absence of normal conditions for life and battle activity.

Group of the factors "B": deficiency of time (lack of time); increase of actions rate; extreme intellectual complexity of decisions, surplus of information; unity of several kinds of activity: а) perception of the multichannel information, б) logic operations, в) operations connected with realization of the accepted decisions; degree of coordinated actions of the experts.

The analysis of combat actions permits to distinguish two groups of factors which influence battle activity: external and internal. The external factors are connected with activity of an enemy. The internal factors are caused by functioning



of nervous system and mentality of fighting man in battle conditions (mental or physical exhaustions, psychological frustration, etc.)

The psychological maintenance of combat actions includes complex of measures which are conducted constantly and directed on formation, development and restoration of psychological qualities which provide high psychological stability and readiness to fulfil a battle task.

The psychological work in battle conditions is an activity of the commanders, staffs, bodies for educational work and moral – psychological maintenance which is directed on restoration of psychological qualities and conditions necessary for the effective decision of battle tasks.

The purposes of psychological maintenance of combat actions are:

- achievement of high battle activity of personnel;
- assistance to the military men;
- development of abilities for overcoming high psychological loading;
- development of skills to save fighting capability in conditions of influence psychotraumatic factors of modern battle.

The main tasks of psychological maintenance of combat actions are:

- psychological readiness of units, subunits for the organized entrance into combat actions, effective application of weapons and military installations;
- prediction and estimation of psychological conditions, recommendations to command concerning optimization of management social - psychological processes in units and subunits;
- formation and support of psychological firmness of the military men to influence psychotraumatic factors of modern battle, prevention and reduction of psychogene losses of personnel, reservation of its high battle activity;
- reduction of psychological influence of the enemy;
- psychological assistance to the military men in battle conditions, improving condition of their mental and physical power;
- estimation and prediction of professional suitability, rational distribution of reinforcement.

The psychological work is a component of moral-psychological maintenance in combat actions which fills it with concrete contents. It is directed on, maintenance, restoration of moral, mental, psychophysical, physical qualities and state of the military men, which are necessary for the effective solving of combat tasks.

Psychological work in a combat situations analysis, prediction of psychological influence. This work is carried out at all stages of combat actions, at their different levels (activity of a certain military man, a group of the military men, a military subunit, a military unit, a formations), taking into account specificity of functioning both conscious, and unconscious stages of mental activity of military man.

As a kind of activity the psychological work includes two interconnected methods: psychological designing and psychological correction.

The psychological designing consists of prediction the psychological contents of the future battle activity, foreseeing of its psychological consequences

and providing optimum psychological conditions of its realization. The sense of psychological designing – prediction of all factors of the future battle which have the certain influence on aims, motives, motivation, emotional, mental, psychophysical and physical state, battle activity of the military men and designing adequate psychodiagnostic, psychopreventive and psychocorrective programs of work with military men and military units.

Identify the psychological content of future combat operations allows to provide:

- a) what mental and psychophysical features military men should have;
- б) what military-professional qualities should be developed for fulfilling battle task;
- в) how to neutralize or to optimize conditions of this activity.

On the basis of this work it is carried out:

- psychological selection of the military men;
- their distribution in units according to their specialities and psychological compatibility;
- psychological preparation for fulfilling concrete battle task (in conditions much approached to real ones: social – psychological, natural geographical, weather-climatic, tactical-operative features of a battle task, etc.).

The psychological correction in battle conditions provides revealing, estimation and changing of psychological conditions of actions, which are carried out at the given moment. For this purpose the commanders, their deputies, the military psychologists must have the certain standard model of optimum psychological conditions for the certain kinds of battle activity of the military men. In case of certain deflections in mental and psychophysical state of the military men from these standard norms the commanders must provide corrections.

Psychological correction should be provided to:

- system of combat installations and motives of the military men;
- mental state, both separate military man, and the whole military unit;
- state of psychophysical health of the military men;
- mutual relations between military men;
- behaviour, both of separate military men, and group of them.

Such correction goes on two directions:

- optimization of external conditions of battle activity: the prevention, neutralization and elimination of consequences of hostile psychological operations; optimization of battle activity environment;
- rationalization of a mode of activity;
- the psychological assistance to overcome stress factors of modern battle: psychological support, psychological rehabilitation.

The optimization of external conditions of fulfilling battle task is carried out with administrative, information-propaganda, military-social, legal, cultural and educational counteraction to information and psychological influence of the enemy.

The main task of psychological work consists of:

- obtaining of the objective return information about efficiency of moral-psychological maintenance measures of battle actions, about their influence on

mental state of the military men, motivation and general moral- psychological conditions in military subunits and units;

- introduction, of moral-psychological measures appropriate to the given battle situation, to support high moral-mental state of personnel, reservation of psychophysical health of the military men, providing operative mental, psychological and social-psychological assistance.

The experience of the modern military conflicts testifies how qualitatively forces were prepared, how skilful military management of their battle actions was. The mentality of the military men does not always, sustain those psychological overloads which are created by modern battle. The vivid examples are battle actions of the American forces in Korea, Vietnam, where mental losses for 1000 militari men made 6-8 soldier. In modern war in consequence of actions psychotrop means and psychological operations of the enemy, the mental losses can exceed physical ones. In confirmation of the given situation there are mental losses of the Iraq forces because of psychological operations of the USA and their allies during realization of operation "Storm in desert", of Russian forces in Chechnia. Today psychological victory over the enemy is the main condition of a victory [2].

Practically, in modern war all military men give in to psychological influence of the enemy, that is why they need the psychological assistance. It is defined by mental firmness of the military man to stress factors of modern fight and received mental and psychophysical shocks.

The psychological help is a complex of mental, psychological, organizational, medical and other measures which are directed to successful overcoming circumstances of modern fight, reservation of fighting capability and prevention of postshock mental dissonance.

It includes psychological support and psychological rehabilitation.

The psychological support is directed to activation of own mental resources, to creation additional ones which provide active actions of the military men in conditions of modern fight. It mainly has preventive character and is directed to the prevention of the negative mental phenomena.

The basic ways and means of psychological support are communicative, organizational, medicinal, autogenic ones.

Psychological rehabilitation is the process of organized psychological impact, which is aimed at restoring the mental health of soldiers to deal successfully combat and service tasks. This activity aims to restore mental functions and personal status of the person due to the action violated stressful factors, using the methods and procedures of psychotherapy.

The psychological preparation of personnel for fight is a system of measures to form high battle readiness and psychological firmness.

Psychological preparation presents system of measures to form and develop emotional and strong-willed firmness, ability to resist psychoshock factors of fight, firm to a victory, resolution and persistence in achievement purpose of a battle task under any conditions.

The general, special and purpose psychological readiness of forces is organized directly, but most intensively – during preparation for battle actions.

## Conclusion

1. The psychological work in battle conditions is an activity of the commanders, staffs, bodies for educational work and moral – psychological maintenance which is directed on restoration of psychological qualities and conditions necessary for the effective decision of battle tasks.

2. The psychological work is a component of moral-psychological maintenance in combat actions which fills it with concrete contents. It is directed on, maintenance, restoration of moral, mental, psychophysical, physical qualities and state of the military men, which are necessary for the effective solving of combat tasks.

3. Psychological work in a combat situations analysis, prediction of psychological influence. This work is carried out at all stages of combat actions, at their different levels (activity of a certain military man, a group of the military men, a military subunit, a military unit, a formations), taking into account specificity of functioning both conscious, and unconscious stages of mental activity of military man. As a kind of activity the psychological work includes two interconnected methods: psychological designing and psychological correction.

4. The psychological help is a complex of mental, psychological, organizational, medical and other measures which are directed to successful overcoming circumstances of modern fight, reservation of fighting capability and prevention of postshock mental dissonance. It includes psychological support and psychological rehabilitation.

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## HUMAN FACTORS IN AIRCRAFT MAINTENANCE

*The author defines the essence of the concepts "personal factor" and "human factor" in aviation. The problem of human factor and the peculiarities of the professional activity of the aviation specialists have been considered. The causes of aircraft maintenance errors have been analyzed. The paper reveals the principles of professional aviation pedagogy.*

The problem of human factor in aviation is that the personal qualities and professional skills of aviation specialist (in this case, the engineer of aircraft maintenance) do not meet the criteria of the modern aviation technology management system. The problem is defined by the international community as the highest priority, because it is associated with flight safety. It can be solved by improving the quality of aviation specialist training by means of vocational education modernizing.

Today, aviation pedagogic has gained the significant achievements that involve various aspects of aviation specialist training. In particular, the problem of human factor in the process of future aviation professionals training has been investigated by V. Denisov, R. Makarov, V. Marishchuk, T. Tarnavska et al. However, the problem of human factor in the process of future aviation maintenance engineers training in higher aviation technical educational establishments remains poorly explored. In particular, the aspects of human factor that can affect the maintenance engineers' activity during aircraft maintenance have not been investigated. Therefore an urgent task of modern aviation pedagogy is to determine the factors that will contribute to improving the maintenance engineers' professional training. Analysis of the recent researches in the sphere of human factor in aviation demonstrates the need to update the theoretical basis for the development of pedagogical system of professional training in higher aviation technical educational establishments.

The paper reveals the principles of professional aviation pedagogy, in particular, the problem of human factor and some peculiarities of aviation specialists' professional activity. An attempt of comprehensive approach to the problem of professional training of future maintenance engineers has been done. Special attention is paid at assessing the level of professional readiness of aviation specialists to activity in unusual situations.

The terms "the personal factor" and "the human factor" are combined into the general concept "the human factor". It the same unusual situations not every specialist makes mistakes. That is why the concept of "the personal factor" has been introduced. The essence of this concept is that the causes of aviation accidents are not technique malfunction, but the personal qualities of pilots, engineers and technical staff. Personal factor determines the following individual professional capabilities such as the level of professional training, physical and psycho-physiological state, discipline and other individual characteristics. The concept of "the human factor" means the physiological capabilities appropriate for the people who have training which is necessary to perform professional activity. These

physiological capabilities are revealed during the interaction of specialist and equipment. The concept of "the human factor" determines the causes of negative human impact on the system's operation. Thus, it is advisable to distinguish these concepts in the process of aviation specialists' professional training.

The concept of "the human factor" has a complex structure and the interaction of its components. R. Makarov determines the following components of the human factor:

- medical;
- physiological;
- physiological;
- engineering and psychological (ergonomic);
- social and psychological;
- regulations, scanning and management activities (policy factors)

[ 1, P. 9 ].

Thus, the human factor is a difficult problem because it combines different aspects of science and technology (social, political, moral, psychological, economic, biomedical, etc.). It makes it impossible to solve the abovementioned problem only by means of pedagogy. The integration of pedagogy and aviation medicine, psychology, aviation pedagogy, engineering psychology and ergonomics is necessary.

Future aviation specialists do not study properly the human factor influence on flight safety in the process of their professional training. It is the cause of ineffective aircraft's systems operation and accidents which can result in people's death or property damage. 90% of all aviation accidents and incidents are related to human factor. The list of aviation accidents presented by circular ICAO 216-AN / 131 "Human factor" proves this fact [ 2 ].

Therefore, the researches of scientists and specialists in different areas are focused at finding the ways to adapt human to machine and machine to human. Experts believe that man-made complex technical systems fail not only because they are poorly made, but because of the actions of people who control these machines. That is why, in our opinion, it is reasonable to propose future aviation specialists non-standard professionally oriented tasks in the process of their professional training. The successful implementation of these tasks requires students' activity, the ability to make effective decisions on their own, to transfer accents from reproductive to productive ways of thinking; to expand the range of tasks that have to be performed by the aviation specialists in terms of risk (professionally oriented situations). We suggest the following types of students' work: pairwork or groupwork, communication in a controlled way at first, use of "acting out" and reading aloud and role-plays [4, P. 131–132], dialogues, chain stories, mime stories, storytelling, conversation, talk-lectures, improvisation, and role-plays [5, P. 53–55].

However, it is wrong to interpret human factor just as inability of a person to control the situation, distraction, false actions. Due to the human factor a number of crashes and people's lives have been saved. For example:

- in June 2006, an American plane Cessna-185 has a flight from Nevada to Utah. In the air, the pilot had a heart attack. However, he managed to land the aircraft and save the passengers' lives. The pilot died on the way to hospital;
- in 2004 in Belarus during the flight of a military aircraft CY-27УБ the windshield was pulled out. The crew continued the flight in an open cockpit at a

speed of 600 km / h. The pilots could eject but they did not do it because the plane was flying over the community. The crew managed to land the plane and prevent casualties;

- in Sydney 'Boeing 474' with 350 passengers on board, was preparing to land. The second pilot noticed that the commander was dead (a heart attack). However he managed to land the plane;
- in August 2005, Cypriot "Boeing 737" crashed. Presumably, the captain experienced health problem. The second pilot could not control the aircraft. The steward, who had a pilot's diploma, but never worked as a pilot tried to save the passengers. However, he failed to avoid disaster.

These examples prove the close relationship of aviation specialists' personal characteristics and professional reliability.

The study of human factor is most intensively carried out in the United States and the European Union. Ukraine also carries out some researches in this area. In 2009 the working arrangements between Ukraine and the European Aviation Safety Agency were signed. The cooperation between Ukraine and EASA provides a Common Aviation Area between the EU and Ukraine. Therefore, in some universities in Ukraine ("KAI", "NAU") within the educational disciplines "Fundamentals of aviation ergonomics" and "Engineering psychology and information display means" the problem of the human factor which is connected with the provision of safe air traffic control is studied. Moreover, in the National Aviation University at the Department of avionics in order to ensure the certification of avionics specialists' training to meet common European aviation regulations (Part - 66, Part - 1 47), training of Bachelors of "Avionics", masters and specialists of "Aircraft equipment" is carried out. It will ensure the participation of Ukrainian aviation specialists in rulemaking agency's activity, their representation in the working committees and commissions under the authority of EASA, improving the safety and regularity of flights in civil aviation. Ukraine trains aviation specialists in accordance with the standards developed by international organizations, such as: the International Civil Aviation Organization (ICAO), the European Organisation for the Safety of Air Navigation (Eurocontrol) and the European Aviation Safety Agency (EASA). These organizations clearly defined requirements for knowledge of aircraft maintenance engineers of A, B1, B2, C categories [3, P. 75–315], [6].

Traditionally, civil aviation has taken into account the human factor in relation to the operation of the flight crew or air traffic controllers. However, it is obvious that the errors of the technical personnel during aircraft maintenance also affect flight safety. The global and national statistics prove it. Over the past decade the number of aviation accidents and incidents because of mistakes made in the process of aircraft maintenance exceeded 100% and the number of flights increased by less than 55%.

There are two main types of human errors made in the process of aircraft maintenance:

- mistakes that result in failure or damage, which did not exist before the aircraft maintenance (improper installation of variable blocks, improper wiring connections);
- undetected unwanted or dangerous condition of the aircraft during maintenance (unnoticed crack in the force element during visual inspection, dismantling of serviceable unit instead of the failed one due to incorrectly identified

cause of failure, inefficient training of the specialist, lack of dedicated resources and tools required for maintenance service).

United Kingdom Civil Aviation Authority listed leading maintenance re-occurrence discrepancies in order of occurrence:

- Incorrect installation discrepancies.
- Fitting of wrong parts.
- Electrical wiring discrepancies.
- Loose objects being left in the aircraft.
- Inadequate lubrication.
- Cowlings, access panels & fairings not secured.
- Landing gear ground lock pins not removed before take-off.

The following examples of some crashes and incidents that have occurred because of the abovementioned reasons serve as convincing proof of insufficient training of maintenance engineers:

- the Airbus 330, without engine power, glided for almost 20 minutes, descending from more than 30,000 ft. before landing safely at Lajes Airport. Several tires blew out causing a fire which was quickly extinguished by emergency crews. The leak was caused by a damaged fuel feed pipe that was caused by interference from the aft hydraulic pump which was improperly installed. No one was seriously injured;

- the aircraft crashed into the ocean 28 minutes after taking off from Lima, Peru. Pieces of duct tape were found covering sensors, placed there by personnel during aircraft maintenance causing the malfunction of instruments. The crew was not able to correctly determine their altitude and airspeed and with no ground reference over water and at night, crashed into the ocean killing all 70 aboard. A maintenance worker was tried and convicted of negligent homicide for failing to remove the adhesive tape and received 2 years in jail;

- on a flight from Birmingham, England to Malaga, Spain, at FL 173, a large section of windshield fell away from the aircraft. The decompression pulled the captain out from under his seatbelt. Despite trying to hold onto the yoke, the captain was sucked out into the opening. A steward in the cockpit was able to grab hold of his legs. Another steward was able to strap himself into the vacant seat and aid in holding onto the captain's legs. The copilot wearing full restraints made an emergency landing at Southampton. The captain remained half way out of the aircraft for 15 minutes and suffered only frostbite and some fractures. Improper bolts used to replace the windshield two days earlier resulted in the accident;

- the aircraft collided with a bridge, shearing off both wings, after a double engine failure occurred during takeoff. The water-injection system to cool the engines during takeoff was inadvertently filled with kerosene instead of water;

- the aircraft took off from Ottawa bound for Edmonton with less than half the fuel required to make the trip. A computer known as the "Fuel Quantity Information System Processor" was not working properly so the ground crew made manual calculations for the amount of needed fuel. However, they used pounds/liter for the specific gravity factor instead of kilograms/liter. This was first model of aircraft of Air Canada to use kilograms. The aircraft ran out of fuel at 41,000 feet. With only standby instruments (magnetic compass, artificial horizon, airspeed indicator and altimeter) and no slats or flaps, the plane landed safely on a 7,200 ft.



runway at Gimli, a former Air Force base converted into a racing drag strip. The plane became known as the "Gimli Glider." The TV movie *Falling from the Sky: Flight 174* was made about this incident in 1995;

- August 12, 1985 Boeing 747SR-46 Airlines Japan Airlines, which was flying from Tokyo to Osaka crashed in a collision with a mountain Otsutaka. This is the second by the number of victims of disaster in the history of aviation after the tragedy on the island of Tenerife. 15 crew members and 505 passengers were killed. The reason – the abruptness of tail stabilizer as a result of mistake made during the aircraft maintenance;

- May 27, 2011 during the flight 717 AEW Borispol-Copenhagen aboard the plane B-737 UR-DND "AeroSvit", during climb, alarm warning of low oil pressure in both engines of the plane worked. The plane made an emergency landing at the airport of departure. After landing on both aircraft engines leakage was detected. During the investigation, it was found out that "technology plugs" on the box drives of both engines were not closed; the operations which provide engine starting for oil system leak testing were not performed. It caused leakage in flight;

- March 3, 1974, the aircraft airline Turkish Airlines Flight 981 crashed in France. The reason – the door of the luggage compartment opened during the flight because it was not tightly closed. As a result of decompression, all 346 people on board were killed. This disaster was considered the largest by the number of victims before the crash at Tenerife.

Maintenance engineers, technicians and mechanics often have to work in the environment which is conducive to mistakes: lack of time; night conditions; adverse weather conditions; no hangar facilities; need for simultaneous service fleet of old and new aircraft, which requires the appropriate level of general training.

Aviation specialists should possess specialized knowledge, skills necessary for successful professional activity (to perform aircraft maintenance, to control aviation equipment) and such personal traits as determination, initiative, courage and ability to realize their deficiencies. An important principle of education of these qualities is to form love and respect for their profession and thus self-confidence. These qualities are formed by means of problem situations solution by the students, overcoming difficulties. These difficulties must have an educational effect. They must be complicated gradually.

The process of future maintenance engineer's professional training should be based on the following principles: the principle of unity of education and training; structuring principle; principle of access to education; individual approach to the students.

Aviation specialist is characterized by his / her readiness to perform professional tasks. His /her professional experience must meet the requirements of the labour market. For aviation specialist, particularly for maintenance engineer the professional habits are of great importance. They are: habit to perform aircraft inspection or maintenance, habit to check controls. These actions are transformed into the specialist's need.

Graduates of higher aviation technical educational establishments possess professional knowledge, skills and abilities but on different levels. However, the knowledge and skills which were formed to work under normal conditions do not provide an effective professional work in extreme situations. The results of the research which had been carried out by the institute of aviation and space medicine

showed that in extreme situations, 20 % of professionals cannot assess the situation, and therefore they do not make any decisions, 10 % – take wrong decisions, 22 % – lose the ability to act 34 % – make the situation worse performing unnecessary operations, 14 % – cannot find the right levers or switches. We mean the reliability of knowledge in non-standard conditions. Therefore, it is advisable to take into account the peculiarities of the human factor in the educational process of future aviation specialists' training.

### Conclusion

The aircraft maintenance errors are revealed during aircraft operation. They are usually caused by faulty repair of aircraft equipment or improper assembly. It is the result of insufficient level of aviation specialists' training. The causes of aircraft maintenance errors are: a low level of maintenance engineer's physiological qualities that provide adaptation to unusual situations; stereotyp and alhorytm of skills to perform aircraft inspection and repair. Technical systems work properly in case of human availability as a basic link. Therefore, the students of higher aviation technical educational establishments are recommended to study aviation ergonomics. This science investigates the human factor and its importance in the process of creation and operation of aviation technology. The peculiarities of human behaviour in extreme situations are characterized by such personal qualities as commitment, determination, organizational and communication qualities, the desire of self-improvement and motivation for professional activity. These qualities are essential aspects of the modern professional's personality. Formed professional reliability of the maintenance engineer will provide the reduction of the number of aircraft crashes and incidents.

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## **USING AN INTERDISCIPLINARY APPROACH IN THE CONTEXT MOTIVATION STUDENTS FOR PHYSICAL EDUCATION**

*The article discusses the use of an interdisciplinary approach to the problem of creating the students motivation to regular motor activity.*

Human activity as a complex phenomenon polyaspect considered by many sciences. Public component studied sociology, political science and other social sciences, psychology considers mental aspect of the activity, physiology - physiological mechanisms and processes. As a general characteristic of living activity, in human society, called "activities". Physical activity, which certainly is an important element of human activity can not be considered in isolation from the other components. In the study of various aspects of human activity can not ignore the individual's motor function and its impact on the effectiveness of these activities. In the theory of physical education and physical education are not usually regarded as a separate motor activity of human activity (except for sports activities). Perhaps this highlights the applied orientation corporeality of man in relation to other types of its activities (his efforts) as well as the uncertainty of the final result in time. Interdisciplinary approach to research activities in its various representations, opens new horizons for the analysis of motivation in the problem field motion activity. In the context of the motivation of the person getting regular exercise, based on the fact that motivation is a product of the human psyche, highlighting the motion activity as a specific kind of human activity, we can:

- see motion activity as a systemic multidimensional phenomenon;
- apply obtained in psychology and pedagogy on the issue concepts, methods and schemes;
- identify strategic vision for human permanent implementation needs in a balanced motion activity.

In our view, given the realities of the negative trends of the modern information society, such an approach is constructive enough and has the right to life. Matter of fact, not with the physical perfection of man and personal physical weakness, displaced, in the modern student or student distorted reality virtual world beyond consciousness. This situation forces us to reassess the traditional view of application motion activity and its place in human activity (perhaps highlighting some model characteristics of activities and extending their motion activity).

Considering human activity and as a subject, in this context, using the definitions adopted in psychology can be characterized by motor activity as conscious and unconscious, depending on the circumstances (with the inherent

characteristics of this periodization). Thus, we can assume that when circumstances arise before us related to the unsatisfactory state of our motor function and requires a choice of strategy or a new method of optimizing the physical condition, the circumstances fall within the clear consciousness. Likely motivation for motion activity may also occur in the zone of clear consciousness and the unconscious in the area (such as - a spontaneous urge to play with the ball, jumping, running, etc etc. at the biological level). However, as the impetus for continuous effective operation necessary understanding of a need for regular vigorous activity. Perceived need motivates. It is considered that such a need - "kinezophilia" is inherent in man. By origin "kinezophilia" can be attributed to natural or human needs. Unconscious realization of this need in modern humans often absent due to historical and social circumstances.

Moreover, the problems associated with lack of movement and exercise in short range is not obvious, because negative results are not immediate. Dissatisfaction or constraint in the implementation of this requirement leads to a variety of diseases, premature "aging" of the body, and ultimately to the degeneration.

We assumed that a regular balanced awareness motion activity occurs in a "zone of clear consciousness," when the human psyche is faced with the need to solve specific problems or challenges. It was at this time lay the foundation for sustained, long-term motivation. And then we must ask the question - is there a student's age factors that empericheskim way (without the intervention of the teacher) will lead a young man to such a state? Perhaps during training in high school, as the development of their chosen specialty student can not identify its compliance with the requirements of physical fitness of the future professional activity (this usually happens at the undergraduate).

Extremely poor physical health, chronic illness, repeated physical state of helplessness can also make people think about the possibility of partially or completely offset these negative trends, changing the mode of life and include the regular physical exercise (especially this applies to students who enroll Sports physical education in special medical team).

Also important in this age, has a desire to be physically and sexually attractive to elect or chosen one, this factor may also contribute to the creation of a "zone of clear consciousness." There are probably other factors like motivation. It is important that this list of factors creating the prerequisites for creating a "zone of clear consciousness" is not, and at this age may not be one of the most important and potentially generalizing tasks - creating the conditions for an active, creative longevity.

In the context of human communion at different age stages to the regular term and permanent motion activity this actual problem in today's society may sound that way. Taking care of their own health in modern society become a sign of professionalism and social responsibility. To understand the importance of solving this problem (including both personal goals) require the appropriate person and engine life experience for themselves the definition of core values, skills of introspection and reflection, updated knowledge and skills. Physical education as a process of students is closely linked to the overall process of human development.

Student body of a relatively high intellectual level, receptivity to new knowledge and skills specific to abstract thinking. In this age period in the process of self-identity with the support of the teacher may attempt to pose productive and awareness of the problem in terms of the long-term prospects.

Thus, before the teacher and student in physical education, among other tasks, can be distinguished as a fairly significant problem awareness of the need for regular balanced motor activity, with a focus on long-term perspective. So how to solve this problem, there are negative factors of age, psychological and social nature here is the most effective joint work of the teacher and student.

For the student implementation of this approach leads to the need to clarify or create your own system of values, make corrections mode of life, makes strengthen willpower and self-control capabilities regularly individual physical fitness. Traditionally, physical education students defined objective exposition of discipline that are not linked to a specific person, but is actually existing social order in public institutions of education. Only realized he need regular physical activity and adequate physical activity a person can set themselves specific targets at a long-term period. Using accepted in cognitive psychology bihevioreslichesky approach can define the following sequence of operations contributing to the emergence of sustained motivation for regular motion activity and of the principle of consciousness in physical education:

- appearance or creation of conditions for a "zone of lucidity";
- emergence of a "zone of lucidity";
- awareness and perception of the problem;
- introspection of physical condition of the individual;
- definition of the purpose or purposes;
- through the assimilation and accumulation of motor experience search object of focus (means and methods chosen sport or improving the system);
- definition and further optimal use of means chosen to solve the purpose or purposes.

Only in the course of continuous improvement and the process of becoming a person acquires its meaning and value. Maintaining an optimal level of physical condition and sufficiently high level of efficiency also requires permanent human effort as long as possible. In this sense, the actual return of educational discipline "Physical Education" orientation to the primary meaning of the word "education", and not just simple to conduct physical training of students.

## **Conclusion**

One of the main objectives of physical education simulation environment in order to create a student's state of "clear consciousness zone 2 in relation to the individual physical condition and the use of physical activity in the mode of life..

The next task of the teacher is the best use of this moment to assist the student in the creation of a regular independent physical activities, determining the purpose or purposes (including for the future, the definition of the object of focus - the main choice of sport or recreational systems), etc.

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## **FEATURES OF ICAO "RISK TRIANGLE" SOLUTIONS OF HUMAN FACTORS UNDER COMPLICATED STANDARDS OF THE AIRSPACE SEPARATION**

*Taking under consideration the necessity as the management of risks on realizing the actions for providing the proper level of flight safety as the proactive notice of negative impact of human factors on this safety, fuzzy models of ATC controllers' attitude to the risk of separation violation established for ATC areas of APP ( $S = 20$  km) and APP TMA ( $S = 10$  km) have been built. The analysis of the crossing points of functions of neighboring terms by ICAO scale of hazards allowed to solve the "risk triangle" and to establish certain patterns under complicated standards of separation.*

Based on systematic studies of the functioning and development of global civil aviation it is proved by ICAO that an adequate level of flight safety (FS) is impossible without effective activities for risk management, which are an integral feature of this operation. At the same time more attention is paid to the development of control systems (CS) FS (SMS) based on the so -called "data". This allows to foresee in the components of the regulations concerning " regulatory compliance " performed standard operating procedures, space for more flexible, more dynamic characteristics of professional activities of aircraft operators " front edge " (air traffic controllers (ATC), the flight crew) that take into account the risk factors [1]. But really, the human factor has been the key cause of the absolute majority of accidents for many decades and its inclusion in the processes of the SMS , especially proactive permanently urgent task [2].

These «data» should be collected during the continuous monitoring of quality control and risk in the operation of the air transport system, which ICAO introduced as a special "risk triangle", which is undone by various combinations of hazard indicators and the incidence of adverse events. These indicators can be represented as a term-sets (sets of terms) of the respective scales:

– to assess the levels of danger (LD) risk factors:

$$T^M(LD) = \tilde{R}_C + \tilde{R}_D + \tilde{R}_F + \tilde{R}_I + \tilde{R}_N; \quad (1)$$

*Catastrophic + Dangerous + Fundamental + Insignificant + Nominal;*

– to assess the levels of frequency (LF) risk factors:

$$T^M(LF) = \tilde{R}_O + \tilde{R}_S + \tilde{R}_R + \tilde{R}_U + \tilde{R}_{VU}; \quad (2)$$

*Often + Sometimes + Rarely + Unlikely + Very unlikely,*

where « + » – is marking the logical association of terms;  $\tilde{R}_i$  – Designation of the term (linguistic assessment) the level of danger or frequency of appropriate scale.

The ICAO theoretical approach has methodological flaws [3; 4], so, based on the results of the analysis methods for the solution of the "risk triangle" and their practical applications [4-7], for the purpose of research, we took an indistinct relationship model of ATC to the danger of separation standards violations of air space ( $S=20$  km). That was established for aircraft (A/C), which are at the same level and on the specified routes in urban areas - manager of air traffic services ACC (Area Control Center) as well as the distance between A/C ( $S = 10$  km) that are already in the control area of APP TMA (Terminal Control Area - node dispatcher area) using an automated system (AS) of air traffic control (ATC).

Research has been drawn up to 70 professional controllers, who, using the Cooper- Harper scale [8; 9], modified by us for the purposes of research, expressed their attitude to risk of violation of these rules of separation analyzing the whole continuum of appropriate distances between the A/C. In this way we collected the expert information in the form of so-called "point on the scale parameter" [10; 11], which allowed us to select for its subsequent processing and construction of membership functions (MF) linguistic variables (LV) method, which applies the so-called "matrix hints" [11; 12]. And at first ATC introduced a scale which is wider than ICAO proposed scale (1) for a more in-depth analysis of the dangers of the investigated separation standards violation:

$$T^M(UO) = \overset{\tilde{R}_{VH}}{\text{Very}} + \overset{\tilde{R}_H}{\text{High}} + \overset{\tilde{R}_{AA}}{\text{Above the average}} + \overset{\tilde{R}_A}{\text{Average}} (\text{common}) + \\ + \overset{\tilde{R}_{BA}}{\text{Below the average}} + \overset{\tilde{R}_L}{\text{Low}} + \overset{\tilde{R}_{VL}}{\text{Very low}} \quad (3)$$

Since all the crossing points of MF and LV is «UO», which were built for scale (3) have a value of MF, more so-called «transition point» L. Zadeh ( $\mu(S) = 0,5$ ) the corresponding intervals between them "rather belong to" the relevant qualitative linguistic estimated scale (3). That certainly demonstrates the effective representation and discrimination of level of risk of violation of investigated separation standards of subject ATC controllers. Therefore, taking into account that the formation of scale (3) was applied as a modifier "very", then performing fuzzy reverse operations "concentration" and "stretch" and applying fuzzy operation «unity», it is easy to reduce the scale (3) to the dimension scale (1) and obtain the corresponding fuzzy model. From the analysis of MF LV «UO», shown in Fig. 1, it is easy to solve the «risk triangle» ICAO as shown in Table 1. As it can be seen from Table 1, the level of unacceptable risk increases with decreasing separation standards, which is marked on the largest importance for ATC distance between the A/C. The same pattern appears, if it is an acceptable level of risk.

The subject ATC pointed out during the further discussion of the result that, despite being able to use AS ATC in the area of APP TMA responsibility, they took into account during as usual intensity in her flight so personal skill level during the test.

## CONCLUSIONS

Thus, taking into account the received and presented new scientific results it



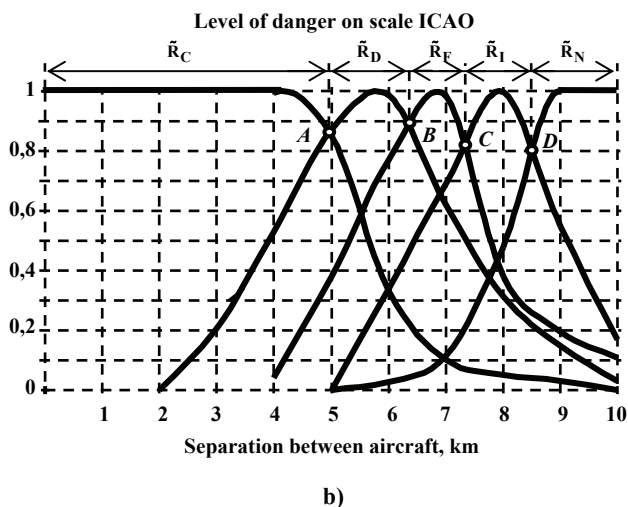
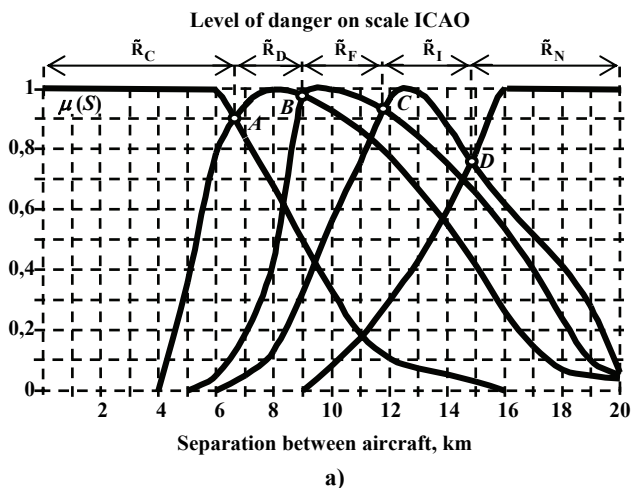


Fig. 1. Fuzzy models of air traffic controllers attitude to risk violation of airspace separation standards: a) separation standards for  $S = 20$  km, established for the control regions of APP; b) separation standards for  $S = 10$  km, set for CTA APP TMA.

should be stated the fact that it is the first comprehensively studied attitude of professional ATC to violations of separation of airspace. The used procedures for construction of the corresponding fuzzy models revealed that subjects clearly see the danger levels throughout the continuum studied distances between aircraft in the open space environment. Reported model allowed to unleash the ICAO "risk

Table 1. Comparative results of hazard levels in dealing with "risk triangle" ICAO provided violations separation airspace control areas of APP ( $S = 20$  km) and APP TMA ( $S = 10$  km).

| Norm of Separation  | Level of danger, km   |                      |                       |                        |             |
|---------------------|-----------------------|----------------------|-----------------------|------------------------|-------------|
|                     | catastrophic          | dangerous            | fundamental           | insignificant          | nominal     |
|                     | unacceptable          |                      | acceptable            | acceptable             |             |
| 1                   | 2                     | 3                    | 4                     | 5                      | 6           |
| APP:<br>S=20 km     | $S \leq 6,5$          | $6,5 < S \leq 8,90$  | $8,90 < S \leq 11,64$ | $11,64 < S \leq 14,79$ | $S > 14,79$ |
|                     | $S \leq 8,90$ (44,5%) |                      | $8,90 < S \leq 11,64$ | $S > 11,69$ (58,45%)   |             |
| APP TMA:<br>S=10 km | $S \leq 4,97$         | $4,97 < S \leq 6,38$ | $6,38 < S \leq 7,38$  | $7,38 < S \leq 8,55$   | $S > 8,55$  |
|                     | $S \leq 6,38$ (49,7%) |                      | $6,38 < S \leq 7,38$  | $S > 7,38$ (73,8%)     |             |

triangle" in clear indicators - distances between the aircraft. It should be particularly emphasized the proactive results, which open the prospects for the efficient monitoring and controlling of the professional ATC activities.

On the one hand, the subsequent research would be appropriate for the entire spectrum of the aircraft separation standards and, on the other hand, it can be used for determining the level of violations of these standards.

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## IMPROVEMENT OF CONCRETE AIRFIELD PAVEMENT DESIGN

*The State norms of Ukraine have only two values of transitive factor which do not account modern aircraft main landing gear configurations and number of wheels. New values of transitive factor for calculation of edge bending moment are determined for concrete airfield pavement. Transitive factor values are obtained by using finite element modeling programs LIRA and FEAFAA.*

In Ukraine concrete airfield pavement of the international airports is two-layer pavement with joint matching that's why improvement of its design is important especially for pavement analysis under impact of modern aircraft (A320, A350-900, A380-800, B737-900ER, B747-8, B777, B787-9) main landing gears.

In the State norms of Ukraine concrete slab structural analysis is performed using infinite slab model with loads placed on its center. The free-edge stress equals interior stress multiplied by transitive factor  $k=1,5$ . If slab has joints the edge stress is equal interior stress multiplied by transitive factor  $k=1,2$  (CHиП 2.05.08-85). According to the analytical research of G. Glyshkov transitive factor value depends on main landing gear configuration and number of wheels [1].

Federal Aviation Administration (FAA) of the United States of America uses the simplified 25% reduction factor that has allowed the complex behavior of joints to transfer load (AC 150/5320-6E). Free-edge loading structural analysis is performed using single-slab model without joints and with wheel loads placed along the edge of the slab. Joint load transfer is not a constant but rather is a stochastic variable changing continually as a function of temperature, and degrading over time due to repeated loading. The degree of load transfer is commonly called load transfer efficiency (LTE) and can be defined based on stresses or deflections [2]. There are three widely-used definitions for load transfer at a pavement joint:  $LTE_{\delta}$  or  $LTE(\delta)$  – deflection-based Load Transfer Efficiency;  $LTE_{\sigma}$  or  $LTE(S)$  – stress-based Load Transfer Efficiency; percent of “Free-Edge Stress” Load Transferred (LT). LT is determined by using the formula:

$$LT = \frac{\varepsilon_F - \varepsilon_L}{\varepsilon_F}, \quad (1)$$

where:  $\varepsilon_F$  – bending strain for free-edge loading conditions;  $\varepsilon_L$  – bending strain in the loaded slab edge at the joint [2].

New values of transitive factor are calculated by using finite element modeling of the two-layer concrete pavement with joint matching that can be provided in program LIRA and FEAFAA. Aircraft main landing gear interior load is modeled by using one concrete slab. Edge loading for joint transitive factor  $k_{joint}$  determination is modeled by using multiple-slab jointed concrete pavement. Edge loading for free-edge transitive factor  $k_{fe}$  determination is modeled by using 1 slab.

In program LIRA two-dimensional shell finite elements are used to represent the upper and lower concrete slab of two-layer pavement and stabilized base. The upper and lower concrete slabs are unbounded layers with separator layer. The separator layer is modeled by FE 262 of the program LIRA finite element library. Subgrade model is Winkler foundation. Joints between adjacent slabs are represented by FE 55. Wheel load was modeled as square load that has the same magnitude as the nominal tire contact area [3].

FEAFAA was developed by the FAA Airport Technology R&D Branch as a stand-alone tool for three-dimensional finite element analysis of multiple-slab concrete airfield pavements. It is useful for computing accurate responses of rigid pavement structures to individual aircraft landing gear. FEAFAA's basic element type is an eight-node hexahedral solid element. The model uses only one element type for all structural layers. The enhanced FEAFAA software uses linear elastic joints, where joint stiffness is modeled as a constant linear stiffness value [2].

Interior and edge loading of dual wheel, two dual wheels and three dual wheels in tandem main landing gears (table 1-3) are analyzed for the following case: 450 mm upper concrete slab (7,5- by 7,5-m. slab dimensions,  $E=35300$  MPa), 300 mm lower lean concrete slab ( $E=17000$  MPa), stabilized base ( $E=7800$  MPa), and Winkler foundation ( $K=60$  MN/m<sup>3</sup>), subgrade modulus 34 MPa.

Table 1

Dual wheel main landing gears

| Aircraft   | Magnitude of the main gear static load, kN | Main gear tire pressure, MPa | Magnitude of the wheel load with dynamic ratio, kN |
|------------|--|------------------------------|--|
| A320-200   | 364,00 kN                                  | 1,44 MPa                     | 227,50   |
| B737-900ER | 403,67 kN                                  | 1,52 MPa                     | 262,39   |

Table 2

Two dual wheels in tandem main gears

| Aircraft | Magnitude of the main gear static load, kN | Main gear tire pressure, MPa | Magnitude of the wheel load with dynamic ratio, kN |
|----------|--|------------------------------|--|
| A350-900 | 1259,60                                    | 1,66                         | 409,37   |
| A380-800 | 1069,20                                    | 1,50                         | 334,13   |
| B747-8   | 1062,99                                    | 1,52                         | 345,47   |
| B787-9   | 1177,4                                     | 1,54                         | 382,66   |

Table 3

Three dual wheels in tandem main gears

| Aircraft   | Magnitude of the main gear static load, kN | Main gear tire pressure, MPa | Magnitude of the wheel load with dynamic ratio, kN |
|------------|--|------------------------------|--|
| A380-800   | 1603,80                                    | 1,50                         | 334,13   |
| B777-300ER | 1629,34                                    | 1,52                         | 353,02   |

The bending moment is determined on the upper concrete slab of airfield pavement. The finite element modeling (FEM) results for joint transitive factor obtained in LIRA and FEAFAA are summarized in table 4, 5.

FEAFAA calculates tensile stress that can be converted to bending moment  $M$  by using FAA formula (AC 150/5320-6E):

$$M = 1,7 \frac{\sigma \cdot I_g}{c}, \quad (2)$$

where: 1,7 – live load factor;  $\sigma$  – stress, MPa;  $I_g$  – the gross moment of inertia calculated for a 1-meter strip of the concrete slab,  $m^4$ ;  $c$  – the distance from the neutral axis to the extreme fibre, assumed to be one-half of the slab thickness, m.

The transitive factor values are determined as bending moment ratio

$$k_{fe} = \frac{M_{edge}}{M_{int}}, \quad (3)$$

$$k_{joint} = \frac{M_{ejoint}}{M_{int}}, \quad (4)$$

where:  $M_{edge}$  – edge bending moment,  $kN \cdot m/m$ ;  $M_{int}$  – interior bending moment,  $kN \cdot m/m$ ;  $M_{ejoint}$  – edge bending moment in slab of jointed pavement,  $kN \cdot m/m$ .

Table 4

Results of finite element modeling (LIRA) for joint transitive factor

| Aircraft  | $M_{ejoint}$ ,<br>kN•m/m | $M_{int}$ ,<br>kN•m/m | $k_{joint}$ |
|---|--------------------------|-----------------------|-------------|
| A320-200  | 69,451                   | 58,362                | 1,19        |
| A350-900  | 101,021                  | 76,903                | 1,31        |
| A380-800 (two dual wheels in tandem main gear)  | 94,264                   | 77,135                | 1,22        |
| A380-800 (three dual wheels in tandem body gear with perpendicular location to the slab edge) | 101,800                  | 87,960                | 1,16        |
| B737-900ER  | 82,165                   | 68,361                | 1,20        |
| B747-8  | 103,540                  | 87,078                | 1,19        |
| B777-300ER (gear perpendicular location to the slab edge)                                     | 115,386                  | 103,187               | 1,12        |
| B777-300ER (gear tangent location to the slab edge)   | 105,665                  | 103,187               | 1,02        |
| B787-9 (gear tangent location to the slab edge)   | 105,411                  | 81,984                | 1,29        |

Table 5

Results of finite element modeling (FEAFAA) for joint transitive factor

| Aircraft  | $M_{ejoint}$ ,<br>kN•m/m | $M_{int}$ ,<br>kN•m/m | $k_{joint}$ |
|---|--------------------------|-----------------------|-------------|
| A320-200  | 69,464                   | 57,992                | 1,20        |
| A350-900  | 98,302                   | 74,527                | 1,32        |
| A380-800 (two dual wheels in tandem main gear)  | 93,990                   | 77,455                | 1,21        |
| A380-800 (three dual wheels in tandem body gear with perpendicular location to the slab edge) | 102,543                  | 87,423                | 1,17        |
| A380-800 (three dual wheels in tandem body gear with tangent location to the slab edge)       | 85,999                   | 87,423                | 0,98        |
| B737-900ER  | 82,867                   | 69,056                | 1,20        |
| B747-8  | 103,207                  | 86,118                | 1,20        |
| B777-300ER (gear perpendicular location to the slab edge)                                     | 117,843                  | 103,167               | 1,14        |
| B777-300ER (gear tangent location to the slab edge)   | 101,269                  | 103,16                | 0,98        |
| B787-9 (gear tangent location to the slab edge)   | 100,913                  | 78,325                | 1,29        |
| B787-9 (gear perpendicular location to the slab edge)   | 100,557                  | 78,325                | 1,28        |

Bending moment has maximum value for three dual wheels in tandem main gear when it has perpendicular location to the slab edge. Bending moment has maximum value for two dual wheels in tandem main gear when it has tangent location to the slab edge. This conclusion coincides with results of FAA NAPTF (National Airport Pavement Test Facility) CC2 [4].

The FEM results (LIRA, FEAFAA) for free-edge transitive factor are summarized in table 6, 7.

Table 6

Results of finite element modeling (LIRA) for free-edge transitive factor

| Aircraft  | $M_{edges}$<br>kN•m/m | $M_{int.}$<br>kN•m/m | $k_{fe}$ |
|---|-----------------------|----------------------|----------|
| A320-200  | 88,167                | 58,362               | 1,51     |
| A350-900  | 123,967               | 76,903               | 1,61     |
| A380-800 (two dual wheels in tandem main gear)            | 119,823               | 77,135               | 1,55     |
| A380-800 (three dual wheels in tandem body gear)          | 132,542               | 87,960               | 1,51     |
| B737-900ER  | 108,843               | 68,361               | 1,59     |
| B747-8  | 129,035               | 87,078               | 1,48     |
| B777-300ER (gear perpendicular location to the slab edge) | 144,895               | 103,187              | 1,40     |
| B787-9 (gear tangent location to the slab edge)           | 137,206               | 81,984               | 1,67     |

Table 7

Results of finite element modeling (FEAFAA) for free-edge transitive factor

| Aircraft  | $M_{edges}$<br>kN•m/m | $M_{int.}$<br>kN•m/m | $k_{fe}$ |
|---|-----------------------|----------------------|----------|
| A320-200  | 86,408                | 57,992               | 1,49     |
| A350-900  | 119,030               | 74,527               | 1,60     |
| A380-800 (two dual wheels in tandem main gear)            | 116,934               | 77,455               | 1,51     |
| A380-800 (three dual wheels in tandem body gear )         | 131,966               | 87,423               | 1,51     |
| B737-900ER  | 104,279               | 69,056               | 1,51     |
| B747-8  | 127,931               | 86,118               | 1,49     |
| B777-300ER (gear perpendicular location to the slab edge) | 140,906               | 103,167              | 1,37     |
| B777-300ER (gear tangent location to the slab edge)       | 130,818               | 103,167              | 1,27     |
| B787-9 (gear tangent location to the slab edge)           | 135,328               | 78,325               | 1,73     |
| B787-9 (gear perpendicular location to the slab edge)     | 128,841               | 78,325               | 1,64     |

According to FEM analysis joint and free-edge transitive factor have values more or less than standard values. Their recommended values are represented in table 8. So long as aircraft B737-900ER has the same gear geometry as lower models (-400, -500, -600, -700, -800, -900, BBJ, BBJ2) transitive factor is shown for aircraft B737. Aircraft B747-8 has freight version with the same taxi weight and landing gears that's why table 8 includes factor values for freighter. Aircraft B777-300ER also has lower models (B777F, -200LR) with the same main landing gears.

Table 8

Recommended transitive factor values for modern aircrafts

| Aircraft   | $k_{joint}$ | $k_{fe}$ |
|--|-------------|----------|
| A320-200   | 1,20        | 1,50     |
| A350-900   | 1,30        | 1,60     |
| A380-800 (two dual wheels in tandem main gear)   | 1,20        | 1,50     |
| A380-800 (three dual wheels in tandem body gear) | 1,20        | 1,50     |
| B737   | 1,20        | 1,55     |
| B747-8 (B747-8F)                                 | 1,20        | 1,50     |
| B777-300ER, B777-200LR, B777F                    | 1,13        | 1,40     |
| B787-9   | 1,30        | 1,70     |

LT values are determined by using proposed formula  $LT = (k_{fe} - k_{joint}) / k_{fe}$ .

Determined LT values are shown in table 9.

Table 9

Simplified LT values considering landing gears of modern aircrafts

| Aircraft   | LT   |
|--|------|
| A320-200, A350-900                                       | 0,20 |
| A380-800 (two and three dual wheels in tandem main gear) | 0,20 |
| B737   | 0,23 |
| B747-8 (B747-8F)   | 0,20 |
| B777-300ER, B777-200LR, B777F                            | 0,20 |
| B787-9   | 0,24 |

### Conclusions

New values of transitive factor are determined by using FEM programs LIRA and FEAFAA for two-layer concrete airfield pavement with joint matching. Transitive factor values depend on aircraft main landing gears configuration and number of wheels.

Joint transitive factor value is equal standard value (СНП 2.05.08-85) for A320-200, A380-800, B737 (-400, -500, -600, -700, -800, -900, -900ER, BBJ, BBJ2), B747-8 main landing gears. For A320-200, A380-800, B747-8 landing gears free-edge transitive factor value is the same as standard value too. Joint transitive factor of B777 gears is less than standard value. For aircraft A350-900 and B787-9 landing gears joint and free-edge transitive factor are more than standard values.

Percent of “Free-Edge Stress” Load Transferred (LT) value of B737 landing gear is equal 0,23 that coincides with C. R. Byrum, S. D. Kohn, C. A. Gemayel and S. Tayabji research results (0,22-0,25 – curled down analysis).

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## **INTRODUCTION OF THE ACOUSTIC EMISSION METHOD IN TECHNICAL DIAGNOSTICS OF BRIDGES**

*Durability and reliability of operation of engineering structures depends on the strength reserve, which is considered in the design. Durability and reliability of operation of artificial structures depends on the safety factor, which is considered in the design. It depends on the quality of manufacturing and assembly, the type and magnitude of operating loads, (climatic parameters) and other factors. All these factors affect the service reliability in varying degrees, which is determined by the reliability of the information on the bearing capacity of the main parts of the structure.*

In modern conditions to ensure reliability and durability of bridges, we need to fundamental revision of technical approaches to their diagnosis. It is necessary tasks to research, development of new materials, structures and technologies, which would provide the required durability of bridge structures, quality control of construction works, checking structures before construction of long-term operation and condition of bridges in the course of their use, planning of repairs and reconstructions and also to prevent accidents. Requires the use new highly informative methods that provide non-destructive inspection constructions parameters during operation.

At present, almost all the information about technical condition of the bridge is formed on the basis of its periodic visual (examinations) (inspection).

However, periodic inspections for detecting fatigue cracks, violating the integrity of color, corrosion cannot be considered absolutely reliable. Latent defects and defects located in remote places for inspection can't be detected. In view of these circumstances, the conclusion of major repair, renovation or extension of the bridge is a difficult engineering challenge. To solve it, perform tests bridges with the use of instrumental control. For this purpose measure the deflection of bearing elements, determine the frequency of natural and forced vibrations of (bridge spans) (deck), track the movements of individual elements, spend ultrasonic defect identification, and strain-gauge measurement of voltage under load, measured static voltage different methods of structurescopy. Such tests are carried out in both the statics and dynamics. However, has not yet been developed any sufficiently reliable, low-cost, easy-to-implement method of strength tests and defect identification of critical elements of the bridge structure.

One of the methods of non-destructive inspection, which answer to all the above requirements, is the most informative, is actively developing and implementing in Ukraine is the acoustic emission method.

According to existing notions and adopted definitions the acoustic emission (AE) this is emission by the material of elastic waves caused by local, dynamic reorganization of its structure. Unlike traditional methods of non-destructive inspection acoustic emissions created by the material investigated object and has a full information about the process as of the moment, and in time. AE phenomenon is accompanied by internal processes that take place in the materials.

Necessary condition in conducting AE (diagnosis bridges) - create load on the test construction, which initiates in the material of investigated object activity of acoustic emission sources (micro-and macro-cracks). The purpose of the AE - there diagnosis, identifying coordinate surveillance (monitoring) the development of AE sources that are associated with the development of cracks in the investigated structures of highway bridges. At revealing in the construction defects, the acoustic emission method can be used to monitor their development. In addition, it can be used to estimate the rate of development of defects for timely termination test and warning of destruction constructions, as well as to assess the impact on the capacity of the bridge defects in structural elements.



Characteristic features of the acoustic emission method, which determine its capabilities in the technical diagnostics bridges are as follows:

- providing location and registering only those defects that develop, which allows them to be classified not by size, but by the degree of hazard;
- in an industrial setting method allows to determine crack growth by a few tenths of a millimeter. According to theoretical calculations, possible to fix the crack growth in the material during the action of a external loads  $10^{-6} \text{ mm}^2$ , which indicates a high sensitivity of the method;
- integral method provides control the whole object with using one or more converters, which are fixed motionless on the structure;
- method allows to control of manufacturing processes and process of changes in the properties of materials;

- the position and orientation of the defect does not affect their detection;
- significantly fewer constraints related to the structure and properties of materials than other non-destructive inspection methods.

As mentioned above, creating a load test constructions is a prerequisite for conducting acoustics - emission diagnostics bridges. Acoustic emission signals registration performed during exposure to certain pre-loading levels (Fig. 1), immediately with the achievement intermediate magnitude of the load.

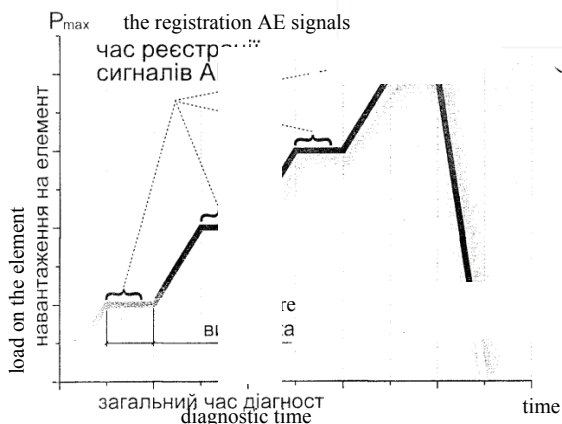


Fig. 1 Typical loading graph

The normative document MBB 218-03450778-240-2004 The method of acoustic emission diagnosis of the technical condition bridges in static tests established the basic criteria for assessing the state of the structures by acoustic emission signals.

Treatment criterial evaluation detection of acoustic emission signals from cracks conducted by coefficient  $K_p$ .

According to theoretical propositions parameter  $K_p$  characterizes the degree of change in the energy density of the recorded signals of acoustic emission and is used to detect signals from cracks. To define it, use the formula:

$$K_{pj} = \lg(E_{cj} / \tau_j^2), \quad (1)$$

where  $E_{cj}$  - energy from the j-th recorded signal,  $\tau_j$  - duration recorded acoustic emission signal.

Hazard assessment processes of destruction that occur in the structure of the construction material during loading, performed by kinetics analysis of the development of radiation acoustic emission using a common analysis of data obtained at stages exposure under the load. To compare and summarize the results,

independent of the dimension of the analyzed parameters, use them to formalize rationing scales to unit:

$$\overline{E_H} = f(\overline{P}), \quad (2)$$

$$\overline{E_H} = E_i / E_{i \max}, \quad (3)$$

$$\overline{P} = P_i / P_{i \max}, \quad (4)$$

where  $E_i$  - value of power storage of acoustic emission signals during exposure to degree of loading in the opposite time interval,  $P_i$  - load value of on the researched object,  $E_{i \max}$  - maximum value power storage of acoustic emission signals during the time exposure under load on degrees in the opposite time interval,  $P_{i \max}$  - maximum value of load on the research object under test. Analysis with the approximation of the experimental data, respectively, as described previously performed by the formula:

$$\overline{E_H} = a \overline{P}^b \text{ if } ti = \text{const}, \quad (5)$$

where  $a, b$  – constants,  $ti$  - time interval of registration acoustic emission signals.

The absolute value of the exponent  $b < 3$  indicates that the defects that develop in the structure of the material is not hazardous. If the value of the exponent  $b \geq 3$  development defects is not dangerous.

Recently, the acoustic emission method is widely used by Ukraine with technical diagnosis bridges. On the basis of the research developed a series of regulatory documents using acoustic emission method in the technical operation of bridges: RV.2.3-218-03450778-712: 2007 Recommendations for acoustic emission monitoring object state road network, M-218-03450778-632: 2007 Methods of determining the degree of corrosion of reinforcement in concrete structures of highway bridges using acoustic emission method; M-218-03450778-661: 2009 Methods of locating defects acoustic emission diagnosis of reinforced concrete structural elements of transport facilities; 218-03450778-677:2010 M Methodology continuous monitoring of transportation facilities acoustic emission method.

### Conclusions

Conducted researches on the use of acoustic emission method led to the following conclusions:

1. This method is highly informative and quite clearly fixes the physical processes that occur in the material structures of bridges.
2. The results obtained are correlated with the results of other methods.
3. Acoustic emission method allows more accurate and fuller appreciation the technical condition of bridge, and this greatly improves road safety.

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## **MOVING IN INTERIOR DESIGN**

*This paper investigates expression of direct and indirect movement in the interiors of different styles, ages and purpose. The main features that characterize the movement were found. Classification of movement in interior design, and their main features was established.*

Statement of the problem. Creating of interiors provides analysis and consideration of all the features of not only the space, but mainly its functionality.

Depending on the wishes, style and era creates a dynamic and static interior. Each of these styles sets a psychological effect because their research will allow more practical and efficient use of space.

The mood of overall perception of ease and reaching of lightness of the interior can be formed by classifying and highlighting key elements of motion. Mood and emotions can be conveyed with the help of the effect of movement. The movement allows more harmoniously emphasize the shape of objects.

Analysis of recent researches and publications. When writing articles many work on topics related to the movement in the design was reviewed. Baryshova V.E. investigated a dynamic form of residential interior space, especially in the interior movement as a whole; three basic formative principles by which the theme of movement developed in the design of residential environments are: mobility, agility and transformation [2]. Farshatova T.N. conducted a classification of methods and tools for creating dynamic and kinetic forms and their mental perceptions. She was found ways and means of creating dynamic forms using the effect of movement in the artistic design. [7]

Purpose. To analyze different interiors, to visual analysis of 1000 images of interiors of different eras and styles. Identify the features of the movement in interior design.

The main part — Design is a practical science that aims to create functional, harmonious, technical and aesthetic existence of objects or its complex.

Movement in the design scientifically — is phenomenon. Exploring of movement can only be general, that it is carried out by certain objects, actions and processes, but the result is a change.

In the design can be seen a number of nuances, depending on the question posed and tasks ranging from the basic principles of creative work, ideas and finishing features architectural elements that have direct influence. The movement can be traced in any design, from 2d graphic to a three-dimensional modeling.

One of the characteristics of modern space in the design of new technologies — is a continuous motion. It is perceived both in the literal and figurative sense, which is equivalent to asking some emotional impact.

During the study was reviewed and analyzed 1000 Interior of historical styles of art: gothic, baroque, rococo, renaissance, modern and contemporary styles — optical art. It was found that the movement of the design manifested as dynamically placed elements of the interior, the design of furniture, by creating lighting and effect of time. Types of movements were identified: Transforming (furniture of different functionality and equipment), compositional and dynamic (decorating, decoration), light (lumiere), prolonged exposure time (its effect on furnishings).

The dynamics of their compositional definition — attempts to create the impression of movement, provide internal dynamics, instabilities which can be achieved with the basic principles of composition.

Line is the main guiding speakers and one of the main elements of the composition. It sets the direction, balances, and moves as technically as possible.

Composition dynamic type of movement can be divided into two groups: the architectural features of the building and pure design approach. In the first group dynamics can achieve out by the use of the main element of movement constructing elements: staircases, windows, doorways, walls, columns. It is their dynamic arrangement of using rhythm, meter, asymmetry and shape will effect movement of the interior. The motion in the second group is achieved by means of established manufacturers, and their placement, the use of ornaments, décor, image textures.

Movement is achieved by a combination of decor that is possible in any form: static, dynamic, symmetric, asymmetric, with its placement relative to static elements. This type of motion allows you to access 2d graphics, which uses blurred, fuzzy image on the wallpaper, more literally perceived as a movement.

Use asymmetry in textiles — upholstery furniture, curtains, tulle, auxiliary geometric shapes that are repeated rhythmically perceived as a movement (Fig. 1).


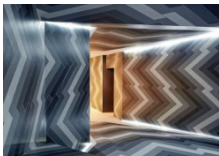

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|                   |   |                       |
| <p><i>Au Vieux Panier.</i><br/> <i>Architectural studio</i><br/> <i>AVExciters. Marsel.2012</i></p> | <p><i>PuLSaTe. Lily Jencks,</i><br/> <i>Nathanael Dorent. Capitol</i><br/> <i>Designer Studio. London.</i><br/> <i>2013</i></p> | <p><i>office Saatchi &amp; Saatchi.</i><br/> <i>Supermachine Studio.</i><br/> <i>Thailand. 2011</i></p> |

Figure. 1 - Possibility to use decor to create a movement

Light is an important factor in the creation of any interior. Natural light cannot be called simple static, because the Earth's rotation changes the angle of the sun's rays, which helps different lighting certain parts of the facility during the day. Due to this factor, areas of the interior think through in more detail. Interiors gothic astonishingly light and shadow, as the windows are large, have a typical form of arches strilchatoyi hromistkym pretty flaky, filigree decoration, and made stained glass technique — providing not only dynamic shadow form, but also color. These

technological features of nature can be successfully used to create motion. The falling shadow of any object will change its angle, creating a movement after a certain period of time, cyclical, circular motion.

The effect of movement can be created due to the help of artificial lighting. An example of this is a modern floodlight in clubs, bars and concert halls. Moving light flow can be directed in the right direction, at the right time and at the specified path.

Movement in industrial design can solve many unusual questions relating to configuration space; increase the functionality of the object, creating a new form, practicality and convenience.

Transformation passed from era to era, but was not always pronounced. Furniture-transformer became popular in the era of Louis XV, ie Rococo (Figure. 2).


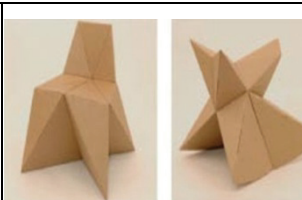
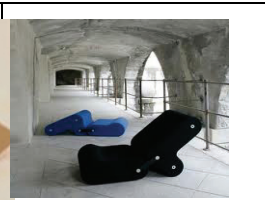
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| <p><i>Roger Venderkrus<br/>mechanical room. 1761</i></p>                          | <p><i>Nicola Enrico Shtoybli,<br/>Foldschool, 2007</i></p>                        | <p><i>Joe Colombo. Multichair.<br/>1969</i></p>                                   |

Figure. 2 - Furniture transformer

The Greeks invented the first furniture-transformers. It was a box that served its purpose and function of couch. In Kiev Rus because of the cold and a small area in which to live was created the prototype of the modern multilevel bed.

Transformation — is the ability to change the properties, shape, function. The design solution allows the use of minimum area for maximum capacity.

Transformers can be divided into certain groups according to the type of equipment; movement of such furniture can be varied, depending on the desires of the object, the direction of motion: vertical, horizontal, spiral. These driving directions were thought out in the early stages of development for more efficient perception of transformation. Also, the direction of motion is considered when setting function. If this is the bed that disappears into the wall, and simultaneously serves as a shelf, the best trajectory is vertical. Chairs, seats, sofas — practical will move horizontally and spirals, as well as shelves, cabinets.

This movement in the objects of the interior creates a more comfortable environment and is functionally advantageous proposal planning. Today transformers are beds, sofas, tables, seats, as it — integral part of any dwelling.

Transformation can be divided into three parts, and more to classify each of them. Complete transformation — is a change of one function to another. This transformation fundamentally changes the object and its shape. This type is most useful for non-standard solutions.

Partial transformation in turn divided into preparation and decomposition, moving elements, sliding system. This transformation is convenient with views of ergonomics.

Method of "compilation and expansion" does not change the function of the object. It complements and modifies the shape that improves it to another function, thereby changing the overall image and perception in general.

The method of "moving elements" could be attributed to any type of transformation, but it has more features and trajectories of movement, fewer prohibitions arising from general principles of arbitrary types of transformation. Random elements are moved only visually. Each part has its own technological singularity.

Extendable system transformations — is the easiest and used in society. It allows you to move only along a given trajectory, and given opportunities to: maximum permitted. This type is quite simple and effective. As transforming the body, it is well suited to the interior of any type.

The latter type of transformation — is arbitrary. It relies on the combinatorics — a flexible type of formation that is based on using some of the same elements, but in different combinations. This type can be divided into five more: the system blocks — creation of forms using the same moving parts; — interaction designer items only single junction; Changeling — repositioning of shape changing function; effect of creating dolls — closed forms, changing inside; mutual adhesion — free transformation, changing the position of the object in any position.

The movement exists in two forms: literal and figurative — direct conditional. The difference between them is the reaction rate of deformation. In the instant change of position, shape, size of object motion is perceived visually, that it is real, literal, and when the strain or meager changes occur during a period, a movement was visible or invisible at all. It can be analyzed only after examining the initial state.

A pattern exposure of time of materials in furniture and textiles can be selected by review in detail and examining the historical interiors.

Time also has a significant impact on the movement in the design. This is constant, gradual motion, the effect of which cannot be stopped, only to slow down knowing the technical features of the object. Having passed the test of time some precious materials have a higher value. Time in the context of motion design requires a separate study.

Conclusions It was found in the analyzed result of historical and modern interiors that the movement of the design manifested in dynamically placed elements of the interior, the design of furniture, in creating lighting and effect of time. Its specific criteria are expressiveness and abstraction. Types of movements were identified: transformed (furniture), compositional and dynamic (decoration), light (lumiere), prolonged effect of time (its effect on furnishings).

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## **SPECIAL FEATURES OF MODERN YACHT INTERIORS**

*Yacht interior design depends on the criteria provided by a customer. The form of yachts is taken into consideration and it is directly connected with the interior. It was found that the space organization depends on the architecture of the vessel and is formed due to its features. During the interior design stage technical premises are taken into account as well. Typical styles of the yacht design have been considered. Yacht furniture is classified according to various criteria. Preferably furniture items are fixed and heavyweight. Furnishings on board are created in a way that does not disturb the maximum physiological and psychological comfort of a person. Both the exterior and the interior of a yacht complement each other while creating a coherent composition that makes a vessel to be perceived in an aesthetic way.*

Setting a problem. Recently, a yacht is not only as a mean of transportation by sea, but simultaneously a place of living and a status statement of its owner. That is why this is a main reason for growing demand on yachts and their perfection of forms and technical facilities. Along with the above space planning and yacht design is being constantly improved. The interior is treated with much attention, because thanks to it a feeling of an enclosed space can be neutralized.

In Ukraine the yacht interior design is not given much attention to. This situation will change, in case the shipbuilding has been revived in the country. Then the demand on yachts will increase. This will enable local designers to develop and to find new opportunities for space designing of vessel interiors.

Analysis of recent researches. Yacht interiors were partly considered by Yudkyna Y.V. [7]. Her research can be used as a basis for studying the yachts, but only partly. The main attention was focused on designing small boats and powerboats with consideration of populated area and defining key dimensions. Also the interiors of yachts and their features were considered by Sharafutdinov G.R. [6]. In his research work he studied the influence of the yacht forms on their interiors and compared them to the interior of the living accommodation. His study does not reveal the main features of the interior of yachts, but it can be a base for further research. A marine boat, in particular yachts were considered by Pavlyhin E.D. [3]. He studied the characteristics and features of the vessel in general. Kasapenko D.V. in his study developed a model of a vessel "agent" with its "life cycle" reflecting its active "navigation existence" along with the ability to predict progress within the process of solving issues of collision avoidance [1]. In this research the technological features of the vessel, which influence the design of interior space, were described.

Setting the goals of the article: to analyze features of modern yacht interiors.

Main part. Within the article various modern interiors of yachts were considered. Eye-catching examples are the yacht "Venus", designed by the French yacht designer Philippe Starck on request of Steve Jobs, and the yacht "A", which

was designed by the same designer on request of Andriy Melnichenko (Germany, 2008); "Maltese Falcon" designed by Jerry Dyktran on request of the American millionaire Tom Perkins; the yacht "Twizzle" developed by Ed Dubois and set afloat by the well-known Dutch company "FEADSHIP".

To clarify the defining attributes of the yacht interiors 600 yachts were analyzed [5]. It was found, that the design primarily depends on the customer and on his/her preferences, and based on them each interior is going to be unique and individual.

When analyzing the interiors much attention was also paid to the forms of yachts. Their comparison showed that the generally used form of modern yachts is not developed and improved. It does not correspond to the solutions of the contemporary style. But there are also exceptions.

In shipbuilding industry the newest materials are applied. In modern world it allows to create boats in a non-standard format. Designers use unusual forms for yachts, but most of the projects keep being unfulfilled. A positive example is a yacht of Steve Jobs that was designed on his request by the French designer Philippe Starck in the Netherlands in 2012 (Figure 1).

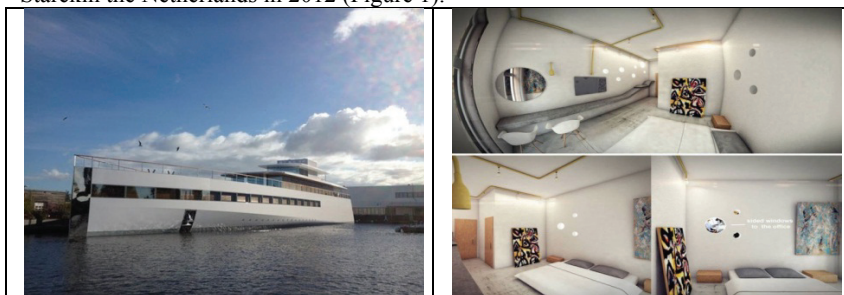


Figura 1. Yacht «Venus»

The form and the interior of the yacht are interconnected with each other. The internal space is formed due to the architectural features of the yacht. The vessel is divided by its height, width and length in a number of areas where the occupancy requirements, sanitary and hygienic norms and mechanisms are met and equipment and cargo are placed.

While designing the living spaces short and easy passages onto the lifeboat deck as well as possibly natural lighting and ventilation should be taken into account. Creating the yacht interior design general provisions shall be considered too. They relate to the technical space organization and depend on the architecture of the boat. The customer when buying a boat rather than ordering its design is limited by the fact that the space design must be chosen under the existing conditions. Companies producing yachts put them on sale already with the existing interior. And this makes a process of creating the individual interior more difficult.

Actually, there are no any basic design styles for yachts, but minimalism combined with reliability and performance can be identified as a priority one (44%). Currently, within the modern interiors of yachts minimalism is combined with high-tech style (11%). Minimalism is preferred much more often compared to the

classical style, which was a trend in 1990s of the twentieth century. (Figure 2). Typical features of the minimalism tend to be a reduction of the expressive means, use of spare space, simplicity and purity of lines. Furniture design combines the functionality with the ease of forms. In this style bright colors are used only as accents while the whole color range is aimed at relaxing.

Increasingly, designers, when designing yachts and their interiors, start to turn to such styles as deconstructionism, aerodynamic style and biomorphism. There are also elements of such styles as Art Nouveau, Rococo and Classicism.



Figure 2. Minimalism in modern yachts interior design

Modern designers while using the same style types try to bring something different from themselves due to applying unusual technologies and materials as well taking into consideration the client's wishes and, what is the most important, the form and the exterior of the yacht. It makes each interior different, more individual and personalized.

A typical feature of the yachts is that it must demonstrate some kind of luxury, splendor and elegance, but in the same time it shall meet all comfort, technical and technological requirements. Both outside and inside the boat has to be aesthetic. Its exterior and interior should complement rather than argue with each other as namely this contradiction can impair perception boat as a complete object. The yacht's exterior can be seen by the unlimited number of people, and the opportunity to get acquainted with the interior is provided to a limited number of persons who stay close to the yacht owner.

Philippe Starck successfully combined the exterior and the interior of the yacht "A". The exterior of this yacht differs from generally accepted standards, it has a sleek silhouette and remind military ships of the 20th century. It is known that such vessel's form is able to hew icebergs. The interior of the yacht is also not standard. The inside space of the boat is furnished in bright white color using brushed silver and tables made of crystal (Figure 3).

For the boat's interior decoration different elements for premise harmonization as well as creating a home atmosphere are used. The interior of the yacht reminds the the house furniture, because a person, who is inside, shall feel as comfortable as possible, and the long trips by sea shall not cause psychological and

physical discomfort. The space shall be zoned in different areas such as a bedroom, a galley, a dining room, a living room and so on.



Figure 3. Yacht «A»

When designing yachts the furniture are mainly tailor-made or produced by companies that make them specially for marine boats. Furniture used on yachts can be classified according to the following criteria: purpose, nature of production, type of material and the order of the mounting. Upon the use there facilities for residential, sanitary and hygienic, catering and servicing areas. Upon the nature of production there are standard manufactured and made by specialized companies ones. Various materials are used as follows: metal, wood, plastic, molded design made of fiberglass and mixed ones. Upon the mounting order furniture on the boat are of two types: non-removable, which include items permanently attached, and removable, which can be easily removed or moved. Furniture items need to be fixed as during sailing regardless of the weather conditions they shall not vibrate, hover and move. Also, to avoid this problem, furniture elements are made more lowly, stable and heavyweight. All this is provided in order to reduce the risk of injury.

In the interior of the yacht its space and a convenient passage are very important. Designers do their best to save area space, so furniture arrangement and facing are critical.

Materials aimed for the furnishing of yachts include different tree species, clothes, leather, alcantara, glass, artificial stones. It should be taken in mind that the materials shall be non-combustible, reliable in operation, water proof, high quality and durable. Use of the material also depends on the customer and the designer's intention. The analysis showed that designing the interior of yachts focuses on criteria of dividing the boat space, materials and installation.

Textiles are used both for decoration and turning elements which belong to the yacht saloons, as well as for making ornaments on the walls. For decorating the walls linen or silk are mostly chosen, for furniture – leather. Furniture and decorations inside the yacht are made of wood. Artificial stones are used in the design of the galley.

Another feature is the use of "overweight" interiors. In these interiors there are massive, overall furniture with wide armrests, frames and upholstery up to the floor. They are very popular in interior design of marine vessels, because they make passengers feel secure and safe.

The interiors of yachts the same colors are mostly used, they are as follows: brown — 23%, beige — 28%, white — 43%, grey — 15%. Selection of such color palette is used to create the most comfortable atmosphere on a yacht board. It is known, that brown color is a symbol of confidence, reliability and stability, it is a natural color representing the earth. Pastel light colors act in a relaxing and calming way. These are warm tints which let down blue colors of the sea. Being in the interiors colored in such way makes a person fully concentrated on relax. By choosing these colors for the interior of yachts a designer creates an environment for complete relaxation of the customer (Figure 4).



Figure 4. Color combinations in the interiors of yachts

The analysis showed that insignificant attention is paid to gardening on the yachts. Mostly there are artificial plants or there are no plants at all. Caring for living plants is deemed to be a problem, since the owner is not always on board. On the yacht people spend not many days far away from the earth and during these days the psychological state stays normal.

**Conclusions.** Typical features of the yacht interiors completely depend on the form of the boat and its customer. There are characteristics as follows: space zoning, certain color palette (brown, beige, white and grey colors that have a calming effect), the advantage of smooth lines, heavyweight furniture, using of strong and resistant material. The yacht design is diverse and unique. It combines yacht design factors such as comfort, aesthetics and safety.

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## **THEORETICAL MODELING AS A RESEARCH METHOD OF A RELAXATION CENTER AT THE AIRPORT**

*The article considers the modeling of the features the relaxation center for airport users. Using the comparison of several definitions provided by different authors was analyzed the importance of this method for studying the organization of the center, which allows to examine options the architectural and planning organization, without causing difficulties in transit.*

**Problem setting.** Modern living standards that force each year to improve the quality of service especially in large transport entities, raises problems in providing comfort to travelers, but also ensuring the necessary form of recreation of workers. To date, unfortunately, overcrowded airports, not enough seats, chairs are uncomfortable lounges not easily accessible, nowhere to relax. Thus, the problem of rest and relaxation at the airport remains open and it consists in the necessity create an appropriate environment, both internal and external, to perform all the necessary functions. The opportunities should be found resolve this issue, which would provide all the needs of users at the same time perform an aesthetic function and offer to visitors a varied range of services, but do not create discomfort transit routes. The airport system must include completely new architectural unit which can provide all functions that contribute to optimize work and rest periods, will help reduce the number of physical and mental stress, both workers and passengers.

In this question modeling can be very useful, as it contains a multiply solutions to every situation. As scientific study of this issue is not paid enough attention, and it is not studied from an architectural point of view, this issue is very important.

**The analysis of researches and publications.** In the general scientific literature reviews several concepts of model, but the most complete definition gives V. Stoff in his book "Modeling and philosophy." Under the model he understands represented mentally or financially implemented system that shows or reproduce object of study, capable of being displaced it so that its study gives us new information about this property.[6]

N. Romanchikov treated modeling as a theoretical method for the study of various phenomena and processes of the frame with the help of their real (physical) or ideal (symbolic, mathematical) models. With the help of the simulation describes the structure of the object (static model); process of its functioning and development (dynamic model).[10]

Towards a classification of models appeals B. Hlynskyi in his book "Modeling as a method of scientific research", where along with the usual division models in the way they implement, and they are divided in character to the sides of the original.[5]



Modeling was also reviewed by A. Konverskyi as a method of investigation of objects in their models. By the nature of the models he singled material (objective) and perfect modeling, expressed in the appropriate symbolic form. [8]

On issues of modeling in architecture worked K. Kiyanencko - social modeling of houses; O. Smolenska - modeling of open architectural spaces in the urban environment; M. Zbova - three-dimensional modeling of the main types of physical culture and sports complexes; T. Zadvoryanska developed different models for organizing recreational areas in the structure of the coastal areas of large cities. [9]

**The purpose of the article.** Its purpose is to determine the role of modeling to create architectural planning of the center of relaxation at the airport based on a functional, urban planning and analysis of existing facilities and their improvement.

**The basic part.** The term “modeling” means study objects using their models. In a broader sense, it is understood as a process of modeling, which includes not only research, but also the development of the model.[7]

The method of modeling is how to create a model of the phenomenon under study. In some research models for are understood as certain material analogues which may give an idea about the object, in other - models take the form of a certain description of phenomena by means of a language. In modern conditions, research models can be divided into two groups: physical and mental, and material model is actually implemented by the device, a simplified and modified copies scale natural object modeled. In other cases, it is an analog model based on the same mathematical description of various phenomena.

Modeling do the following functions:

- 1) is in accordance with the specific object of study, as it is much easier;
- 2) replaces object under study in a certain way;
- 3) capable of providing direct and indirect information about the original.

This method is indispensable especially in cases where the real object is not available for study, or his immediate research entail unpredictable consequences, which may lead to undesirable changes. Yet it has enough abstract and schematic knowledge of relevant research facility.[2]

Model - it is also a material or ideal system, which under certain conditions can replace the original object and is used to obtain information about the object-original and (or) other objects associated with it.

It is possible to list specific cases in which the model are required:

- As the original object is a complex system that is difficult to study directly, it is impossible or uneconomical;
- Like a direct experimentation with the original subject could have a devastating impact on him or other objects associated with it;
- When you need to predict the possible state or behavior of the object in the future;
- As a need to develop alternatives and select optimal solutions associated with the operation of the original object;
- Like the original object does not exist in material form, but already in the design phase is required to provide information about this property, evaluate the effectiveness of selected methods and means of development;

- When in practice it is necessary to a simplified representation of the original object information to support the information of people working with him;
- Work at training with a simulated system, etc.

To perform its functions, the model must meet two basic requirements: be simple enough that unlike the original, it could be explored, experiment with it; be similar to the original object, with the necessary completeness reproduce its properties.[9]

That is why the model is indeed necessary to consider such a complex object in terms of its connections with the system - the airport. Construction of the system model is based on the synthesis of different system views. For specific tasks can be used and theoretical system models.[1]

The model is a artificial object that reflects the functional structure and behavior of the real system under investigation - relaxation center. For its simulation are important functional features of processes that create architectural environment.[3]

Because the compilation of architectural and planning structure consists of a situation analysis (comprehensive diagnose problems and to clearly define their source and nature), as well as finding and developing possible solutions of the problem, taking into account available resources and evaluate the possible consequences of each option, modeling just satisfies all these requirements.[4]

So it is needed to conduct modeling of the center of relaxation according to the main functional and planning characteristics.

Functioning of this type of relaxation center largely depends on placement. That is what will determine the types of recreation of workers from work, rehabilitation of physical and psychological capabilities, comfort stay of other users. Center may be in the space of the airport system, outside its territory, as well as a separate unit in the city environment. This is determined by the needs of each transit node, its size and throughput. As an example, we can consider the urban modeling (Pic.1).

Each model of the relaxation center has its own specific advantages and disadvantages of placement. Therefore, projecting it into the airport system should be considered the specific conditions that match a given situation and functionally fit to transportation hub depending on the country, the needs of the population and of passenger traffic. To make the most of functions of the center of the relaxation, it can be used some of the solutions to problems that arise when constructing it in a particular position.

Thus, by modeling it was determined urban features of center's accommodation. Based on the identified results it is possible to identify further characteristics of building with use of various types of functional models and planning organization. These models will be useful to formulate the requirements for architectural and planning structure of the relaxation center at the airport.

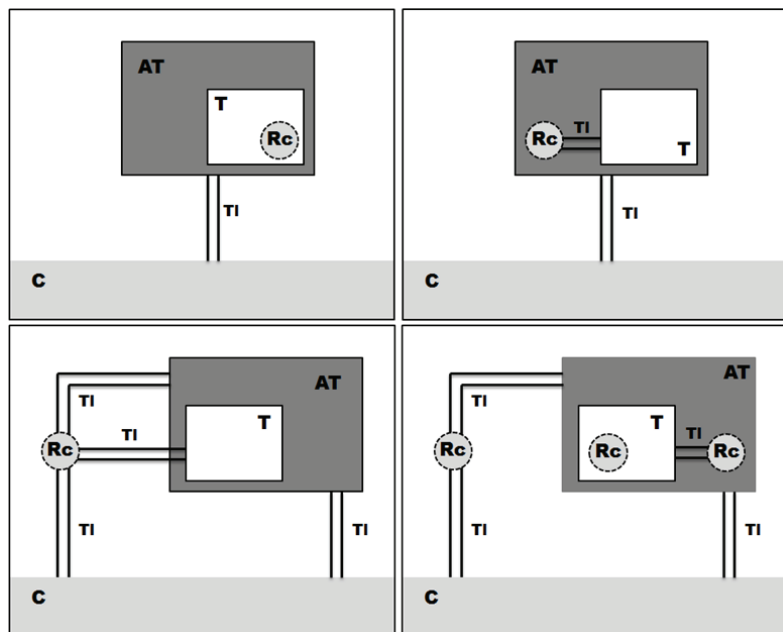


Fig.1 Urban modeling.

TA – territory of the airport; T – terminal of the airport; Rc – relaxation center; TI – transport links; C – city.

## Conclusions

Specialized multi-functional relaxation center for employees and visitors of the airport will not only provide proper rest, but will also reduce the risk of human factor influence on flight safety. Thus, we can achieve a higher level of the number of passengers at the airports, as well as provide avoid stressful situations. The analysis of the current state of the airport and examples of international practice shows that there are a number of problems that can be solved using modeling to ensure complete functionality, solve the lack of employment during transit, recreation and stress relief.

The combination of variety decisions of accessibility and of separateness functions of the multifunctional center of relaxation, as well as placing it in the airport environment will create a comfortable space to stay and meet the needs of all categories. So there is a need to create multiple models, which further define the necessary requirements for the organization of the centers.

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## FEATURES OF THE FORMATION OF FIRST-AID MEDICAL CENTERS WITH USING AIR AMBULANCE

*The prospect of creation of specialized much type medical establishment was considered in the structure of first-aid which would allow to modernize the system of giving first medical aid, undertaking the row of functions of the specialized setting.*

**Statement of the problem.** The problem of modernization and obsolescence socially important objects to which the medical center is quite relevant. Of particular urgency architectural spatial organization of health facilities takes in the context of the national project of economic reform program for 2011-2014 "Prosperous Society, Competitive Economy, Effective State" .

In every country of the world the problem of how to provide emergency medical care is quite relevant. It is a primary obligation and it is in the priorities of governments. Ukraine is no exception.

Dynamics of deaths in Ukraine from external causes in 2008 was 131.5 per 100 thousand population, and it is one of the most relevant indicators among other countries. In absolute numbers this is 60760 persons:

- 24% of people die in hospitals;
- 76% - died in the prehospital phase.

Currently there is separation of health care by providing medical care, as a result, singled out primary, secondary and tertiary health care facilities and palliative care facilities and health care facilities nationwide system of emergency medical care. This upgrade has enabled a new way to consider the organization and gave promising ways of architectural and spatial organization of medical centers using air ambulance.

Air ambulance as a system implementation of health care is extremely important link in the system reform, but the current state and future development allows it to be desired, but predicted the inevitable progress of history .

In the process of modernization of the national health system for introducing air ambulance service in emergency medical care as a result of modernization and architectural and spatial organization of the health institution is sufficiently important factor for further investigation and search options for solutions. Question architectural and spatial organization of the medical center at present highly relevant to cities in Ukraine because of worsening socio-economic, demographic, urban problems.

**The main part.** Reforming the health care system in Ukraine is one of the priorities of modern social policy and an integral part of the socio-economic transformation of the Ukrainian state. Currently there is divergence in the health system at primary, secondary, tertiary medical care and emergency medical care.

Organization of emergency medical care by creating in every region of emergency medical assistance consisting of emergency center health care and emergency medicine, emergency stations (emergency) medical care, emergency crews (emergency) medical care and emergency departments (emergency) medical care.

Planning, management, organization and financing of health care are held by administrative and economic distribution, which does not provide equal health care in each administrative area in the view of the fact that they are different in size, number and density of settlement. The uneven development of material and technical base of health facilities and lack of advanced placement schemes for health care institutions adversely affect the condition and development of the network as a whole. [1]

First-aid medical centers with using air ambulance is a specialized multidisciplinary institution combined with the Emergency Medical Services are undergoing treatment and survivors of acute illnesses and injuries. It is a transitional link between the hospital and the hospital stage, thereby reducing the concentration of flux "emergency" patients at the hospital.

The main objective of health care - is to provide skilled care, maintenance of vital functions and human health.

Defining the main functions and tasks enables us to organize the structure of the medical center, taking into account the specific features that set ourselves this type of establishment. Providing comprehensive and timely realization of these tasks should be a basic requirement in the development of medical center structure, and the resulting design is functionally organized medical center environment.

Defining functions and tasks of the emergency medical center, we can assume that its structure is similar to the structure of plants, hospitals, ambulances, but have a number of separate specialized departments and facilities that are designed specifically for use in the structure of the air ambulance medical center.

Examining the structure of plants and hospital emergency room, it was found that the structure Medical Center includes four main divisions: the hospital with specialized departments and offices, organizational-methodological department, administrative department, DPT.

1. Full-time department with specialized departments and offices include: Foster diagnostic department of reference and information service; Specialized medical departments (surgical, pediatric, etc.) Autopsy department;

The main task of a hospital with specialized departments and offices are welcome referrals and diagnosis of patients and survivors, providing emergency medical care to the affected population.

2. Coordination and dispatching service (CDS). The main task of the creation of coordination – dispatching Service (CDS) is the organization at present and coordinate emergency medical care in the field of provision of timely qualified and specialized emergency medical care.

Problems CDS: centralized management, reducing unwarranted challenges, improving the quality of the care, reducing the time of arrival crews, automation and processing challenges at all levels.

3. Organizational and methodological section includes the Operations Division and the Department of hospital

lization.

Operations Division incorporates three departments: receiving, sending department, department of information. Department receiving calls - provides clear and timely reception of calls from the public and medical professionals call the city "03" timely transfer of information in emergency situations in the parent organization, law enforcement, fire service and other emergency services of the city. [4] Department referral must be provided an automatic call, which will provide timely referrals away by ambulance for making calls with regard to 15 - minute availability [4]. department of Information - allows a database to the information and form a daily summary of the work station emergency, as well as information about the visits by ambulance to accidents and perform timely transfer of information in the Bureau of accidents [4].

The Operations Division provides information: the city's population; sanitary-epidemiological station; regular emergency rescue services of the city; police.

Department of hospitalization. Department of hospitalization is a subdivision of emergency medical aid station, which provides round the clock, every day of the week, the flow of the sick and injured in hospitals of the city. The Department includes: emergency hospitalization sector, sector planning and admission control inspectors sector. The main objective of the department of hospitalization - even distribution of flows sick and injured in hospitals and control over the implementation of the established order of admission.

Emergency hospitalization sector - organize a uniform distribution of flow of emergency patients at the request of ambulance, emergency department physicians in clinics and doctor-patient - polyclinic establishments in regular hospitals of the city, according to the profile of the disease and evidence for an emergency hospitalization, support reliable communication from hospital city on matters of hospitalization.

Sector planned hospitalization - implementing a planned admission to specialized departments of hospitals, transfer of patients for medical tests, from hospital to hospital, is the daily and monthly counts of congestion "hospital bed" mesh hospitals and availability.

Sector inspectors Control - controls the execution according to the manner of hospitalization and the validity of the relevant documentation in the direction of patients to the hospital and confirmed in hospital [4].

4. Services Office. It includes specialized facilities for the organization of the medical center (head doctor, educational and research facilities, catering facilities, etc.)

Defining functional and spatial structure of medical center, the main problem posed by a given type of establishment we proposed to organize the division of medical center in some architectural and spatial module (ASM), which are combined with each other functionally and communication transitions.

Modular Architecture and spatial organization based on the separation of identical functions Medical Center and implement them in separate modules of the nature of problems:

The result obtained three ASM:

-Medical - implemented to provide medical assistance to victims and victims of medical modules in various fields.

-administration - a group of buildings on the implementation and realization of functioning medical center (dispatching, radiopost, lounges maintenance personnel, accounting, medical records, etc);

-communication - vertical and horizontal communication, which are ways of taking patients and access to certain modules.

This arrangement has the following advantages:

1. Allows different urban situations, apply the appropriate combination of modules for the criteria put forward by (output of establishment, specialization, load, current development, social demand, etc.); 2. Speed of delivery of the victims and survivors to provide appropriate emergency care; 3. Rational functional organization; 4. Distinction flows of groups of people sick staff, visitors,

As a result, proposed various kinds of medical center (Total ASM) depending on the urban setting, power institutions, profile, the number of patients per year of service and other factors.

## **Conclusions**

This article deals with the problem of modernization and obsolescence of facilities providing emergency medical care. There was the problem of having to create emergency medical center using air ambulance, research and defined the basic functions and structure of the medical center, which affects its architectural and spatial organization. The solution to this problem, as the options offered by the application of the principle of modular organization, which requires a more detailed analysis and further study.

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## TAWNING COVERS AS MEANS OF FORMATION OF ARCHITECTURAL EXPRESSIVENESS OF AIRPORTS

*Airport complexes are considered, where a part of long span premises is covered by awning covers. In Ukraine, it is proposed use awning covers for buildings and structures that are to become composition components in developing the airport building.*

Airport complexes as integral parts of complex dynamic systems (airports) are samples of innovative searches for image and artistic expression of architecture of public buildings.

Modern airport complexes are primarily an effective organization of technological processes that provides comfortable stay and quality of service of multi-million passenger flows; secondly, they present a dizzying geometry of volumes filled with light, vegetation, art objects, cultural initiatives etc., which gives airports a unique architectural expression [1, 2].

A special place in global practice of airport building belongs to complexes, in which a part of long span premises is covered by awnings with complex geometric shapes (Figure 1). By virtue of originality of the created curved surfaces of negative Gaussian curvature, awning covers, in most cases, are the center of the architectural composition (Figure 1d). The most popular is the "pseudoconic" hip form of the cover with a central pillar. In this case, the central support can be arranged via a traditional compressed internal structure (Figure 2), or suspending this highest point of the cover using a rope system attached to the external supports outside the lower contour of the tent (Figure 1, a-c). The polygonal shape of the cover is achieved by bringing several different top points on levels different by height (Figure 1, e).

Folded surface or combinations of «pseudoconic» hip and folded forms (Figure 1c) are used to cover linearly extended objects.

Overlapping of open spaces is provided by a set of modules having similar designs, the number of which depends on the size of the overlapping area - waiting areas (5 blocks of 21 modules with a total area of 495 thousand m<sup>2</sup>, Hajj terminal, Jeddah airport, Saudi Arabia, Figure 1, a), flyovers of the entrance and transport stops (27 modules, Denver airport, USA) etc.

Expressiveness of architectural images of airport terminals is largely attributable to a significant shape-generating potential of high-duty synthetic material, as well as technological and design-engineering solutions. The choice of the cover shape is primarily dictated by:

- **climatic conditions in the construction areas** (hot climate: the Arabian Peninsula, the Sinai Peninsula; semi-arid, continental climate: Colorado, USA; Mediterranean, Turkey);

- **natural surroundings** (high sandstone mountains towering in the midst of

rocky deserts: Arabia and the Sinai Peninsula; snowy peaks of the Rocky Mountains and Great Plains of Denver, Colorado, USA).



a)



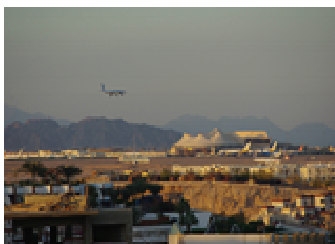
b)



c)



d)



e)



f)

Figure 1. Airports with awning covers: a, b - Jeddah, Saudi Arabia; c, d - Denver, Colorado, USA; e - Sharm el-Sheikh, Egypt, f - Antalya, Turkey

The influence of national traditions in the construction area is also important. The realized objects show images of:

- **tents** – Bedouins' camp shelters (Figure 1, a, e);
- **Cheyennes' encampments**, which located many traditional portable dwellings - teepees (Figure 1c).

The shape of the cover can reduce the level of exposure to the sun on the building, provide natural ventilation of the covered volume, and the material (PVC fabrics, PTFE-, ETFE-films) - reflect heat rays of the sun, transmit and dissipate daylight [3].

These covers are placed above the premises hosting large numbers of people due to the maintenance technology: waiting rooms, receptions and baggage handling rooms, etc. Considerable height of the premises enables to reduce the influence of thermal radiation of the heated ceiling perceived by man, as well as to decrease the concentration of carbon dioxide and water vapor, additional heat buildup from people.

Air exchange in airport terminals in hot climates is a powerful tool to improve thermal comfort when staying in buildings.

Translucent materials are widely used by architects to illuminate interior spaces, and in the evening and night - to light up facades.

Properties of synthetic covers enable not only to realize original ideas, but also to create high performance objects, including:

- minimum unit cost of materials;
- fast assembly and disassembly technology;
- ease of transformation etc.

High degree of maintainability of the tent construction should also be noted. This is confirmed by a surprisingly short time of reconstruction of Sharm el-Sheikh terminal destroyed by a hurricane in January 2010.

Constructive systems of awning coverings are also actively involved in space-planning and architectural design of overlapped volumes (Figure 1, a, b, d, 2). Systems may have a support frame with high external supports (Figure 1b).

Spatial framings of tent coverings implemented in Sharm el-Sheikh, Denver, Antalya terminals are located within the covered premises, are open for overview and are an integral part of interior solutions (Figure 2).

Half a century of experience in building and reconstruction of airport terminals in Ukraine suggests that traditional building materials were brick, concrete, metal, glass. This is primarily motivated by temperate continental climate with distinct seasons, except for the south coast of the Crimea where the climate is subtropical; and operational requirements to airports - objects of III-V complexity categories, where disruption or damage to structures can lead to significant consequences [4].

Modern airports which implement in their operation the concept of «city airport» provide a range of non-aviation services on a commercial basis [5]. This involves not only the existing areas and volumes, but also specially created zones in the airports or adjacent areas. As a result, multi-functional transport companies (airports) are transformed into formations with signs of urban settlements, where the technological and functional architectural design must meet modern requirements to

urbanized areas.

New buildings and facilities (logistics centers, warehouses, hotels, shopping and entertainment complexes, parking, etc.) should be compositional components of the existing building of the airport. At the same time, some of them must have multifunction free planning, be built with the use of fast-assemble structures, as well as enable transformation and rapid dismantling.



a)



b)



c)



d)

Figure 2. Fragments of constructive solutions of the awning covering in Sharm el-Sheikh airport, January 2010 (a, b, c); Antalya airport, Turkey, January 2011 (d)

The use of awning covers of various geometric shapes and colors to overlap open structures can solve the problem of unification of different purpose objects in a single ensemble. In this case, a shift of emphasis of perception may accentuate functionally important sites. Awning covers can change the shape in time depending on the proposed events (anniversaries, industry events, etc.).

Developing airports should not only become successful enterprises, but also be attractive for life activities.

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## **METHODOLOGICAL APPROACH TO SCIENTIFIC RESEARCH IN ARCHITECTURAL SPACE AT THE EXAMPLE OF OCTAGONAL CONSTRUCTIONS**

*The article reviews the principles, the methods and the instruments of the scientific research in architectural constructions at the example of theorization of a scientific research to study an octagonal architectural space.*

Traditionally architectural design of a dwelling site in a scientific context is interpreted as a material-special architectural form created for certain needs of a client. The up-to-date scenario in the sphere of scientific cognition allows to state that this oversimplification requires a development and a theoretical justification of a fundamentally new perception of a process and of creation of a more profound comprehension of a research method for architectural design as a part of establishing connections between different types of a scientific thought.

Presentation of the range of problems in the scientific paper is linked to the performance of the tasks which leads to the resolution of a problem in the framework of a system revealing contradictions at different levels of an academic and empirical scientific thought where the object of an engineering architectural research is opposed to its subject [5;4].

**Significance of researching** the academic models of architectural space constitute the target steering mechanism of scientific thought as a proficient potential of architectural perspective, and in this case all the phases of a research represent both a separately created techniques for studying any architectural object and a complex paradigm in the process of studying an octagonal form.

The recent developments in the system of general scientific knowledge have been done by such scientists as Anufriev A.F, Kanke V.A., Yaskevich Ya.S. In the sphere of architecture such architectural theorists as Bglukha M.T [1], Lavrik G.I. [2], Pustynnik E.I., [3], Ruzavin G.I. [4], Savchenko M.R. [5] are occupied with studying a scientific universal. None of the mentioned above authors have offered a complex solution which could become a universal academic approach to research architectural constructions. Consequently **the goal** of the development of a scientific methodology for studying octagonal constructions is a set of internal and external factors becoming apparent in a complex of scientific methods and their interrelations serving as means for achieving a scientific perception of an architectural construction.

The direct **task** of the architectural thought becomes an immediate comprehension and an adequate evaluation based on scientific research for an architectural object.

In the process of a scientific cognition of octagonal constructions the following three main phases can be outlined:

- the first phase is “meditative” – watching an object, as a phase it does not form any scientific knowledge but is the most important for accumulation of information and observing a range of problems.

- the second phase is “systemic” – the phase starts at the moment when the information requires certain arrangement and definition of goals.

- the third phase is “algorithmic” – creation of certain approaches to find dialectic relations which could assist in making conclusions based on the systematized knowledge.

The means for studying the octagonal constructions are the techniques of methodological approaches which characterize the lines of logic transitions while establishing interrelations between scientific phases. Such means are the following:

- methodology – the main interrelations and chains of logic transitions are established in it;

- the system of methodological approaches – characterizes the main measures in studying octagonal houses and differentiates these approaches by levels;

- a processing unit of a research - allows for outlining the main methods and techniques at different phases of resolving the set goals.

The procedure of a research is a relation between a scientific research based on set goals and tasks and a range of problems at the level of a philosophical modelling of a situation. The lines of the phases are determined by the relations which characterize the importance of a task set, expediency of a research based on the established relations. The system of relations allows for prioritization of the studied phases and for defining the levels of significance of the phases in the process of a research. The relations are characterized as the following: steady, conservative not requiring additional definitions - fundamental. The lines which create mutually subsequent equal relations are functional. The relations which are typical for a conflict and accord of extremes and requiring the intellectual and dialogic support are dialectic. The lines of relations beyond physical parameters and based on the insight hypothetical approach are metaphysical.

A research structure creates a system of methodological approaches which in its turn is formed based on the step-by-step mutual relations between the reverse lines of brainwork stemming from the four levels of cognition, namely:

A general philosophical level is formed by a philosophical and a psychological method of studying a range of problems in octagonal constructions. These methods are determined by the necessity to introduce critical goals of a research to a scientific work, to define the frames and levels of a processing unit.

A general logic level is a structural content of the process of thinking and is created to be a dialectic part of a research.

A theoretical (academic) level makes formal models for studying octagonal forms in different situations and is the instruments of a problematic task.

An empiric level is a set of means allowing certain ways of checking, disproving, confirming the conclusions made at all the previous phases, or providing the ground for theoretical (academic), logical or philosophical apprehension.

The technological unit of a research is based on a logical modelling and projection in the context of the goals and the range of problems of an octagonal dwelling site. The technique created by the author in the framework of this scientific work can form the main projection line for studying octagonal objects with the help of the chosen approaches and of the main characteristics determining the significance of an octagonal construction in formation of an ecological low-rise site development. The priority lines of interrelations create a conventional significance of a certain tendency in a research and characterize the methods and means of studying of an octagonal house. The technique of the methods affects the analysis of the parts of the scientific work where theoretically there are chains of logical steps created and presented the methods of an analytical resolution by means of the mentioned above approaches. Each of the approaches forms a conclusion or an action which is a logical continuation of the previous conclusion or an action as a result of applying another approach, and the methodology of approaches is created by step-by-step synchronization of a method and its role in the research.

In that way the author has created some margins for formation of methodological approaches in a scientific research. Formation of the margins between the methods gives an opportunity for a step-by-step resolution of tasks set in the research work, nevertheless the margins create only a conventional division confirming in that way the reversal nature of the lines of thinking allowing for both a direct and a reverse structuring between the lines of these relations. The basis of researches as a base for movement of parity directions created functional reversal correlations between the dialectic parts which in its turn has allowed creation of a research procedure and systematization of the methods and approaches applied in studying octagonal dwelling houses. The pool of approaches creates consistent directions in studying octagonal constructions from different aspects of the author's perspective: philosophical, psychological, logical, theoretical and empirical. Each of the units of the research opens a perspective perception of the studied range of problems, and can both individually and together with other units create a chain of logical mutually transitional conclusions.

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## **EFFECTIVENESS OF THE BUFER ZONE**

*Effective functioning of the buffer zone of communication between an architect, a manager and a customer is ensured by creating initial comfortable conditions for a proper dialogue by means of appropriate equipment and design including creation of a footage out of whole of the palette of psychological types: "Creators", "Pragmatists", "Intellectuals" and "Dreamers".*

A buffer zone is an area which is meant to ensure an effective communication between an architect-practitioner and a customer representing a wide range of psychological types. Since a project and its implementation are the main result of architectural activity, the most convincing argument is photographic images from nature. And such footage is supposed to represent different psychological types. It becomes of special importance when an individual dwelling house is considered as an object of a contract since it requires the most possible consideration of the personal preferences of a customer in terms of images and sensuality and functionality. Whether a bargain (a deal) takes place at all depends on whether a customer sees in the exposition presented to him "his" version of interpretation of an architectural object and of space arrangement. Consequently an expository range should be properly segmented and each the psychological types not only represented but also outlined and accentuated (by means of the range of colors typical for a type, accessories, and a way of arrangement). In this case it is also important, for example, in which frame the exposition is represented, from what material the frame is made, its structure.

One of the main parts of the buffer zone should be an image-making and representative one where the diplomas, certificates, awards issued to the firm and authors of developments are located. The representative part affects different psychological types differently: for "pragmatists", for example, it is a significant argument while for "creators" – not very much, but its presence is obligatory because it testifies for the actual accomplishments of a firm, a studio, an architect, and works for their image.

In the buffer zone there can be also a screen for demonstration of video presentations when there are discussions about projects or there is a dialogue with a customer.

Architectural space of the buffer zone can be created in different ways depending on the creativity preferences of a director of a firm/ a studio, his/her psychological setting.

According to the existing classification of the types of architect managers (by Yasinskiy M.) there are five categories currently working in Ukraine: 1." Architect on Sale", 2."Substitute Mother", 3."White Dove", 4."Satrap", 5-"Commercial Diplomat"[1 ].

The architectural and design arrangement of the area of the buffer zone by architect managers of the "Architect on Sale" type as well as their principles of "omnivorous" work aimed at getting money are built exclusively on the advertising basis using brutal and grotesque techniques and effects (going on the leash of a customer they violate the normative requirements, moral and aesthetic principles in order to get a

contract).

As far as this psychological type of architect managers is negative and temporally occupies a market niche due to the freedom of administrative and economic mayhem which will be liquidated in the nearest future I believe it is not expedient to review it in this research work.

The psychological type of architect managers “Substitute Mother” takes care of the quality of his/her project, its implementation hence they require a necessary diligence and quality decision making from the project performers.

The architectural and design arrangement of the area of this buffer zone should be well-disposed, clearly segmented and aesthetically rich. Usually such managers prefer to work with a customer in their offices or in a special hall, sometimes in a reception area. In the first case their office turns into the buffer zone and is formed in a quietly reserved manner, the exposition part is located on the longitudinal wall, and the side wall serves as “an image-making” one.

When locating the buffer zone in a recreational area or a hall the issues of its functional segmenting, emotional and aesthetic enrichment are up to the preferences of a manager but at the same time the principles of a complex representation of all the kinds of customers psychological types as well as of the balanced arrangement of space should not be violated. It is desirable to make provision for a comfortable corner to communicate with a customer and ensure his observance of all the exposition from that place. Drawing a customer’s attention to certain objects, fragments of the exposition line can be done during the communication itself. An architect should preliminary find out to which psychological type his/her current customer belongs.

Formation of the buffer zone by the “White Dove” psychological type which follows the pure creativity principles, nurtures image ideas of a construction and space, is done rigidly in compliance with the laws of harmony, aesthetic adequacy and functional expediency.

The main peculiarity of arrangement of the architectural area of this buffer zone is about necessity to accentuate the economic expediency in project decision making because now an architect has to deal with mainly stiff businessmen, pragmatic and quasi-educated executives, rationalist-managers whose down to earth pragmatism is their life suggestion.

The architectural and design arrangement of the area of the buffer zone by the “Satrap” psychological type which follows drastic, authoritarian methods of organizing the process of projection and execution is done by similar principles, namely, outlining the central axis of symmetry, compositional coherence of all the elements with the main one which in this case is the image-making part of the expositional line.

The psychological type of architect managers of “Commercial diplomat” is a highly educated, experienced architect with a significant creative potential who achieves compromises though is ready to sacrifice the image and aesthetic features of a building, or of a space arranged for the sake of making a deal. Due to this fact the architectural and design arrangement of the area of the buffer zone by this psychological type should be based on the principle of a dynamic balance, dissymmetry and have an exquisite aesthetic enrichment. Since this type of managers in their work with customers apply quite flexible psychological techniques, it is necessary to make provision for elegant but comfortable furniture in the area of his/her communication with a customer. Such furniture should

easily transform ensuring in that way democratic ways of communication.

It worth of saying that the mentioned above types of architect management develop in the changing social and economic environment and in the nearest future should be exposed to significant changes due to the upcoming process of harmonization of the social relations provoked by the “Euromaidan”. First of all as it has been already mentioned before the type of “Architect on Sale” as a rudiment will disappear completely. The “Substitute Mother” type will transform into a “United family” and “Satrap” into a “Harmonious Rapport”. In that way there will be four main psychological types corresponding with the types of nature power (Fire, Earth, Air, Water) and aezo psychological types of “Creators”, “Pragmatists”, “Intellectuals” and “Dreamers”.

The profession of an architect manager implies certain requirements and first of all the ability to not just professionally correctly communicate your thoughts but to do it with the necessary conceptual and emotional accents depending on the psychological and physiological peculiarities of a customer, his/her aesthetic preferences, psychological type.

For example for “pragmatists” it is necessary to make accent on expediency of the proposed solutions, their economic advantages, while for “dreamers” it is important to make accent on the emotional integral parts of the project, its image and aesthetic features such as design, colors solutions. These integral parts should be smoothly integrated into the special environment of an object, be its indispensable part, so it means that for each of the psychological types there should be selected a palette of appropriate solutions for a preferred type of a construction no matter whether it is an individual dwelling house, or an office, or a restaurant. If the image melody of the construction or of the space sounds in a customer’s mind as his/her own one then the deal and further cooperation will take place [2].

So the effective functioning of the buffer zone of communication between an architect, a manager and a customer is mainly dependent on its being comfortable ensuring in that way the proper perception of all the “seen and heard” by a customer, manager’s “hitting” the core of the problem under review and a successful completion of a dialogue.

To achieve this goal the buffer zone should be appropriately equipped and designed. The main integral part of an exposition is a footage of a project developments and photograph images from nature, of the objects interesting for a customer, and should represent the whole of the palette of the psychological types, namely: “Creators”, “Pragmatists”, “Intellectuals” and “Dreamers”

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## **IMPROVEMENT OF MANAGEMENT DEVELOPMENT OF AIRPORT INFRASTRUCTURE**

*This work defines the economic structure of management the airport activities, considers the preconditions improving the management of the regional airport infrastructure. On the analysis base of such management functions as planning there were defined narrow sides and perspectives of improving the management of airport infrastructure based on project management.*

Transition to a new qualitative and quantitative management airport development level requires rethinking of the airport management in the new realities. First of all, one needs to take into account changes of a global character - within the context of the European choice of liberal model of economic development the demand of international and regional producers on the transfers of goods and passengers, on logistics and warehousing services will increase. Secondly, China's experience of coming out from the global economic crisis 2009-2011 showed that the huge potential for economic development is in the internal market of goods and services. In the context of the research it means that in the country there is practically an undeveloped network of intra-regional passenger and cargo transportations. The problem of regional airports and inter-regional traffic will obviously be one of the important components of the economy over the next 20 years. Thirdly, the subjects of air transport and servicing enterprises of the industry sector must already introduce all the available and necessary changes: the transition to the system of quality control management that allows market identification of the producer services in the world as equal one among equals; it is the introduction of elements of crisis management and minimization of political and market risks. Fourthly, it is the change of approach to business management - from traditional post-Soviet system of cost management - to process-oriented budgeting, outsourcing, management by objectives, requiring new quality planning, the control of financial flows, investment resources management and so on.

In the economic literature dealing with the problems of improvement management of airport enterprise, the vast majority of research concerns the interaction management of the airport, the airfield and the airline [1], justifying the use of a certain model of management, consideration of management principles – A.A. Korohodova [1], adaptation of international quality management system requirements to domestic enterprises [3], the effectiveness of management – L.M. Khristenko [4], G.A. Dudkalo [5] and others.

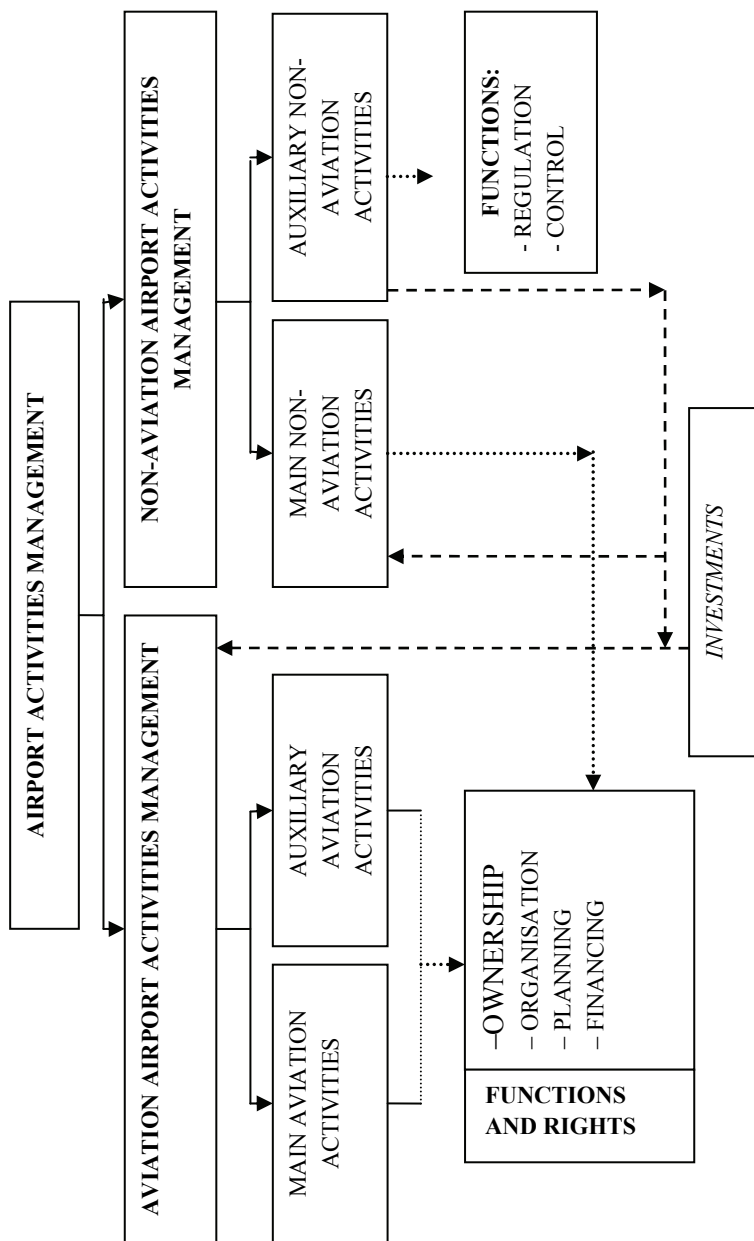


Fig. 1. Economic structure of airport activities management

According to industry-specific manufacturing process and services customers airport complex management includes two types of management: aviation airport activities management and non-aviation airport activities management (Figure 1). The development of non-aviation activities at regional airports becomes an urgent necessity not only for saving and development of airport network and improving the safety (as permits to involve additional sources to funding appropriate measures), but also to stimulate the regional economy, in which territories the airports are located.

Airport facilities include airfield facilities and other airport facilities which provide AC services, passengers, baggage, cargo and mail, and work of airport support services. Today the most facilities of ME "International airport "Zaporizhzhya" limit the ability of AC access and handling services of passengers, baggage, cargo and mail; they can not provide modern level of services; they have a high degree of wear and they are morally outdated.

Thus, at the researched enterprise ME "International airport "Zaporozhye" within the project management there were developed economic measures of reconstruction and modernization of the airport complex, including the reconstruction of the airfield, terminal, international terminal, station square, cargo terminal. Reconstruction of administrative building and modernization of fuel facilities services will contribute to solving the tasks in other priority areas.

1) The airfield modernization. The airfield has restrictions on the access of AC certain types. In particular, due to unsatisfactory state of airport surfaces there is an AC compelled towages with low-lying engines, which significantly increases the services time, reduces throughput capacity and it does not meet modern standards of airport services. Within the given direction there was planned the implementation of the project "Reconstruction of the airport and the construction of a new terminal at the airport Zaporizhzhya." The aim of the project is to improve the performance characteristics of the airport, its equipment by modern means of safe AC takeoff and landing, improving its competitiveness by increasing the capacity from 180 to 360 passengers per hour and creating a more comfortable and more favorable conditions for passengers to attract new airlines and travel agencies, which ultimately lead to an increase of passenger and cargo traffic at the airport Zaporizhzhya. Total project costs 94 USD millions. The need for investment is 100%.

2) Reconstruction of the terminal. Terminal is characterized by low throughput capacity, it also doesn't provide comfortable services to the passengers. Area of passengers' arrival and baggage claim is outside the terminal building, the state of the building does not allow to organize passengers' access to services in a sufficient way.

3) Reconstruction of the international terminal. The technical condition of the building of the international sector is unsatisfactory and it needs major repairs. Today the costs of maintenance and maintenance services of the building bears only ME "International Airport Zaporizhzhya." The actual users of the facilities, including boundary and customs are state structures, they use this property at no cost and without any reimbursement. Due to this situation it is necessary to solve a number of legal and organizational questions with the owners and users of the facilities for providing major repairs and reconstruction. The capacity of the

international sector is below the required (necessary) level. These problems do not allow to organize high-quality and comfortable passengers' services, to reduce services time and generally hinder the development of the route network of the airport.

In order to solve these problems it is necessary to develop and implement the Action Plan of a major overhaul and reconstruction of the international airport terminal structures that will improve the quality of passengers services of international flights, which will allow to reduce the time for their services, to increase capacity and expand the route network of the airport.

4) Reconstruction of the station square. Station square does not meet modern functional and aesthetic requirements, and that is why there is the need in carrying out the reconstruction and its accomplishment. For the purpose of reconstruction and improvement of the station square it is advisable to develop the Action Plan of Reconstruction and preparation of design estimates documents.

Organization of comfort conditions for passengers and those accompanying them, arrangement of the required number of parking spaces, improving the architectural appearance of the airport - these are the factors creating a positive image of airport structures and, consequently, improving the quality of services provided by the airport.

5) Cargo terminal construction. Commercial warehouse is located at a considerable distance from the airport, this fact increases the operating costs on goods delivery, and increases the service time as well. In addition, the existing building of warehouse does not meet current requirements of a cargo transportation. The construction of a new cargo terminal at the "International airport "Zaporizhzhya" requires the development of plans of building cargo terminal and the preparation of project documentation, the implementation of which will deliver to a qualitatively new level of ground handling of cargo and mail, will reduce operating costs and services time, will increase the capacity of the airport.

6) Reconstruction of office building. Offices located in the administrative building of the airport do not meet the status of the company, since they need to be repaired. There is an urgent reconstruction of administrative building with an increase of its area for the centralized location of most of the services of the ME "International airport "Zaporizhzhya". The solution of this problem requires the formation of Action Plan of administrative building reconstruction, the implementation of which will reduce operating and transportation costs, improve enterprise management, improve the working conditions of workers.

7) Modernization of Fuel Services Facilities. The facilities of fuel services demand modernization. The pipelines of fuel warehouse according to their service life have exhausted their resources and do not meet the requirements in the sphere of industrial safety. Other objects of the fuel warehouse also need to be updated. These problems do not allow to provide quality services of AC fueling, which can negatively affect the income level from the sale of aviation fuel, which represent a significant part of revenue of ME "International airport "Zaporizhzhya".

Modernization of Fuel Services Facilities according to the modernization plan will improve the quality of fuel supply services, improve aviation safety level, ensure compliance to the norms of industrial safety.

Conclusions. The provided analysis of planning in the management system of the development the airport complex indicates that it is too little in today's realities to write reasonable plans for modernization in the absence of its own resources. Experience of management and own management experience indicate that it is necessary to change management approaches. One of them is the rejection from the comprehensiveness and the concentration of economic and organizational efforts on the most real modernization project of airport infrastructure that is the use of project management.

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## **BASIC CHARACTERISTICS OF OPEN PUBLIC SPACES ON THE TERRITORY OF CIVIL AIRPORTS ORGANIZATION**

*Development of open public spaces as elements of civil airports structure allows to turn them into comfortable places with organized territory. Basic principles and characteristics of public spaces aimed at achieving this goal. International experience analysis of public spaces creating allowed to identify basics of their organization.*

One of the most important questions of urban space formation is development of public spaces. Today is very important to control the formation of the urban space towards sustainable development (taking into account the interests of future generations).

Sustainable development is the harmonious development of economic and social sphere with balance between the modern needs of the population and protecting the interests of future generations in close connection with the preservation of the environment.

The principles of sustainable development had been implemented in such important sphere of human activity as urban planning and urban management. The concept of sustainable development of urban settlements formed in order to achieve economic development and solve environmental problems. Result is to create a new level of life of citizens through an integrated approach to environmental, economic and social problems in cooperation of government, business and the public.

The urban space is a structure that captures all aspects of its development and has great potential to change. However, during the formation of urban space we need to pay attention to all its parameters: material, physical, functional, social, emotional and aesthetic.

In Ukraine, we have a problem to understand, what public spaces are. I think that the correct definition, that take into account all functions and features of place, is the next: "democratic, safe and comfortable place, that is good accessible for all persons and dedicated for using by groups of people according to the territorial principle».

Modern civil airports usually have on their territory buildings and structures. But all territory is not developed for people accommodation. Very often people stay at the airport for a long time. Open public spaces organization can help to improve the quality of service and to develop airport system.

The issue of public space in the United States have been investigated in the late 20th century. Was created a well-known now «Project for Public Spaces». It was aimed at the humanization of urban public spaces and turning them into comfortable places for people accommodations. The project identified key attributes should be also inherent to open public spaces on the territory of civil airports:

- Accessibility and communication - space should be available to all, including people with disabilities.

Visual and physical space with the environment containment describes such feature as accessibility. Well-developed public space is one which is easily accessible and is easy to navigate; it is good seeing from a distance and up close. Quite important is the environment of space, it must be aesthetic and not hampering movement in space; space environment also should have a high capacity for parking and for public transport.

- Events and activities - people have to realize the different types of activities.

Types of activities and events that are available in the public areas are the main elements that form it. The possibility to have activity gives people a reason to visit certain point and move between them. If in public space some activities are missed, it will be empty. Empty public space symbolizes the lack of attraction places.

- Comfort and image - space should provide for the needs and ease of stay, have distinct features and be aesthetic.

The space should be comfortable and have a good image. "Comfort" includes the concept of safety, purity and availability of seats. The last aspect is not always getting enough attention, but is very important for the comfort of durable public space.

- Communication - space should be a place to communicate.

It is quite difficult to achieve a high level of this attribute in public space, but achieved it will be no errors in the future. When people see friends, meet their neighbors and feel comfortable interacting with strangers, they begin to love a place where they are, as well as their community and tend it.

Each of the main attributes has its assets and indicators which can assess the level of implementation of the attributes.

Basing on these settings, we can obtain the following basic characteristics of open public spaces on the territory of civil airports organization:

- Accessible to all people, no barriers and obstacles;
- Comfort and safety of location;
- The existence of different types of activities;
- The image of space;
- Possibility of communication;
- Isolation of traffic.

Very important is to consider and analyze users feedback. Cooperation with the local community and attention to local features is the best approach to create and develop successful public spaces. Public space is the space of events, urban living space, where any user has unusual types of activities and different possibilities of communication.

Dynamics of transformation of public space forms a new strategy for designing the urban environment as a capabilities matrix. In modern conditions change space in scenarios occur very quickly and easily with modern equipment, technologies and designs using.

Public space is emotionally rich, comfortable and is a synthesis of subject (equipment), space (architecture) and activity (action and perception) solutions.

Creating open public spaces on the territory of civil airports is necessary to form unique image of place and to pay special attention to timely inform passengers and make the place comfortable (including security case.)

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## **SPECIFICS OF THE SPACE-PLANNING ORGANIZATION OF AVIATION UNIVERSITIES**

*The effectiveness of the educational process depends on many factors, including the successful space-planning of the university complex. An important influence in aviation university architecture shaping has its specialization, the need for large-space location of major equipment.*

**Raising of problem.** Modern space-planning organization higher education institution formed in the historical development of educational institutions. New requirements for the learning process led to the reorganization of specialized classrooms, and modern standards of comfort learning process dictate the conditions enhancing the training areas and territories. To ensure all these requirements should be considered a new plan structure of the institution, which will enable the scheme to provide a flexible school organization regardless of specialized professional orientation.

**Analysis of researches and publications.** In previous researches attention was paid to the general aspects of the formation of educational institutions. Unlike the previous studies of sectoral institutions aviation universities were not enough investigated. The rapid development of science in our time makes it necessary to take into account foreign experience designing schools, as in the introduction of advanced educational technologies and borrowing of progressive experience in the formation of space-planning of Aviation University. One of the latest studies for today is the work of Solobay P.A., which deals with "Typological basis for the formation of architecture of higher education institutions." In the above mentioned works by changing the system of understanding the structure of the university in terms of the learning process, turning it into a system where the basic unit of shaping the institution becomes the student. This approach allows us to better understand the specifics of the training process, and thus form a successful educational system, that approach to the formation of the structure of the institution from the inside. As in previous researches an above said work focuses on developing system. The issue in today's conditions is becoming increasingly important, as the active development of technology to change the vision of the educational process as a whole and functional and designing of the educational institution. Universities and transport direction in this case is no exception.

One of those features that directly affect the space-planning structure of the institution is its specialization. Therefore, the primary objective of study is to determine the types of universities in various fields, which have been considered in Mahydina M.I. Potokin A.A. Zaychenko EN etc. Another challenge in the development of modern universities is the territorial limitats within the historic center. In a recent study examined the possibility H.L.Kovalska issues sealing building schools and to identify new opportunities for their development. The

principal layout of different types of specialization of universities studied H.N. Tsytovykh, H. Kretov and L.M. Kovalskii.

**Purpose of the article. Basic part.** The basic element of the space-planning decisions of an aviation schools designing is a grid of columns and the height of the floor. The solution should provide for better placement process equipment, which in turn will minimize the overall size of the room without sacrificing comfort level of training.

The concept of multidiscipline school appears at the present time education due to the development of science and technology. Thanks to these changes created new university structure, affecting the space-planning structure of the university and its location in the structure of the city. In the history of schools narrow thematic orientation formed relatively recently. This is due to the fact that the school is not a set of more classrooms for lectures, but is a complex of a space-planning structure that combines lectures and practical audiences, technological laboratories specially equipped for the technical audience with specific equipment. In modern practice, not even build their new hubs for practical training of students. A striking example of this approach is the Pardew Aviation University, West Lafayette, Indiana, USA, which is based in the own airport. Influenced by the pace of modern life there is a need to create new types of universities from many specialties and departments on the student's choice. University loses its usual conservatism and today is the combination of technical and humanities in one institution, sport and art, science and art. Urgent issue of expediency of such a variance majors in one university unit. Notably, at the moment it is advisable to create, for example, the Polytechnic University of the few creative professions and on the contrary, is appropriately limited to highly specific to one institution. Based on the above we can assume the possibility of systematization space-planning of universities in three categories:

- 1) Universities with the fully sustainable space-planning scheme. These universities include the schools of one type, such as transport, health, agriculture and others. Such universities require strict adherence to technical standards laboratory equipment, creating polygons for practical training and others. Also it can be historically established universities that are in the area of dense housing, and therefore have limited areas.
- 2) Universities with a relatively flexible planning structure. In the schools of this type available partial reorganization specialization educational process, or replacing one specialization to another close to her for the specificity of the learning process. For example distinction between purely technical or purely creative specialization similar profile: universal computer labs for several engineering specialties and workshops for creative art direction, respectively.
- 3) Educational institutions with the fully flexible structure. Nonstandard approach to the educational process will result in greater mobility and adaptability of existing funds to growing needs. Under the flexible structure means the adaptability of the same audience for the needs of different classes of profile orientation.

Modern database of Ukrainian Universities is a collection of different planning structure of institutions. Some of them are classical school with already

established tradition, while others represent a new type of modern school of planning structure able to adapt. Thus, the modern university is a fundamentally new structure in terms of adaptability to different type of learning process.

Space-planning organization of the institution is influenced by many factors. One of them is the surrounding environment, including natural climate zone location facility, construction site topography and other components. Features of the institution together with others factors shape its overall concept.

Modern Aviation University incorporates the specialized scientific and practical training laboratories. These labs are usually large in size and are located in a group of ancillary facilities. The mutual arrangement of different size and design schemes rooms profile and universal primary purpose is the formation of space-planning of aviation school profile.

Worldwide experience designing schools for today shows great tips of how the schools in difficult terrain, becomes an organic approach combining structure and environment. An interesting example of this approach is the School of Arts at the Nanyang Technological University in Singapore, university centers in Singapore and Bahrain. Universities technical profile, such as aircraft type, with its own specific location through specialized technical laboratory. Most of these facilities are located on the ground floors of buildings, or in some cases where such facilities have a considerable size, forming a single-store block. An example of such a block is a hangar of the National Aviation University.

An important influence on the space-planning, organization aviation university is the presence of scientific and practical laboratories that require a high degree of illumination. At the same time, some classrooms require minimal lighting, due mainly to the training function - practical training for staff and other aircraft.

### **Conclusions**

Thus, space-planning features of Aviation University first of all is the availability of specialized research and practical laboratories. Abovementioned laboratories vary in size placed equipment, the nature of the learning process, the need to provide adequate coverage according to the aforementioned nature of the educational process. Around the research and practical laboratories is formed a number of ancillary facilities, which together form a functional interrelationships block of buildings in the core structure of the Aviation University.

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## **EFFECT OF ENVIRONMENTAL COMPETENCE ARCHITECTS IS RATED THE WORLD'S AIRPORTS**

*Reveals the influence of environmental efficiency competence of architects and its  
application in terms of work and evaluation of modern airports in the world.  
Highlight the following types of ecological thinking of the future architect.*

**Statement of the problem.** The environmental situation prevailing today in our country is characterized by a large professions of architect architects loss of influence in the formation of professionals spatial environment. Technical progress does not stand still, ever more complicated construction technology, and with them the profession of architect. Tasks that relate to architects, change and ecological competence of modern specialist is defined more clearly than ever before.

In these circumstances, the main task of the system of higher education is increased attention to the problem of graduate training architects a new level, namely the establishment of ecological kompetenosti, able to independently identify and resolve technical and environmental issues that go beyond the standard management and design, the construction of complex and functional urban facilities as interior projects.

**The aim of the paper** is to outline the impact of environmental efficiency competence of architects and its application in terms of work and evaluation of modern airports.

**Analysis of recent research** expertise in environmental literature is treated as an integral personal development, providing the ability to assess current environmental processes aimed at ensuring ecological balance, which makes mastering architect "virtuoso" of his case. Architectural activities in its unique manner of execution.

This space, which interact with three educational components: science, art and technology. On ecological expertise have a big impact, both objective and subjective factors: globalization of education, the prestige of the profession, the quality of education and culture of the future specialist formation of professional motivation, capacity for self-development and professional growth.

Environmental competence based on knowledge of the laws development and interaction of nature and society and environmental responsible liability for professional work

Architectural education as cultural activities are updated several problems, the most important of which is the formation of the future of the architect as a person of high professional environmental expertise.

**There are varieties of ecological thinking of the future architect:**

- concluded only with technical problems, the internal logic of architectural design: modernization, increased environmental competence, efficiency, functionality, reliability buildings;
- aims to study the role of buildings in public life;
- motivated for the implementation of the principles of natural science in architecture to meet the social needs associated with the construction of modern, advanced buildings.

Therefore, a professional architect thinking promotes knowledge of the laws of nature and society, in-depth understanding of patterns of development, and is closely related to other types of professionally-oriented thinking and includes technical thinking, elements of economic and ecological thinking.

Moreover, in the practical and theoretical work on the creation and reconstruction of the entire project architect faces the tasks for which the operating structures and cognitive thinking no specific techniques and concepts. This ecological thinking is understood by us as creative, it is directed to the discovery method of solving these problems and create new laws and properties of unique values of future architects. A vector modern environmental thinking architect should consider the ability to embrace reality and comfort in all its aspects.

Going on a trip, travelers thorough study of the country belongs visit: climate, political situation, hotels, and other important points. And few people with the same care studies airports worldwide, of which mostly begins to know the country. Many simply cross the globe on the plane with the usual and ordinary point A desirable and unknown to B, then passing the terminals, then go to the end point of his journey. Of course, the choice of the airport, where you have to land or spend some time in between flights does not depend on your wishes. Yet, unfortunately, not all airports can be considered quite comfortable, precise and secure. Otherwise, why should the company Skytrax, consists annual ranking of the world's airports?

Occupational environmental architect of modern thinking in its technical activities necessary to consider the design, invention, design, rationalization [1-4]. Add that according to European scientists identify essential features outlined above activities and the development of the educational system in universteti is a necessary part of becoming environmental competence in students as a structural element of training.

So, J. Dixon [2] divides the design into three parts: invention, analysis, technical and environmental decision-making. Invention is characterized by a scholar as creative ability of the individual to identify new original technical ideas that can be used in solving design problems, which are often characterized by incompleteness. Therefore, the performance of these activities, according to the scientist depends on the sensitivity and experience of experts. In Turn, it's getting decisions, choosing the best option among alternatives.

These students gain the necessary knowledge in the professional environmental training at the university, but the presence of the students theoretical knowledge does not mean their practical implementation and management careers. Environmental training future architect to the practical use of relevant theoretical and methodological solutions aimed at the productive organization of the



educational process and improve the quality of software development professional environmental competencies required for the organization of technical activities that allow the architecture to become competitive in the job market.

Note that work - a process activity that creates new quality material and spiritual values and the creation of an objective summary of new [3; 6; 7]. The main criterion that distinguishes creativity from manufacturing (production), it is a unique result. The most surprising that the quality of service at the airport does not depend on how big it is.

Or on whether you are traveling to Europe or Asia. According to this same ranking, the European air gate is not so good and comfortable, such as Hong Kong airport for many years held the top spot as the most comfortable and convenient for many passengers, a high level of training, the building itself made the most accurate standards, particular attention is paid to the ecological competence of experts who developed the project.

Despite the fact that "Europe is ahead of the rest", an important place in the ranking of "best airports in the world" is not the first rank Asian airports.

**The best airport in 2013 became** the Hong Kong airport. The efficiency and accuracy of the passenger service arrival and departure of aircraft deserve special praise .. Excellent construction, the design part is executed perfectly. And the comfort of waiting rooms can make a legend. And this despite the relative youth of the airport. Among other things, in the Hong Kong airport provided all sorts of bonuses in the form of a modern 4-D theater room with computer games, including superb flight simulation, and massage parlor. The main thing is not to forget that you were going on a trip and do not miss your flight.

**Second place goes** to Changi Airport in Singapore. It is known for the five flowering gardens written all known tabloid world. If your flight is still detained, or just so happened that you are forced to spend the night in Singapore, you do not have to huddle in the waiting room. You may well settle comfortably without going through a grueling procedure of migration control, as in the terminal located hotel "Ambassador".

**The top three locks** Seoul Incheon airport. "That's a comfort!" - Cry every first hit the golden air gateway of South Korean tourist. It offers passengers not only a nightclub, where guests are always welcome, but many gaming halls. Straight from the airport, you can go on a trip to the nearby temple or to exhibit pottery. The choice is great, and some travelers say, that the travel agency that offers its customers first tour of Asia airports, will not exhaust stream wishing to participate in the Asian hospitality and luxury.

**Airport in Dubai is considered** the best for location, comfort, cleanliness, efficiency of information and registries. And the presence of a huge number of duty-free shops and amenities of their work to tourists Dubai Airport ahead of Hong Kong and Singapore airports. Despite the presence of all three terminals at service quality, precision missions and comfortable seating areas, the airport was ranked fifth in the ranking of most-most. And for good reason. He is considered the most beautiful and high-tech airport. Its extraordinary architectural beauty is worth mention. Looking at the buildings from the airplane, passengers compared to the Beijing airport with dragon lurking at the edge of the field.

**The largest airport in the world**, too caught up in the list of the best. It affects their infrastructure Amsterdam Airport Schiphol like a small city within a city. Every day within its walls open various art exhibitions. Here you'll hardly Celebrating wander in search of entertainment, if you have the opportunity to supplement its cultural baggage. Among other things, young people offer four different types of wedding ceremonies on the air bridge or directly into the cabin. That is, a gift for newlyweds or for those struck by Cupid's arrow. This can be especially true Valentine's Day. Here you can pamper yourself with a variety of spa treatments. It's nice that the builders of the airport took care of the children and for them created a large play area.

**Swiss airport**, though not the largest, but named the most accurate. But what to expect from the country, producing the most accurate and expensive watches in the world. Only politeness of kings. But this is not the only criterion by which the airport was in the top ten. Straight to the airport you can take a ride on rollers. By the way, give them a small fee to the rental. You can go on a bike in a short trip to the nearby surroundings. And if you want to admire the city from on high, then the service is available, you can climb to the observation deck. The airport has many shops, which offers a variety of treatments. And that's not counting comfort zones for leisure passengers. This is where, indeed, the Swiss have provided it.

**Top ten list of "best airports in the world"** closes Copenhagen Kastrup in of Denmark. Relatively small airport. It surpassed even the world famous Tokyo airport, and after many years of this airport confidently entered the top ten. What is special about this airport? Functionality and concise use every inch of space small by conventional standards, building. Clarity in the attendants, no delay in the documents and baggage claim.

Architectural activities, by their nature, unique. Architect studying life and thus must constantly monitor the latest developments.

Architectural education like no other line with modern educational concepts "Continue Education of a lifetime." Environmental competence depends on the content and organization of the educational process at the University. The architect should be trained in architectural design, in engineering and building improvement in the economy, construction process, as well as in the environmental field.

## **Conclusion**

So now the priority area of training future environmental competence of the architect at the University is to develop competent, professional competitive as a creative personality that realizes itself in the design, engineering, research, manufacturing activities to create new objects (on the device airports), in harmony organized and comfortable space environment and interior.

Solving environmental challenges in the professional work of the architect is associated with objects that have aesthetic value can be productive only if the current ecological competence of the architect.

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## METHOD OF PROGRESSIVE COLLAPSE MODELING BASED ON REAL HIGH-RISE BUILDING EXAMPLES

*Using real examples, the paper focuses on stability evaluation in frameworks of high-rise buildings for different types of damage. The proposed method enables you to analyse stability of a building in progressive collapse. The idea of this method is to carry out nonlinear analysis on specific (emergency) combination of normative loads and actions*

**Introduction.** Analysis of several massive collapses in construction which took place during last 30 years showed that the main reason of accident is low quality of construction and imperfection of modern construction standards. A significant amount of collapses were due to default of installation technological requirements, understatement of concrete grade, etc. Often, the reason of accidents and collapses is incorrect constructive decision which was adopted due to improper accounting of loads and computer modeling of complex constructions. Also, there are accidents in construction practice which were caused by imperfect geotechnical testing, insufficient consideration of groundwater and many other factors [1, 2, 3, 4, 5]. That is why determining value in designing process has method of building modeling which takes into account real work of construction, nonlinear properties of materials, process of stepwise construction and construction of proper structural building scheme, considering spatial operation of all elements. Currently, because of widespread introduction of new space-planning and design solutions for buildings and constructions and new construct materials in designing practice, there is required to use new methods of numerical and computer modeling and provide strength calculation of building, stability analysis and identification of load bearing capacity reserves by adaptability of construction, which increases its survivability. Thus, the fundamental issue in research of design scheme work nature is choice of building design model or calculation method that as a result will lead to reliability of obtained results.

There is still no uniqueness concerning buildings and structures calculation methods of progressive collapse in normative documents and publications. Many modern program complexes for strength analysis of building structures suggested algorithms for such calculation, where reliability of the results are not always confirmed by numerical experiments and real designing. During transition from the real object to its design model uses a variety of assumptions that can significantly affect the final result. The reason is the number of uncertainties: heuristic choice of scenarios, schemes and limitations of building destruction, method of removing of elements from design scheme, as well as determination of building structures failure criteria. The data presented in the regulations and recommendations of various countries often differ or contradict each other [6, 7]. Growing importance is gained

by numerical experiments that are tested by real designing and allows precisely and reliably describe real behavior of structures at influence of different loads.

When carrying out such a numerical experiment, the following factors of real structural operation at all stages of the life cycle are taken into account: accounting for the sequence of building erection, ductility and subsidence of vertical structural elements, dynamic loads (pulsating wind, seismic), spatial character of building operation, as well as joint work of diaphragms and frames not only on horizontal, but also on vertical loads. These and other factors have a significant impact on design computer model formation of the building and choice of rational calculation method allowing to receive real data about stress-strain state (SSS) of bearing structures.

Due to the introduction of computer technology design into practice there is a possibility to calculate complex, large size design models in 3D. However, this is what leads to the appearance of one of the main disadvantages of calculation programs, namely, the complexity of quality checks for given results which, in turn, significantly increases the effect of the human factor on the final result i.e., increasing requirements for highly qualified professionals who can use modern computational software systems.

Despite the fact that all calculation program complexes are based on the finite elements method (FEM), there are still no recommendations in the normative base for compilation of finite element building model as well as uniform guidelines for choosing the type of finite element (FE), able to provide the necessary accuracy of the calculation model taking into account all the main factors affecting the strength and stability of the building. This is partly explained by the presence of many software systems that have different finite elements in their database, analysis and choice of which is quite difficult. However, the main reason is the lack of understanding in the factors to be considered at preparation of calculation building computer model, and features of their mutual influence on SSS of building bearing system. Creation of building finite element model i.e., its design scheme and entire responsibility of the developer. Accuracy and reliability resulting from the calculation data depends on the understanding of the structures operation, its virtual reality display.

Modern means of computer-aided design (CAD) allow pass from the previously accepted concept of calculation (design scheme – SSS) to modern one, modeling of life cycle processes (construction process, loading process, etc.). In particular, modeling of structure operation period in addition to factors such as the rheological properties of material (creep), construction scheme changes due to reconstruction, etc., includes modeling of progressive collapse process.

This article proposed method for modeling and calculation of progressive collapse of high-rise building in program complex Lira – CAD based on two real buildings example.

**Problem formulation.** Modeling of progressive collapse is necessary for study of structure survivability, opportunities and its adaptation mechanism for emergency shutdown of individual structure components. Such analysis can be done within nonlinear dynamic calculation, but its implementation in mass design is currently not possible due to the high complexity and resource consumption of

calculation. At the same time, it can be considered insolvent attempt to model the process of progressive collapse on the basis of linear elastic static calculation undertaken in certain works and software systems. Solution of this problem is proposed by the method of mathematical modeling of the loading process on the basis of proximate step method as the main method for the modeling of the structure life cycle.

Given work proposed carry out modeling of “force majeure” emergency situation in the next manner. At first it is performed calculation of the structure in operational phase or in several installation and operation stages, taking into account the history of the construction and structure loading prior to local failure. At the same time physical and geometric nonlinearity is taking into account. Stress strain state of the first stage is start for the second one which performs calculation of the scheme without deleted elements. The loading at the second stage include efforts in the deleted structure elements, increased by a factor that takes into account the dynamics of the process. Calculation also needs to be carried out taking into account the physical and geometric nonlinearity. If it turns out that some of the model elements do not satisfy the strength (i.e., broken), then the calculation continues in a similar manner in the next step without such elements. The calculation will be finished either local destruction or complete destruction of the bearing system. However, it should be noted that in most cases to prevent progressive collapse the bearing ability of all elements at initial emergency damages need to be provided. In these cases, calculation will be stopped in the first step of the second stage of calculation and modeling of the progressive collapse process is not required.

Next, there are represented examples of the sustainability evaluation technique for framework high rise buildings at collapse of various types: collapse of lower floor supporting column, collapse of the upper floor slab part with area up to 80 m<sup>2</sup>.

**Research description.** When making calculation on progressive collapse, it is necessary to take into account the convention presuppositions, such as follows:

- there is no reliable information about the location and cause of the process and the nature of the destruction;
- real parameters of materials limit destructive characteristics usually differ from strength conditions adopted in the regulations, therefore calculation complexes, such as Lira – CAD (subsystem INSTALLATION), at physical-nonlinear calculation, except standardized material data (concrete, reinforcement), provides assignment of arbitrary calculated values of strength parameters (including field observations results). Therefore, result of numerical modeling gives possibility to get good estimation of structure stability characteristics with respect to progressive collapse and compare several scenarios of collapse to identify weaknesses the structure.

To estimate the stability against progressive collapse building should be considered only the most dangerous design schemes of destruction.

Resistance to progressive collapse is verified by nonlinear calculation for special (emergency) combination of normative loads and impacts, including normative permanent and long-term loads and also impact of hypothetical local

destructions of bearing structure elements. It is permitted in the first approximation, after determining the local zone of collapse, for example using subsystem «LETTER» in PC « Lira – CAD », perform calculation of structures taking into account dismantling of destroyed elements at low elastic modules of bearing elements: for vertical elements coefficient is equal to  $0.6E_0$ , for overlapping it is equal to  $0.3E_0$ . Displacement of structure elements and cracks development are not limited, but the factor of safety when checking the stability of such a system with dismantled elements should be of more than two.

Safety factors for loads should be equal to one. For design characteristics of materials are accepted their normative values. Furthermore, the design resistance is multiplied by the increasing factors of working conditions, taking into account the low probability of accidental impacts and increase of concrete strength after the construction of the building, as well as the opportunity of reinforcement work beyond the elastic limit. Such a possibility of correction factor introduction to the material strength and elasticity modulus at different stages of installation and dismantling is implemented in the billing processor PC Lira – CAD (subsystem INSTALLATION).

The minimum area of longitudinal and transverse reinforcement in concrete slabs and overlapping must not be less than 0.25% of the concrete area wherein reinforcement should be continuous and dock in accordance with the requirements for the design of reinforced concrete structures.

Since it is impossible to predict all the scenarios of progressive collapse, the key point in calculation on emergency collapse is the choice and approval together with the designer and customer of all possible collapse scenarios maximally close to real conditions of object location on the terrain, for example:

- at the location of the building next to the transport routes, the calculation of the structure is performed by removing of extreme columns;
- at presence of a helipad, the calculation is performed on the collapse of the slab section;
- at presence in the structure or nearby gas distribution stations, the calculation is performed on gas explosion;
- at presence of retaining walls and other protective structures, the calculation is performed on collapse of these structures section.

Thus, there considered requirements of DBNV.2.2-24:2009 (AppendixE)[7] and allowed the collapse of individual elements on the area up to  $80\text{m}^2$ :

- cross-section of removed RC elements must not exceed  $0.9\text{m}^2$ ;
- cross-section of removed fiber concrete elements must not exceed  $0.7\text{m}^2$ ;
- cross-section of removed stiff reinforcement must not exceed 15%;
- overlapping of the high-rise building must be calculated on the perception of the area located above the overlapping area up to  $80\text{m}^2$  with dynamic factor 1.5.

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## **THE METHOD OF CALCULATING THE METAL FRAME CONSIDERING ITS SPATIAL WORK**

*In the calculation of the building shell is usually broken up into flat transverse and longitudinal frame structure. When based on the vertical loads applied to the girder, and wind forces acting at the same rate to all the transverse frames, such a method is correct [1, 2]. When calculating the same transverse frames, the load on the crane operating for only a few frames (usually three frames) [3] can be taken into account to improve the accuracy and the involvement of other transverse- frames, joined by longitudinal constructions.*

Frame displacement from the load of cranes in the spatial block  $\Delta_{sp}$  is less than flat frame displacement  $\Delta$  loaded with the same load. Relation  $\Delta_{sp} / \Delta$  is called the coefficient of spatial work  $q_{sp}$  [4, 5].

When calculate building in spatial form it is required to take into account:

- steel frame regarded as a system of continuous beams;
- the spatial calculation of the steel frame rigid roof (prefabricated concrete slabs, steel profiled decking, corrugated steel, etc.) taken into account as the longitudinal element;
- design scheme of transverse frames taken as a flat frame that receives, in addition to the attached directly to her external load, as the forces of horizontal resistance arising in the longitudinal plane of the disk due to the spatial framework.

The inclusion of spatial frame work of the calculation of a single flat frame is reduced to the determination of the elastic resistance of the longitudinal braces, which is regarded as the external load applied to the frame at the level of braces.

Exact calculation of a frame with cranes can be performed with the help of computer programs Lira SAPR. Designed scheme is considered as spatial bars system.

In calculation one frame and three framed building is compared with the same acting load. The results proved that the more times statically undefined frame the better distribution between bearing elements occur.

Thus, consideration of the spatial framework allows in some cases to admit an increase in crane loads on the frame without its strengthening. The inclusion of spatial frame work can often reduce the consumption of steel and other materials, the feasibility of this calculation is established in each individual case on the basis of specific conditions - the dimensions of buildings, its design concept, the nature of external loads and other factors.

### **The inclusion of spatial frame work**

Expediency of accounting for spatial framework established in each individual case on the basis of consideration: size structure, its design scheme, the nature, magnitude and method of application of the loads, such as longitudinal

designs in terms of their compliance with the additional requirements (stiffness, etc.), affecting operation of the load acting in the transverse direction. The inclusion of spatial frame work is appropriate in crane buildings.

Functions longitudinal drives, providing a spatial frame work, can perform steel braced truss, playgrounds, as well as the building envelope, made of other materials.

Among these discs include, for example, roofing and floors prefabricated or monolithic concrete slabs, steel profiled sheeting, corrugated steel, etc. These drives should be considered as the longitudinal members when non-rigid roof, for example the roof of corrugated asbestos plates, count only the longitudinal communication coverage.

Commonly used in industrial buildings has several longitudinal adjustment discs that conform to their business requirements.

In each case it is necessary to establish what drives must be taken into account when calculating the spatial scheme. In single-storey industrial buildings with a coating disposed on one level, is usually counted only one longitudinal drive located in the level of coverage. In one-story buildings with coatings, located on different levels, can be accounted wheels located in each level of the coatings.

Payment scheme in the spatial frame is made differently depending on the stiffness of the longitudinal drives, the number included in the calculation of the longitudinal drive and location of columns in terms of (the same or different steps on different rows of columns).

When calculating the spatial single-storey industrial buildings with one longitudinal drive should:

- 1) steel frame as a system of continuous beams, longitudinal elastic discs on settling piers, where the role of continuous beams play a longitudinal design, elastic settling supports - cross frames;

- 2) for the calculation of spatial steel frame rigid roof ( prefabricated concrete slabs, steel profiled decking, corrugated steel, etc.) taken into account as the longitudinal member. In some cases, the presence of the other longitudinal elements, such as brake pads and workers, it is advisable to take into account these elements, especially when in their horizontal transverse plane effects;

- 3) the design scheme of the transverse frame taken as a flat frame which receives, in addition to applied directly to her external load resistance and horizontal forces arising in the longitudinal plane of disks due to the spatial framework.

In accordance with the currently used methods of spatial frame of all the roofs at the industrial buildings are divided into non-rigid and rigid. In the first case, the distribution of the longitudinal drive is horizontal longitudinal communication bottom chords of trusses, in the second - carpet, take infinitely rigid. Such a division is rather conditional roofs, as the effect of spatial correlation depends on the stiffness of the roof and transverse frames. Redistribution of loads from overhead cranes contributes brake design, located in the level of action of these loads. The proposed method of calculation takes into account the finite stiffness of the roofs and longitudinal connections to truss bottom chords, and a second longitudinal disc - brake design.

In determining the longitudinal forces in the frame can be assumed that applied to the column vertical forces it is transferred to the foundation and the other column of the frame through bolt is not redistributed. If necessary, one can determine the moments and shear forces in columns.

Calculation of frames so as independent elements of the block is valid if the frame is the same and is equally loaded. However, the crane loads are applied only in selected locations along the length of the block.

In this case, the longitudinal connection to the bottom chord connecting frame at this level, can transmit the horizontal loads on the part of the frame and the neighboring several frames unload the busiest. Engage in joint activities in the local load columns adjacent frames can also break beams with sheets can serve the same roof bearing concrete panels joined at the corners welded fixing and embedment grout joints that form the hard disk. Such work is called spatial elements frame work.

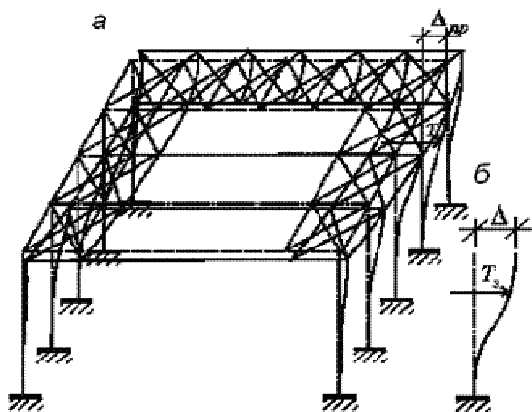


Fig. 1. Circuits of the second end of the roof girder, comprising a working unit and a single a) and b)

The inclusion of spatial frame work is appropriate, if the moments and offset from the taps are not less than 20% of the total points or displacements. Most effective work in the inclusion of spatial is a single-span frame. In multi-span frames (3 or more spans) registration drives covering unsuitable in this case can lead payment on the basis of lack of disk displacement.

When calculating the same transverse frames, the load on the crane operating for only a few frames can be taken into account to improve the accuracy and the involvement of other transverse- frames, joined by longitudinal constructions (roof slabs, longitudinal braces on the bottom chords of trusses, brake constructions, etc.).

Replace unbalanced horizontal thrust loads on crane longitudinal connection at the bottom truss equivalent force  $T$  frame with a continuous beam, transmitting

the load from the loaded frame on 4-5 adjacent. In the most adverse conditions with spatial structural work is second from the end of the block frame, as the latter a unit frame can be the maximum load of the crane is loaded.

The displacement of the top of the maximum loaded column  $\Delta_{pr}$  less than a single frame. Taking into account spatial and work determining effort from crane loads in the above formula instead  $\Delta_i$  substituted  $\Delta_{pri}$  where  $\Delta_{pr} = \alpha_{pr} \Delta_i$  linear relationship, preventing displacement.

In this  $\alpha_{pr} = 1 - \alpha' (n_0 / \sum y - 1)$  coefficient  $\alpha$  and  $\alpha'$  determined depending on the parameter. Spatial frame work industrial building is shown under the action of some loads applied not to all cross frames. To apply such a load from the impact of traveling cranes, operating in a plurality of transverse frames (typically three frames).

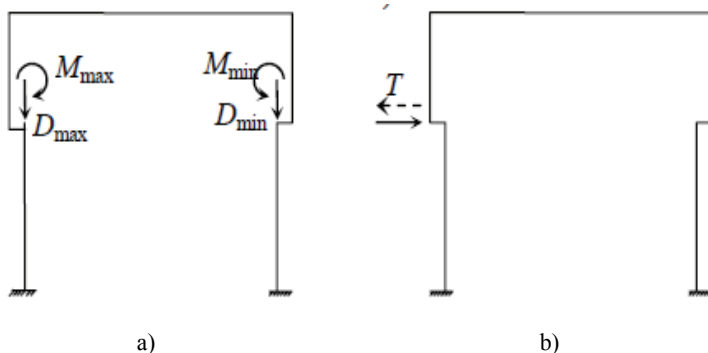


Fig. 2. Calculation scheme of the vertical frame (a) horizontal and (b) the crane load

Longitudinal frame structure (roofing, longitudinal connection to the lower chord, brake design, etc.) distributes the load on all the frames, thereby reducing the horizontal displacement of the columns and the bending moment in the most laden frame. In calculating the impact on the flat frame cranes spatial frame work is taken into account by a factor of spatial  $\alpha_{pr} = \Delta_{pr} / \Delta$ , where  $\Delta_{pr}$ ,  $\Delta$  respectively offset frame comprising a spatial frame block and a flat.

In the calculation value  $\alpha_{pr}$  defined by the formula:

$$\alpha_{pr} = 1 - \alpha - \alpha' (n_0 / \sum y - 1), \quad (1)$$

where  $\alpha$ ,  $\alpha'$  – coefficients determined from Table. 1 are depending on the parameter  $\beta$ ;  $n_0$  – the number of wheels on one thread tap crane girders;  $\sum y$  – is ordinate amount of influence lines considered frame.

Table 1.

|           |           |      |       |       |       |       |       |       |       |       |
|-----------|-----------|------|-------|-------|-------|-------|-------|-------|-------|-------|
| $\beta$   | 0         | 0,01 | 0,02  | 0,03  | 0,04  | 0,05  | 0,1   | 0,15  | 0,2   | 0,5   |
| $\alpha$  | 0,86      | 0,77 | 0,73  | 0,71  | 0,69  | 0,67  | 0,62  | 0,58  | 0,56  | 0,46  |
| $\alpha'$ | -<br>0,14 | -0,2 | -0,22 | -0,24 | -0,25 | -0,25 | -0,26 | -0,26 | -0,26 | -0,26 |

Parameter  $\beta$  characterizes the ratio of the transverse stiffness of the frame and cover:

$$\beta = \left( \frac{B}{H_p} \right)^3 \cdot d \cdot \frac{\sum I_n}{I_n}, \quad (2)$$

where  $B$  - step transverse frames;  $H_p$  - height of the frame's girder;  $d$  - speed reduction coefficient column to column of constant cross section, equivalent to a shift;  $\sum I_n$  - is sum of the moments of inertia of the bottom of the column;  $I_n = I_{ch} + I_{cr}$ , here  $I_{ch}$  is moments inertia of the horizontal elements of the roof and longitudinal connections on the bottom chord;  $I_{cr}$  is the equivalent moment of inertia of the roof;  $d = k_b / 12$  ( $k_b$  determined according to Table. 2).

Table 2.

| $H_v/H$ | Coefficients $k_b$ when $I_v/I_n^*$ equals |      |       |     |
|---------|--|------|-------|-----|
|         | 0,1  | 0,15 | 0,2   | 1,0 |
| 0,2     | 5,203                                      | 5,82 | 6,315 | 12  |
| 0,25    | 5,195                                      | 5,8  | 6,315 |     |
| 0,3     | 5,182                                      | 5,77 | 6,283 |     |
| 0,35    | 5,11                                       | 5,73 | 6,263 |     |
| 0,4     | 4,956                                      | 5,67 | 6,248 |     |

The ratio  $\sum I_n / I_n$  can be taken in the following ranges for the coatings: large-size reinforced concrete slabs 1/40...1/100; small size reinforced concrete slabs on purlins 1/10...1/25; flat steel plate on purlins (steel panel) 1/5...1/10; with profiled sheet on purlins (corrugated panels) 1/2...1/6. Smaller values  $\sum I_n / I_n$  should be taken into buildings without lights span up to 36 m with light-duty cranes.

Design scheme is adopted in the form of three-dimensional bar system consisting of 5-7 planar transverse frame connected to the level of girder and crane structures longitudinal elements of finite stiffness.

When calculating the plane transverse frame bioactivity influence other transverse frames associated with the considered frame longitudinal members, be taken into account in the calculation scheme supports the introduction of an elastically compliant Figure B. If the crane beams and brake design cutting, the value of their resistance to the attachment points to columns and almost negligible does not affect the magnitude and distribution of forces in the columns, so it cannot be ignored. In this case, the spatial frame work can be accounted for by defining a reaction  $X_R$  at level of the roof girder ( the calculation method of forces) or the top of the frame shift in the system of spatial unit  $\Delta_{pr}$  (calculated by displacement).

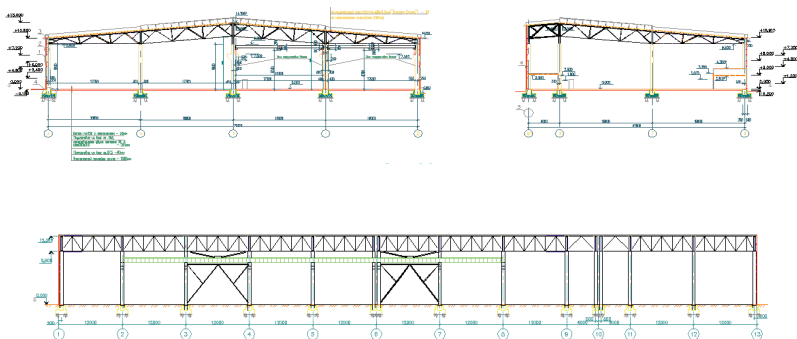


Fig. 3. Scheme to the spatial integration of the frame

In determining the longitudinal forces in the frame can be assumed that applied to the column vertical forces it is transferred to the foundation and the other column of the frame through the bolt is not redistributed. If necessary, one can determine the moments and shear forces in columns.

Calculation of frames so as independent elements of the block is valid if the frame is the same and is equally loaded. However, the crane loads are applied only in selected locations along the length of the block.

In this case, the longitudinal connection to the bottom chord connecting frames on this level can transmit the horizontal loads on the part of the frame and the neighboring several frames unload the busiest such work is called spatial elements frame work.

The inclusion of spatial frame work useful if moments and displacements from the taps are not less than 20% of the total points or offsets most effective work in the inclusion of spatial single-span frames in multi-span frames (3 or more spans) accounting cover discs unsuitable in this case can lead to lack of payment on the basis of the displacement of the disc.

## Conclusion

Thus, consideration of the spatial framework allows in some cases to admit an increase in crane loads on the frame without its strengthening. The inclusion of spatial frame work can often reduce the consumption of steel and other materials, the feasibility of this calculation is established in each individual case on the basis of specific conditions - the dimensions of buildings, its design concept, the nature of external loads and other factors.

| DISPLACEMENTS OF THE FRAME IN PLANE AND SPATIAL WORK |                     |  |                            |          |         |        |                     |       |        |       |  |
|--|---------------------|--|----------------------------|----------|---------|--------|---------------------|-------|--------|-------|--|
| PLANE WORK OF FRAME                                  |                     |  |                            |          |         |        |                     |       |        |       |  |
| COLUMNS OF 1 SPAN                                    |                     |  | COLUMNS OF 3 SPAN BUILDING |          |         |        | TRUSS DISPLACEMENTS |       |        |       |  |
| 14.5   | 4.93                |  | 18.3                       | 15.8     | 15.8    | 8.5    | 71                  | 107   | 107    | 106   |  |
| 40.6   | 9.72                |  | 49.5                       | 41.7     | 41.4    | 18.2   | 70.9                | 108   | 106    | 105   |  |
| 69.6   | 18.9                |  | 85.7                       | 72.8     | 72.5    | 34.3   | 70.95               | 107.5 | 106.5  | 105.5 |  |
| 72.6   | 61.7                |  | 106                        | 102      | 102     | 93.2   |                     |       | 79.875 |       |  |
| 49.325   | 23.8125             |  | 64.875                     | 58.075   | 57.925  | 38.55  |                     |       |        |       |  |
| 36.56875   |                     |  |                            | 54.85625 |         |        |                     |       |        |       |  |
| SPATIAL WORK OF FRAME                                |                     |  |                            |          |         |        |                     |       |        |       |  |
| 8.51   | 0.105               |  | 9.43                       | 5.79     | 5.73    | 0.89   | 21.7                | 30.5  | 29.8   | 29.1  |  |
| 28.8   | 2.6                 |  | 31                         | 19.6     | 19.5    | 0.71   | 21.8                | 31.5  | 30     | 28.5  |  |
| 50.9   | 4.27                |  | 54.8                       | 36.4     | 36.1    | 0.92   | 21.75               | 31    | 29.9   | 28.8  |  |
| 28.5   | 16.6                |  | 36.6                       | 32.2     | 31.6    | 23.1   |                     |       | 22.425 |       |  |
| 29.1775  | 5.891               |  | 32.9575                    | 23.1975  | 23.2325 | 6.4875 |                     |       |        |       |  |
| 17.53575   |                     |  |                            | 21.54375 |         |        |                     |       |        |       |  |
| RESULTS  |                     |  |                            |          |         |        |                     |       |        |       |  |
| $\alpha_{PR}$  | total for 1 span, % |  | 8.08765                    |          |         |        |                     |       |        |       |  |
| $\alpha_{PR}$  | total for 3 span, % |  | 33.67434                   |          |         |        |                     |       |        |       |  |

Fig. 4. Results of calculation

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## ANALYSIS OF THE MAIN RESULTS OF EXPERIMENTAL RESEARCH RIGIDITY OF PLANE TENSION REINFORCED CONCRETE COMPOSITE CONSTRUCTIONS

*The article presents analysis of the main results of experimental studies plane tension reinforced concrete composite constructions with a detailed study of rigidity; opening width of normal and oblique cracks at the axis of the longitudinal and transverse reinforcement; changing the distance between the cracks and crack length; net of discontinuities and other parameters that allow comparative analysis of such constructions.*

Today precast-monolithic reinforced concrete construction is the main structural material and therefore improve methods for calculating the composite plane tension reinforced concrete constructions is an important **actual** task.

**The purpose** of experimental research is to determine the basic parameters necessary to determine the stiffness of plane prestressed concrete composite constructions in the presence of normal and inclined cracks, the analysis at different stages of loading, verification of the proposed settlement system, based on the equations of the development and opening of cracks and the effect of discontinuity, and to develop recommendations for designing efficient composite reinforced concrete constructions.

Currently in plane prestressed concrete composite constructions are virtually no experimental data on the parameters of resistance in areas directly adjacent to the shores of cracks and their vertices [1].

There are few experimental data and the crack length and increase with increasing load. However, these parameters are crucial for analyzing resistance areas adjacent to the intersection cracked working armature, which, as shown by recent studies [1], an effect of discontinuity.

In the experimental studies addressed the **following tasks**:

1) development of methods of experimental research rigidity plane prestressed concrete composite structures in the presence of normal and oblique cracks;

2) experimental determination of the following parameters: deflections along the entire length of reinforced concrete structures; width of the crack opening at the axis of the longitudinal and transverse reinforcement and stretched at some distance (1.5-2 diameters) of these axes ( $a_{crc}$  along the crack profile); changing the distance between the cracks  $l_{crc}$  and crack length  $h_{crc}$  extent by increasing the load (with multi-process inspection cracking), deformation of concrete to crack along the axis of the working valves; fibreboard strain compressed concrete, height compressed zone of concrete);



3) verification of the proposed settlement apparatus according rigidity plane prestressed concrete composite structures in the presence of normal and oblique cracks.

General view of the test set and mechanical appliances elektrotezorezystoramy shown in Fig. 1, respectively.

In order to obtain maximum information from each sample was tested to destruction proof. Load beams-walls was carried out smoothly - small steps, which accounted for  $0,1M_{cre}$ . It was necessary to identify the characteristics of deformation in the formation of cracks first, second, etc. levels.

Check the load for checking hardness and fracture toughness was maintained for an hour. Exposure to all stages except the control to test hardness and fracture toughness was 15 min. During short-term load samples for mechanical devices and sensors were removed twice a stage: immediately after applying load and after appropriate exposure.

Before the expected time of cracking tension zone of each beam carefully viwed, cracking was recorded visually. By way of further loading, were monitoring the emergence of new cracks and development of existing МКБ-2 microscope with 24-x magnification and point value 0,05mm; measured the width of the crack opening on the two side faces, at locations stretched and fittings in several levels of height cross sections of beams. When under load occasionally noted the development of cracks in height. Sketch of cracks was carried out on special plates.

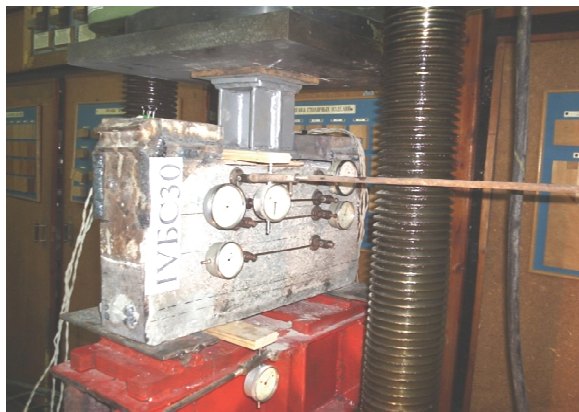
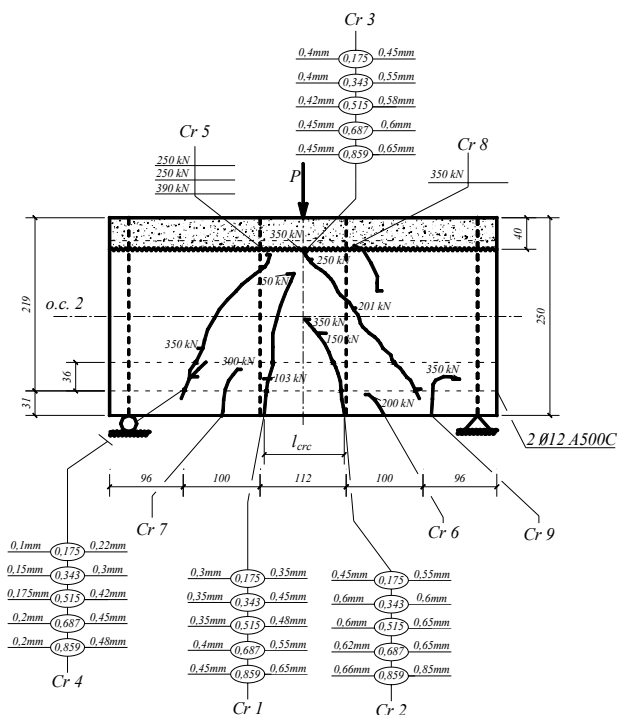


Fig. 1 General view of research

Picture of cracks, their disclosure and development at each stage were applied to the special plates at scale 1:1, which allowed a detailed analysis. Results of such information on concrete composite beam-wall VIBC30-20 sixth series of paintings and disclosure of cracks shown in Fig. 2 oval specified ratio of current to the load devastating; left – the width of crack opening.

Experimental data certainly allow you to specify a differential parameter (measured in experiments with a microscope) as the crack opening width, the number of levels of cracking, the distance between the cracks, in relation to the

***a)***



10.71

Quite effective were the graphs of the distance from the seam of strain  $\varepsilon_b$  concrete in layers adjacent to the seam. With regard to the experimental concrete composite beam-wall IIIБC30–30 third series – the graphs shown in Fig. 3.

The analysis shows the presence of the perturbation strain state in the layers adjacent to the seam. This disturbance is observed not only on the steps of the operational load (load level 0.7, curve 2, Fig. 3), but also in the early stages of loading (load level 0.25, curve 1, Fig. 3).

Thus there is a transition from tensile strain to compressive strain. If these perturbations approximated by straight lines adjacent to the junction layers, such a transition can be considered as a conditional concentrated shear, ie as a "jump" strains.

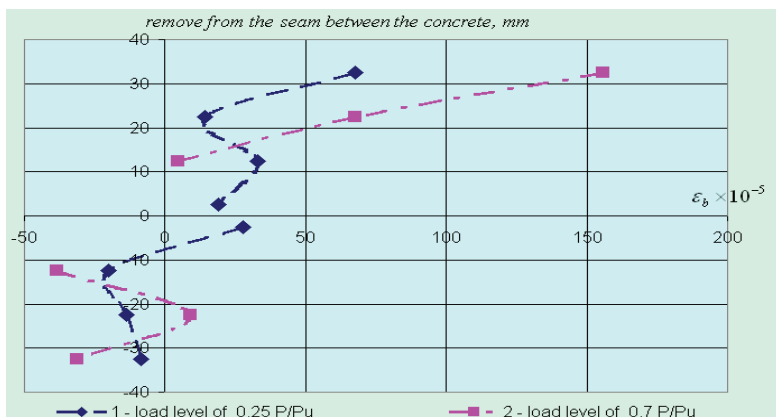


Fig. 3 Graphics depending on the distance from the joint deformations of concrete in layers adjacent to the seam in the experimental beam-wall IIIБC30–30 third series;  
1 – load level of 0.25P/P<sub>u</sub>; 2 – load level of degree 0.7P/P<sub>u</sub>

## Conclusions

Experimental studies make it possible to check the reliability of working hypotheses and computational methods rigidity plane prestressed reinforced concrete composite constructions in the presence of normal and inclined cracks with regard to their degree of development, determine the distances between the cracks and the width of their disclosure, taking into account the effect of discontinuity.

There are thus varying the reinforcement and concrete classes in an appreciable extent complement existing facts.

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## **BUILDING A COMPUTER MODEL OF AN OPTOELECTRONIC FIRE SMOKE ALARM DETECTOR**

*The work deals with modeling an optoelectronic fire smoke alarm detector at the functional diagram level by means of MATLAB tools. The developed model makes it possible to estimate the ability of a logic unit to distinguish between fire signals and noise.*

**Introduction. Setting the problem.** Modeling of systems at the functional diagram level is widely used in the practice of design [1]. In this work modeling of an optoelectronic fire smoke alarm detector has been carried out at the functional level by means of MATLAB tools. Such detectors are widely used in fire alarm systems. The purpose of creating a model is theoretical research of the influence of signal processing parameters in the fire smoke alarm detector on smoke detection efficiency in atmospheric noise environment.

### **Development of a computer model of the fire smoke linear optoelectronic detector.**

The development of a computer model of the fire smoke linear optoelectronic detector is carried out during the following stages [2,3]:

1. Choosing the prototype detector.
2. Analyzing the structural diagram of the prototype detector and analyzing the signal processing in the structural units of the diagram.
3. Constructing a simplified block diagram of the specified model of the detector.
4. Constructing a functional model of the detector.
5. Constructing a mathematical model of signal processing in the detector.
6. Designing a block diagram of the computer program implementing the mathematical model.
7. Writing and debugging the program in the chosen programming language.
8. Testing the program.

As a prototype detector we take an active infrared fire alarm detector "Kvant-1", which is analyzed. The detector "Kvant-1" reacts to smoke in operation. The device triggers an alarm when smoke enhancing the optical density of the environment by 10% appears in its operating area within 3 seconds.

The operation principle of the device is based on scattering and absorption of the infrared energy emitted by the smoke and on registering its part that has reached the receiver.

The operation of the device is illustrated by the block diagram shown in Figure 1. The generator 3 produces a pulse current that powers the transmitter 2, whereby its radiation becomes intensity modulated. This radiation is formed as a narrow

beam (by the lens of the emitter) and sent to the reflector 1 installed on a wall of the room. Part of the scattered energy reaches the surface of the photodetector 4, which converts it into an electric pulse signal amplified in the preamplifier 5 and then fed to the amplifier 7. The output signal of the amplifier 7 is supplied to the synchronous detector 8, which demodulates it, and then via the integrator 9 it gets to the alarm signal generator 10. The synchronous detector 8 is controlled by sync pulses arriving from the generator 3.

The appearance of smoke within the operating area of the device causes amplitude modulation of the output pulses of the amplifier. The pulse envelope derived by the synchronous detector 8 comes to the alarm signal generator 10 via the integrator 9. The alarm signal generator produces a signal with duration more than 2 seconds and applies it to the alarm unit 11 that opens the contacts of a slave relay.

The device has the automatic gain control unit (AGC) 6 that controls the gain when the signal goes from the preamp at low levels and the magnitude of its power radiation at high levels. To do this, the control signal is taken from the integrator 9. The magnitude of the control signal is proportional to the voltage at the output of the synchronous detector 8. Both AGC loops operate synchronously and change the gain of the signal path, but this kind of arrangement increases the AGC dynamic range.

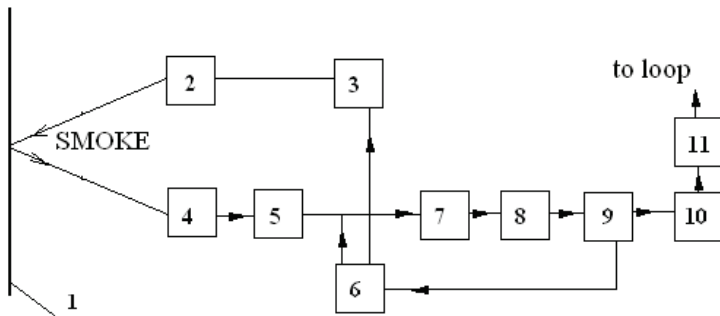


Fig.1. Block-diagram of the detector "Kvant-1"

1. Reflecting surface. 2. Emitter. 3. Generator. 4. Photodetector. 5. Preamplifier. 6. Automatic gain control unit. 7. Amplifier. 8. Detector. 9. Integrator. 10. Alarm signal generator. 11. Alarm unit.

It is important to note that the most important signal processing element determining the noise immunity of the detector is the AGC unit. The infrared beam propagates from the emitter 2 to the photodetector 4 in changing air dustiness and pollution, which leads to significant changes in the optical density of the air. Consequently, the input signal of the receiver is significantly reduced, which may be erroneously taken as a fire start.

The signal processing algorithm included in the detector "Kvant-1" that separates the signal from the noise is based on the experimentally revealed regularity: optical density variations of the air due to its dustiness and pollution and changes in gas composition are significantly slower than they are in the case of

smoke when a fire starts. The AGC unit, having a slow reaction, slowly restores the output level of the amplifier that has changed due to the noise, but misses a signal reduction pulse caused by rapid smokiness. Signal level reduction by 10% within 3 seconds should be perceived by the detector as "Alarm". Slower variations should not be perceived as "Alarm".

Analyzing the efficiency of the detector with varying optical density of the air and with different parameters of AGC is the aim of our modeling.

### **Studying the effect of interference on the operation of the fire smoke linear optoelectronic detector.**

False alarm of the detector may be caused by two main types of interference:

- weather conditions causing very slow changes in environment attenuation;
- birds crossing the detector beam and causing a short-term and rapid change in beam attenuation.

Figure 2 represents a very slow change in environment attenuation (line1) and the output signal of the detection unit of the detector that responds to this change (line 2). This figure also shows a change in the smoky environment attenuation (line 3) and the output signal of the detection unit (line 4). The parameters of the detector are optimal one. We can see that the right choice of the threshold evaluation (e.g.  $P = 0.80$ ) provides reliable separation of these two signals.

Figure 3 shows a short-term change in environment attenuation (line1) and the output signal of the detection unit of the detector responding to this change (line 2). The parameters of the detector are the same. We can see that a simple threshold evaluation does not allow separating this interference and avoiding false alarms. However, we can also see that an additional evaluation of threshold exceedance time solves this problem.

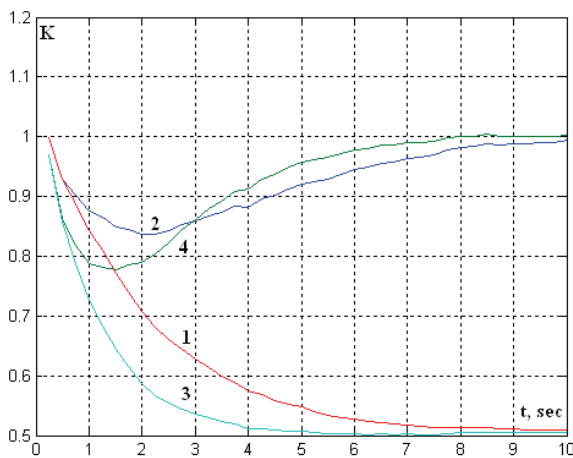


Fig. 2. Detector curves in the case of meteorological changes of the environment

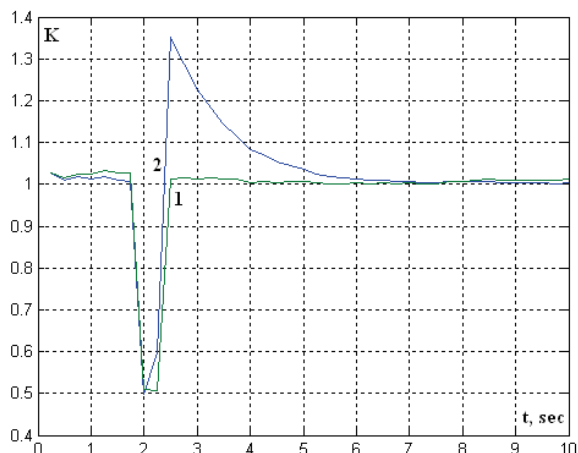


Fig. 3. Detector curves in the case of beam crossing by a bird.

### Conclusions

The developed model makes it possible to estimate the reliability of separating fire signals from interference/noise signals and determine signal parameters that cause false alarms.

The model also allows us to evaluate the quality of the signal processing algorithm used in this detector. It may be helpful both for developers of IR fire detectors in improving processing algorithms and for students in studying the principles of this type of detectors.

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## **GLOBALIZATION AND COMMERCIALIZATION OF SPACE ACTIVITIES AS A DETERMINING FACTOR OF DEVELOPMENT OF INTERNATIONAL SPACE LAW**

*The article analyzes the problems of legal regulation of space activity that have emerged because of the process of globalization and commercialization of space activities.*

In the 80s of the 20th century increasing commercialization and globalization was marked in space activities in different countries. If before those years the participants of space activity were only the states and governmental space agencies, nowadays, the situation has changed, as to them joined private and multinational corporations.

The necessity of adaptation of existing space law to the reality is the reason of such changes. Most of the documents of international space law were adopted in the 70s and they have a lot of gaps. Those gaps are explained: before the document was signed nobody could predict the direction of development of space activities in future.

The first important moment is the disparity of the present realities and concepts of international space law. Many of concepts are not fixed in the international acts and those that were identified do not include the activities of non-governmental organizations of space activities.

The main concept that requires priority resolution is the definition of the meaning «launching State». Its elements are assigned in “Convention of International Liability for damage Caused by Space Objects” in 1972. It defines the following signs of launching State:

- the State that launches a space object;
- the State that procures launching a space object ;
- the State from that territory launches a space object;
- the State from that facilities launches a space object.

The definition above is the basis of the Liability Convention and it generates a lot of problems in the context of space activities made by non-governmental organizations. It's the reason of problematic application of this convention in the modern conditions.

Articles 2 and 3 of the convention define liability for damage:

-Launching State is responsible for the payment of compensation for damage caused by the space object on the Earth or to the aircraft in the air.

- In any place, except the Earth surface, if the one space object, person or property is damaged because of another space object, the last is responsible for the loss only if it's guilty in what had happened.

As we can see concept “launching State” is used in the definition of liability. It's important the provision of the Article 6 of the “Treaty on Principles of



Governing the Activities of states in the Exploration and Use of Outer Space including the Moon and other Celestial Bodies” in 1966 according to that “States – parties of the Treaty should bear international responsibility for national activities in the outer space, including the Moon and other celestial bodies, regardless of whether it’s carried out by governmental organs or non-governmental juridical persons and for the providing the national activities in the accordance with the provisions included in this Agreement. The activity of non-governmental juridical persons in the outer space, including the Moon and other celestial bodies, should be allowed by the State and be under observation of the participant of the Treaty. In the case of activities in the outer space, including the Moon and other celestial bodies, of international organization the responsibility for compliance of the Treaty carried out the participants of the Treaty and international organization”.

The provisions above emerge the following problems:

1. If damage made by the space object that was launched from multinational company, it becomes extremely difficult to determine the responsible State. Multinational company may be registered in one State, has offices in another and has the owner in the third place, be under the laws of the forth and execute projects of the fifth State.

2. It seems unfounded statement that launching States are only that provide its territory for launching space objects, but does not launch by themselves. The developing countries (most of them are located along the equator ) can hardly be named as a valuable participant in space activities. The allocation of responsibility for damage to these States is not right.

**Conclusions.** The whole system of international space law was created on the basis of the fact that the subjects of the most relations are the State and its organs. The changing nature of space activities shows the necessity of revision and addition of international space law. At the initial stage would be logical decision to do changes in the documents that have already been taken and to revise the most important problems. In the future new norms of international space law should be worked out and adopted; they add and replace existing ones. It can be made by signing new documents in certain directions of space activity or by adoption of a single convention of international space law.

The primary role in the modernization of international space law should be given to the United Nations that is a platform for harmonization of key positions on regulation of space activities from the formation of space activities.

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## **TERMS OF THE AIR CODE OF UKRAINE AND PROVISIONS OF CRIMINAL LAW**

*The article highlights the issue of the relationship of air and criminal law of Ukraine. The attention is paid to the controversial moments, when the legal requirements of the Air Code of Ukraine do not correspond with the theory of criminal law. The author criticizes certain provisions of the Air Code of Ukraine from the standpoint of the doctrine of criminal law.*

The presence of the specific connection among the branches of law of the state is the objectively existing fact that doesn't require the substantiation. It is difficult to name the subject of the jurisprudence where the first topics don't highlight issues of the relationship of the particular branch of law with other branches or applied legal science. Named aspect of the existence of certain field of law derives from the nature of the entire legal system of the state.

Taking the example of criminal law we note that it has a close relationship not only with the related fields of law and science (so-called criminal cycle (direction)) – the criminal procedural law, penal law, criminology, criminalistics, forensic medicine and psychiatry, but also with such branches of law as civil, commercial, labor, finance and other. It's not necessary to give examples because it is obviously for any professional in the field of law.

One of the evidences of the interdisciplinary connections is the legal norms with so-called blanket disposition in criminal law. It is provisions of criminal law, where the references to the provisions of other areas of law, which reveal in detail the content of criminal behavior, are made apparently or latent. However, there are also situations, when the rules of other areas of law include a reference to the requirements of the Criminal Code of Ukraine. In this case, the authors of the legislation or other regulations agree provisions of "their" branch of law with the norms of the law of Ukraine on criminal responsibility.

We can make the assumption that, as a rule, the authors of the draft laws consider that such coordination isn't so complicated because it applies directly to the Criminal Code of Ukraine. By the way, an insidious trap can hide there – mechanical using of the terms and terminological phrases of criminal law without proper awareness of their doctrinal content. Finally, it can lead to the significant distortions of the content and, as a result, impede or make impossible application of such legal norms.

The reasoning given below is only the first superficial view of the author at the difficult and interesting issue of the interbranch connections of criminal and air law that isn't sufficiently studied in the modern legal literature.

The Air Code of Ukraine, adopted 19.05.2011, [1] establishes the legal basis of the secure activity in the field of aviation. In terms of legislative technique, the Air Code authors' approach to the introduction of the first article, which contains

definitions of the terms used in this legal act, is undoubtedly a positive step. Among explanations of the terms and their meaning there are those that are related to the criminal law. The authors of the Air Code of Ukraine have used, in particular, the terms "bodily injury", "deadly effect", "death", "victim", "disaster" and other. But their explanations are not always perfect.

One of the terms causing the question is the concept of "bodily injury with fatal consequences", which is widely used in the Air Code of Ukraine. For example, p. 100 part 1 of Art.1 of the Air Code of Ukraine determines: "bodily injury with fatal consequences is the damage, which person obtained in the aviation accident that led to his death within 30 days after the event". Paragraph 2 p. 49 part 1 of Art.1 of the Air Code of Ukraine provides that "in the event of bodily injuries, due to which death occurred within 30 days from the time of aviation events, they are classified (probably, in original the term "qualified" should be used here – S.B.) as bodily injuries with fatal consequences".

We consider that the expression "bodily injuries with fatal consequences" is a pleonastic turn of phrase. This conclusion can be reached on the basis of the interpretation and clarification of the correlation of the mentioned dangerous consequences by doctrine of criminal law that is supported by the current criminal law and other legislation.

The rules of forensic determination of the bodily injuries severity (approved by the Ministry of Health of Ukraine № 6, January 17, 1995) determine that from the medical point of view bodily injuries – are a violation of the anatomical integrity of tissues, organs and their functions, which arises as a consequence of one or more external damaging factors – physical, chemical, biological, mental (Art. 1.2 of the Rules). According to the Criminal Code of Ukraine there are three degrees of injuries severity: heavy, moderate severity and light (which, in its turn, is divided into two types – Art. 125 of the Criminal Code of Ukraine).

The death of the victim is a special dangerous consequence that is separated from bodily injuries by legislation. It should be noted that from a medical point of view death as a result of unlawful behavior can be caused only by disturbance of the anatomical integrity of tissues, organs and their functions, which arises as a consequence of one or more external damaging factors – physical, chemical, biological, mental by causing some injuries.

Only in one case, criminal law directly connects two socially dangerous consequences within the one corpus delicti. It is intentional grievous bodily injuries and death of the victim that is caused by them (Part 2 of Art. 121 of the Criminal Code of Ukraine). However, in this situation the legislator, firstly, bases on the organic relationship existing between intentional grievous bodily injuries and death of the victim and, secondly, focuses on the intentional character of the grievous bodily injuries. If death of the victim occurs as a result of the negligence associated with the violation of certain safety regulations (for example, flight safety or other security at the air transport), the consequences should be formulated by the legislator as "the death of the victim" instead "bodily injuries with fatal consequences," although the physical mechanism of death causing, of course, includes the bodily injuries. Thus, we conclude that the indication of the bodily injuries is unnecessary – it would be sufficient to note "the victim's death" or "death of human" and so on.

As we have already mentioned, par. 2 p. 49 part 1 of Art.1 of the Air Code of Ukraine provides that "in the event of bodily injuries, due to which death occurred within 30 days from the time of aviation events, they are classified as bodily injuries with fatal consequences". A literal interpretation of this provision leads to the conclusion that the victim's death occurred on the 31<sup>st</sup> day or later will not be considered as the bodily injuries with fatal consequences.

Is this normative approach, establishing a causal relationship (the phrase "due to which" points to this) of the death with the bodily injuries on the basis of the time period between the injury and death, correct?

Domestic science of criminal law has long believed that it is impossible to establish any abstract terms for the issue of a causal relationship. The point is that the character of the injury and the features of the victim's body could be so specific that we cannot consider the abstract terms in such cases at all. The only task of the court during the solving of the issue on causality is the clarification of the fact whether the bodily injury evoked health disorder or death or not.

If it is obviously proved that the injury inflicted to the victim is the cause or at least one of the major causes of the victim's health deterioration or death the subject must be found guilty for these consequences. It isn't matter for solving issue on responsibility whether such consequences have happened immediately or after some period of time (even very long). And on the contrary, if the causality isn't proved in the case it excludes responsibility of the subject for the victim's health deterioration or death even these consequences coincided in time with infliction of bodily injuries.

**Conclusions.** As to body injuries the issue of causality has two aspects: 1) is the victim's health deterioration or death the outcome of subject's action? 2) And is the period of time between them important? Thus, in some cases, the victim's health deterioration or death happens immediately after infliction of the bodily injuries but the time gap can be measured in hours, days, weeks and even months.

Is it possible to establish the certain maximum of time for the recognition of causality? It seems that it's impossible. The nature of the caused damage, characteristic of the organism is so unique that we can't conceder any scientific basis for establishing some general abstract terms.

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## **REALIZATION OF INTERNATIONAL LEGAL NORMS OF ADJUSTING THE SAFETY OF AVIATION IN UKRAINE**

*Development of documents of international air law, improvement and introduction of standards and recommendations which are used in international and national air practice are analysed in the article.*

A civil aviation is the important constituent of an international transport system. It provides the important segment of market of international transportations, loads and other transport services. One of most relevant problems of a modern aviation industry is providing the safety flights and creation of effective control system by this process, which foresees forming of policy and operating procedures of providing the safety flights, optimization of organizational structure, distributing of responsibility between public authorities and subjects of aviation activity. Priority of this direction in national aviation industry is determined by comparatively low indexes of flights security and considerable losses from aviation events which were made during last ten years over 160 million grn. [3].

At the same time safety flights are a determinative direction of activity not only within the limits of separate country but also in an international scale, that stipulated the creation of the specialized institution at UNO – Temporal international organization of civil aviation (PICAO) in 1944 years by Chikago conference, which in 1947 was renamed in IKao [1]. From May, 1948 IKAO is the specialized establishment of UNO which is engaged in organization and coordination of international cooperation of the states in all aspects of activity of civil aviation. In the moment of foundation of IKAO, 52 countries became the participants, and now there are near 190 of them, among which since 1992 on the basis of succession was Ukraine (Soviet Union was a member IKAO from November, 10, 1970).

Importance of problem of adjustment of international aviation activity caused creation of other intergovernmental organizations, in particular the Agency of safety air navigation in Africa and Madagascar (ASECNA) was created in 1959. The proper convention was signed by the prime minister of France and heads of governments of 12 African states-members of the «French community». The primary purposes of activity of this organization was providing the regularity and safety flights above territories of states-participants of the African continent, presenting the flighting, technical and vehicular information, operational control, control after air motion. In 1969 the African commission of civil aviation (AFCAC) was created at Conference of representatives of 32 African states in Adis-Ababa by initiative of IKAO and Economic commission of UNO, the primary purpose of which was an assistance in development of general policy of states-participants in relation to the increasing of efficiency of the usage of African air transport in obedience to the practice recommended by IKAO [5, page 57].

European organization of safety air navigation (EUROCONTROL) was created in Brussels in 1969 as international regional intergovernmental organization, Convention of which was signed by Belgium, Great Britain, Netherlands, Luxemburg, France and Germany. Ukraine joined to Eurocontrol in 1999. The primary purpose of this organization is the protection of flights of civil and military air vessels. In 1973 the Latin commission of civil aviation was created in Mexico (LACAC). In 1991 the intergovernmental Council on an aviation and usage of air space (RAVPP) was created in Minsk under participation of states-participants of the CIS (Azerbaijan, Armenia, Belarus, Kazakhstan, Kyrgyzstan, Moldova, Russian Federation, Tajikistan, Turkmenistan, Uzbekistan, Ukraine) and Georgia. The purpose of activity of RAVPP is the development of rules of the usage of air space, organization of the unique air traffic control, realization of intergovernmental normative acts and standards of flights security according to the ICAO requirements [5, page 58 – 59].

Today ICAO is the main international organization which determines the conceptual policy of development of industry of civil aviation and develops standards and recommendations which are followed in the work by other intergovernmental organizations on questions of air shipments and also national aviation removal firms.

The main aims and objectives of ICAO are defined in Article 44 of the Chicago Convention. Among them: guarantee of safe and well-organized development of civil aviation in an international scale; providing the organization and co-ordinations of international cooperation on different questions of civil aviation; encouragement of art of constructing and exploitation of air ships in peaceful aims; encouragement of development of air-routes, air-ports and aero navigation facilities for an international civil aviation; satisfaction of necessity of people in a safe, regular, effective and economic air transport; providing the complete respect of rights for the contractual states and just for every contractual state possibilities to use their airlines in an international air traffic; promoting the safety flights in international air navigation.

Priorities of activities of ICAO in the field of aviation safety on the modern stage touch questions, related with management of risks for aviation safety and simplification of formalities; development of educational materials; granting help to states-members in providing of observance of regulations of ICAO in relatively to aviation safety; creation of functional elements and methods of achievement of the global system of market measures, directed to lowering of aviation emission; formulation of policy and standards with the purpose of coordination and support of efforts in industry of development of alternative types of ecological fuel and acceptance of more demanding standards from aviation noise; development of ICAO new Statistical program and innovative strategies from bringing in and maintenance of aviation specialists for next generation.

ICAO activities aimed at continuous improvement of successful indexes of civil aviation in the industry of safety of flights, cover four main areas: policy and standardization, monitoring of basic tendencies and indexes in the field of safety flights, analysis of the state of safety of flights, realization of having a special purpose programs in safety flights.

In 2011, instructional materials ICAO Navigation Manual (Doc 9613) were updated and published, in which they consider the questions, that are related with flying verification of charts of flights with devices, and also requirements to qualification of pilots. In strategy of ICAO it is accentuated on lowering of index of accident rate by using the improvement of co-ordination and standardization of the programs in industry of safety flights. Other initiatives in the field of safety flights touch improvement of accounting procedures which are bases for regional control system of safety flights, creation of the Global travelling map of providing the safety flights, general method of modernization of the aviation system, global conception which examines the flight path in all aggregate and combine into the unique unit air, surface and normative components of the global aero navigation system [2].

State regulation of civil aviation of Ukraine is carried out by Government aviation service of Ukraine, which is the authorized organ on questions of a civil aviation and will realize a public policy and strategy of development of national aviation. This organ implements complex measures on providing the safety flights, aviation, and ecological, economic and informative security; creates conditions for development of aviation activity; organizes the usage of air space of Ukraine. Government regulation of the usage of airspace is carried out on the basis of general decisions of the authorized organ on questions a civil aviation and Department of defense of Ukraine.

In 2009, Ukraine adopted the Conception of the State having a particular purpose program of safety flights till 2015, in which development and realization of effective measures is foreseen for introduction of control system by safety flights in obedience to the requirements of ICAO and Eurocontrol. Solving the problems of safety flights and increasing of attractiveness of the Ukrainian air transport, competitiveness of national exploiters of air ships was determined as important direction. Having a special purpose program of safety flights the government foresees providing of the proper level of security of flights by every subject of aviation activity, in particular by exploiters of air ships and air fields, organizations of technical service of air ships, by providing the aero navigation service, educational establishments of civil aviation, developing and producing of air ships. According to requirements of ICAO and ECC the introduction of the modern approaches to the management of flights safety is foreseen through organization of permanent work in revelation and removal risks, which will give an opportunity to ensure safety flights during exploitation of air ships, air fields, certification of personnel, maintenance of air motion, providing flying fitness.

The necessary condition of introduction of the modern approach to the management of safety flights determined a development of new legal acts, improvement of public policy in the industry of adjusting of air shipments. Realization of this program will further the raising till 2015 the level of flights security on 50% and reduction of middle relative indexes of accident rate during passenger- freight transportations from 0,72 aviation events on a 100 000 o'clock of raid to 0,36; during conducting of aviation works from 9,37 aviation events to 4,6. The increasing of level of flights security will be provided with introduction by all subjects of aviation activity of control system of safety flights, by modernization of infrastructure of industry of civil aviation, updating of park of civil air ships and



structure of their service, strengthening of control after the observance of requirements of safety flights by the subjects of aviation activity. In obedience to recommendations of ICAO it will conduct optimum balance of the system of government control in relation to establishment of requirements to exploiters of air ships, air-ports and enterprises which give aviation services [3].

Leading role in training specialists, who will carry out realization of management of flights safety in obedience to recommendations of International organization of civil aviation, plays an educational center in air-port «Boryspil» and Institute of ICAO of the National aviation university. In particular, an educational center in Boryspil trained over 5000 specialists of aviation safety in 2012 for the countries of the CIS, Baltic and Ukraine. Activity of this center was highly appraised by general Secretary of ICAO R. Bendzhamin and by the director of Europe North Atlantic bureau of ICAO L.F. de Almeyda. Collaboration between the National Aviation University and ICAO began in 80th XX century from participating in the programs of the studies of specialists, retraining of soldiery pilots, development and translation of materials of ICAO. Since 2000 more than 2800 workers of aviation administration, airlines, air-ports, aviation enterprises, flying clubs, aviation educational establishments of Ukraine and 35 foreign states passed training and retraining in Institute of ICAO NAU. The institute of ICAO has close creative ties with aviation administrations and enterprises of many countries and closely co-operates with Advice of ICAO, with Management of aviation safety of ICAO, with the European North Atlantic bureau of ICAO, the leaders of which participate actively in work of Institute ICAO NAU and became its honored professors [4, c. 309 – 311]. Accepting the challenges of global problems of the present ICAO and its regional representative offices, direct their efforts to development and introduction of normative, organizational ensuring of control system of safety air passenger shipments in consideration of general and national interests of the separate aviation states, including Ukraine.

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## **STRUCTURAL AND FUNCTIONAL ASPECTS PERSONNEL OF CIVIL AVIATION**

*Correlative analysis of the functions of civil aviation and aviation personnel competence remained beyond the legislative definition and impact, as well as research out of research of scientists in administrative field. Received knowledge about the functions of other aviation personnel allow objectively declares their genetic similarity with the functions of aviation personnel.*

The problems in the legal regulation of the subjects' activity, who implement their authority in the sphere of civil aviation of Ukraine allows talking about the topicality of the theme. The research task is to get objective knowledge about the degree of the normatively fixed competence of the aviation personnel that were determined by the Air code of Ukraine, allows to the appropriate specialists to implement the functions of civil aviation in the limits of the law.

In the legal investigations of the Ukrainian scholars in the sphere of administrative law such as: N. Daraganova, A. Filipov, A. Bychkov, M. Kovtyukh, F. Skrypnyk, O. Reva etc. the separate issues of the subjects' activity, which realize their competence in the sphere of use of civil aviation, were discussed. However, there was no task to investigate the legal mechanisms that determine their aggregate in an integrated system. That is why the correlative analysis of the functions of civil aviation and aviation personnel' competence, which shows that in some cases the expected interdependence and therefore normatively regulated relations between them are investigated not enough or out of investigators' interests at all. This circumstance determines the feasibility of the implementation of scientific research for the purpose to determine and normatively objectify it as an independent systematic unit, the continuum of the specialists with competence adequately correlated with the functions of civil aviation.

In the normative documents, which regulate the legal relations in the sphere of civil aviation in Ukraine, there are no concept and, therefore, the term "civil aviation personnel".

At the same time, the Air code of Ukraine [1] defines the civil aviation as aviation, which is used to satisfy the needs of the economy and citizens in air transportations and aviation works and also private flights. There is no doubt that the implementation of these functions requires specially trained personnel.

In this connection attention was paid on the determination in research legislation materials of the concept of "aviation personnel". Firstly they are acts, which regulate aviation activity in Ukraine [2], the documents of the International Civil Aviation Organization (ICAO) [3] and also the legislation of other countries [4].

By the definition of the aviation encyclopedia [5], the aviation personnel are employees of civil aviation the activity of that are directly related to its use.

The term “aviation personnel” on the legislative level for the first time was created in the Air code of the USSR in 1983. The Code established that the aviation personnel include the personnel of an aviation enterprise, an organization, a department, an educational institution, that consist of aviation specialists in accordance with the professional property.

In the legal documents of Ukraine, adopted before 2011, aviation personnel were understood as personnel of an aviation enterprise, an organization, a division, a command management staff, that consist of aviation specialists according to professional property.

In accordance with literature sources of this period the aviation personnel include: a) civil aviation employees whose activity is directly aimed at the objectives of the use of civil aviation; b) specialists of aviation enterprises, institutions, organizations and educational institutions that have appropriate training and access to provide and make flights.

The Air code of Ukraine, which was adopted in 2011, in the item 9 of the article 1 determined that the aviation personnel consist of people who: a) have passed the special professional training, b) have an appropriate certificate, c) are carry out flight exploitation, d) technical service, e) air traffic management, f) technical exploitation of ground-based communication, navigation and surveillance.

These characters, firstly, concretized the sphere of functioning of aviation personnel, secondly, considerably narrowed the sphere compared to earlier regulations in force.

In accordance with these features six groups of employees in the sphere of civil aviation are determined by: 1) a pilot (a commander) of an aircraft; 2) the air traffic controller (a service manager of motion); 3) the personnel of technical service of aircrafts; 4) test crew members; 5) a member of a passenger cabin crew (a flight attendant); 6) the flight operations manager.

According to normative characteristics of the aviation personnel it is possible to understand that all of them execute the next functions.

1) A pilot (a commander) of an aircraft has a function to check required for the flight instruments and equipment, to make a decision about proper state of the aircraft for the flight; also he is responsible for implementation of the procedures of the present-piloted or supervising pilot, etc.

2) An air traffic controller (manager traffic services) is responsible for taking direct control of air traffic, air traffic control service of aircraft; acceptance the information about air traffic control and its transfer to the adjacent departments of air traffic services, etc.

3) The aviation personnel on aircraft service execute different types of technical service of the aviation technic and repairs of equipment, registration and certification of the equipment etc.

4) A member of the test crew. Functions of the crew are preparation and coordination of the flight test programs and overflights on the corresponding topics, preparation and conduct of flight tests etc.

5) A member of the crew of the passenger compartment (a flight attendant) performs the pre- and after inspection of the interior, takes on an aircraft things for passengers service, provides security of passengers etc.

6) Flight providing manager (an officer of flight providing) considers and estimates in aeronautical calculations and operational planning of flights technical capabilities of aircraft and relevant air navigation equipment, controls the members of the crew to observe their working time rules and preflight resting etc.

Analyses of the function of each occupational group shows that they all more or less are implemented in order to ensure safety. At the same time, we consider, that it possible to divide them into functions, which: a) directly provide safety and b) indirectly provide safety.

The investigation of them using the methods of formalizing and idealization can give real base to suggests that a pilot (a commander) of the aircraft has 92 % of the functions which directly and indirectly provide safety; an air traffic controller has 90 %; the personnel of aircraft service have 84 %; the test crew members have 96 %; the crew of the passenger compartment (a flight attendant) has 54 %; the flight providing manager has 91 %.

Accordingly a pilot (a commander) of the aircraft has 8 % of functions which indirectly ensure the safety of flights, an air traffic controller has 10 %, the personnel of aircraft service have 16 %, the test crew members have 4 %, the crew of the passenger compartment (a flight attendant) has 46 %, the flight providing manager has 9 %.

Among the subjects, who are not determined by the Air code of Ukraine of 2011 as aviation personnel, but workers of civil aviation perceived the activity of that are directly connected with use (call them “other personnel whose activity is directly related to the using of civil aviation”), it is possible to admit: 1) employees of the State aviation service of Ukraine; 2) workers of air companies (operators), dealing with internal and international transportations of passengers; 3) airport employees, providing service of passengers, flight, exploitation of aircraft, buildings and structures and also bases of flights providing; 4) workers of airfields providing takeoff, landing, placement and service aircraft; 5) workers of companies of technical service and repair that ensure the airworthiness of the aircraft and their service; 6) state inspectors on aviation supervision, which execute inspection of objects and subjects of aviation activity and control of their implementation of ukrainian aviation rules; 7) staff of education institutions (provide training, retraining of the specialists in the sphere of civil aviation); 8 ) employees of the manufacturers of aviation technic in Ukraine, which provide delivery of aircraft technic to the operators and supervision of its operation; 9) employees of the National bureau of aircraft events and incidents involving civil aircraft; 10) workers of the Ukrainian state design technology and research institute of civil aviation “Ukraeroproekt”; 11) workers of the State air traffic services enterprise of Ukraine (Ukraerorukh).

Dominance of the functions to provide aviation security in the competence of the subjects of aviation of Ukraine is in accordance with the obligations of Ukraine that follow from the fact that its entry into the ICAO and the full ratification of the Chicago convention from 1947, which is “the constitution of the international civil aviation”, designed to prevent a threat to the general security in the world.

Thus, the aviation personnel and other personnel whose activities directly related to the use of civil aviation, perform the same type in their genetic nature and objectives functions.

In accordance with this conclusion it is possible to discuss about the systemic unity of a) the aviation personnel, determined by the rules of the Air code of Ukraine in 2011, and b) other personnel, whose activity is directly related to use civil aviation. On this basis it is advisable to put the term “the personnel of civil aviation” to the aviation legal sphere.

An important aspect of the institutionalization of civilian aviation is establish evidence, that the above sum of its components is a specific education system.

Under the system commonly understood by the sum of elements connected to each other and form a integrity, unity. Thus the properties of an integrated system determine not only the addition of the properties of its individual elements, but also the properties of its structure, especially system-integration relationships.

System organization of civil aviation authorities is inextricably linked with the uniform principles, upon which the activities of all civil aviation: the unity of airspace Unity air legislation, the unity of government regulation.

As aviation personnel and other personnel providing civil aviation security are interrelated and work with a single purpose - meet the needs of individuals and the economy as services and works of civil aviation, therefore, the industry is only possible on the basis of an integrated approach to it and the general principles of aviation, uniting them in a common industry basis.

Based on the foregoing, all employees consider as their set that is able to integrate all components into a single integrated system of civilian aviation.

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## **LEGAL REGIME OF REGIONAL PATENTS**

*The author discloses the essence of a regional patenting system, describes the process of registration and issuance of regional patents, in particular, the European and Eurasian patents.*

Original ideas and creative work are assets which may be of commercial value in the same way as material goods. Establishing and protecting the ownership of ideas and their representation or application is the function of intellectual property rights such as patents, utility models, copyright, trademarks or designs and models. The protective right may depend on some kind of registration procedure, as for trademarks and as is usually the case for design rights.

Patents protect technical inventions. They are valid in individual countries, for a specified period. Patents confer the right to prevent third parties from exploiting an invention or utility model for commercial purposes without authorisation. In return for this period of protection applicants must fully disclose their invention (utility model). Patent applications and granted patents are published, which makes them a prime source of technical information. An invention can be, for example, a product, process or apparatus. To be patentable, it must be new, industrially applicable and involve an inventive step [1, pp. 355-376; 2].

So, a patent is an exclusive right granted for an invention, which is a product or a process that provides a new way of doing something, or offers a new technical solution to a problem. The patent provides protection for the owner, which gives him/her the right to exclude others from making, using, exercising, disposing the invention, offering to dispose, or importing the invention. The protection of invention is granted for a limited period of 20 years. The protection of invention is granted for a limited period of 10 years [3, pp. 65-85].

Patent protection is not automatic. One has to file an application describing the invention in technical terms and in a form that meets certain requirements. The first step is usually to file an application with a national patent office. Under the 1883 Paris Convention, someone who files an application in one country can then claim the “priority” of the filing date of that application for later applications in other countries, provided that they relate to the same invention and are filed within twelve months of the first one [4; 5].

A patent does not confer a right to make use of or exploit an invention. It is a right to prevent others from deriving economic gain from the technology without the owner’s permission. The use and exploitation of technology remain subject to national laws and regulations. A patent does not provide a guarantee of commercial success. All it shows is that the idea in question is new, industrially applicable and inventive. It is up to the owner to develop the business side. The purpose of patents is not to establish long-term monopolies. They are granted for a limited period,

which can only be extended in the case of medicines and pesticides which have to undergo lengthy clinical trials for safety reasons [6; 7].

The essence of a regional patenting system is that countries of certain region (for example, Europe, CIS, Asia or Africa) signed certain regional treaties on obtaining a single patent valid on the territory of all countries in this region. Regional patent is a patent, granted by one of the regional patent offices, which is valid on the territory of each member state of this regional treaty, but under condition that such patent is registered in the national patent office of the appropriate country. Hereby, there arose the European patent (covering a majority of the European countries), Eurasian patent (covering countries of CIS), etc.

Regional patent office is a patent office, authorized by the member states of regional treaties to implement legally significant actions on applications and law enforcing documents to certain industrial property object.

The European Patent Office (EPO) is located in Munich (Germany) and it has departments in the Hague and branches in Berlin and Vienna. The EPO is a structural unit of the European Patent Organization and performs the above mentioned actions for member states of 1973 European Patent Convention. Since 1973 the European Patent Organisation has grown to include 38 member states, covering an area with nearly 600 million inhabitants, namely: Albania, Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Monaco, Former Yugoslav Republic of Macedonia, Netherlands, Norway, Poland, Portugal, Romania, San Marino, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom. The European patents can also be extended at the applicant's request to Bosnia-Herzegovina and Montenegro [8].

The European Patent Convention makes it possible to obtain patent protection in about 40 European countries on the basis of a single application. The applicant selects the countries in which he wants protection. The European patents are granted by the EPO in a centralised and thus cost-effective and time-saving procedure conducted in English, French or German, its three official languages. They have the same legal effects as national patents in each country for which they are granted. Every European patent undergoes substantive examination and can be obtained for countries which otherwise have "registration-only" systems, thus providing strong protection.

The term, scope of protection, binding text and grounds for revocation of the European patents are the same for all contracting states to the European Patent Convention.

All the contracting states to the European Patent Convention offer the possibility, as a first step, of applying for a national patent. Filing an application with a national patent office has the advantage that entry to the procedure is relatively cheap and that applicants can deal with a patent authority in their own language. If they decide that they also need protection in other countries, they have twelve months from the date of first filing to file applications for the same invention elsewhere. They can claim the priority of the date of first filing for such subsequent

applications. The European patent application can claim the priority of a national application or, as is less commonly the case, may itself be a first filing [7].

The European application can also be derived from an international application filed under 1970 Patent Cooperation Treaty (PCT). This Treaty offers a simplified patent application procedure for 146 countries worldwide. It enables inventors to file a single international application designating many countries, instead of having to apply separately for national or regional patents. In this international phase, an international search and, on request, international preliminary examination are performed [9]. In the national or regional phase, the patent granting procedure is then carried out by the relevant national or regional patent offices, for example the EPO.

Under the law of the European Patent Convention, patents are only granted for inventions that are new, that involve an inventive step and that are industrially applicable. An invention meets these requirements if it was not known to the public in any form prior to the date of filing or to the priority date, was not obvious to a skilled person and can be manufactured or used industrially. Discoveries, mathematical methods, computer programs and business methods as such are not regarded as inventions. Surgical and therapeutic procedures along with diagnostic methods practised on the human or animal body are excluded from patentability. New plant varieties or animal breeds are completely excluded from patentability. The European Patent Convention does not, of course, recognise inventions whose commercial exploitation would be contrary to “ordre public” or ethical principles, such as means of cloning human life or the use of human embryos for commercial and industrial purposes [8].

The cost of the European patent depends very much on the number of designated countries and the planned term of the patent. Fees are charged for filing and search, for the sixteenth and each subsequent claim, for designation, extension, grant and publishing, along with the renewal fees payable for the third year after the date of filing and the years thereafter until grant [7]. On September 9<sup>th</sup>, 1994 in Moscow countries of CIS (except of the governments of Uzbekistan and Turkmenistan) signed the Eurasian Patent Convention [10]. This Convention established the Eurasian patent system, organizational shaped in the form of the Eurasian Patent Organization (EAPO) and Eurasian Patent Office, headquartered in Moscow. Ukraine also signed this Convention but did not ratify it, so our country is not a member state of the EAPO and the Eurasian patent’s action does not extend to its territory [11].

The Eurasian Patent Convention came into force on August 12<sup>th</sup>, 1995. The main purpose of this Convention and the EAPO is to create an international regional system of legal protection for inventions on the basis of a common Eurasian patent covering the territory of all states party to the Convention. The term of the Eurasian patent is 20 years from the date of filing the Eurasian application. The Convention’s entry into force has created a unitary patent system throughout the territory of its states party to the Convention which, following international practice in the field of patent co-operation and integration, provides for the following: a simple and inexpensive procedure for obtaining patents with validity in all states party to the Convention (one Eurasian application in one language (Russian), one



examination, a common Eurasian patent); strong Eurasian patents since all Eurasian applications have to undergo substantive examination; harmonised protection of the patentee's rights within a unitary patent area on the basis of the Convention and other related regulations.

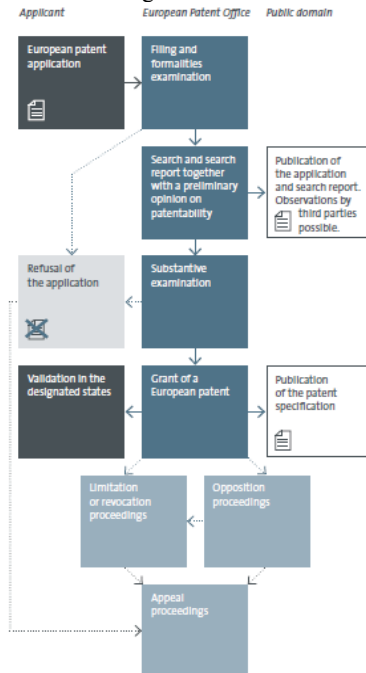


Figure 1. The Procedure of Granting the European Patent

entity eligible to obtain the Eurasian patent, irrespective of their citizenship, residence or principal place of business. For the purposes of the Eurasian procedure, a person who has filed the Eurasian application shall be deemed eligible to obtain the Eurasian patent. The Eurasian patent application may also be filed by a group of persons, for example, jointly by a legal entity and physical entity. Applicants with residence or principal place of business in a state party to the Convention can file the Eurasian applications (and take action before the Eurasian Patent Office) independently or through a representative. Applicants, irrespective of their nationality, residence or principal place of business, can file the Eurasian applications and pay fees independently, i.e. without a representative, even in cases where the appointment of a representative for subsequent actions before the office is mandatory.

At the request of the patentee, the twenty-year term of the Eurasian patent may be extended in states party to the Convention whose legislation contains a provision for the extension of the term of national patents. The extension of the term of the Eurasian patent in such a state party to the Convention is performed by the Eurasian Patent Office in accordance with the terms provided for in the state's legislation for the extension of the term of national patents. The processing of the Eurasian application consists of two stages, the first one including the determination of the filing date, the formal examination, the search and the publication of the application, the second one starting with substantive examination and ending with the grant and publication of a patent. The examiner can invite the applicant to take part in the processing if his application at any stage of the exercise.

The Eurasian patent application may be filed by any physical or legal

The Eurasian patent applications should be filed directly with the Eurasian Patent Office or via the national office of a state party to the Convention where this is required by national law.

At present, applicants from all states party to the Convention must file with their respective national offices. This requirement does not apply to applicants claiming priority on the grounds of a previous application or a divisional application. Where an application is filed with the Eurasian Patent Office, the required materials may be furnished either directly to the Office, or mailed or faxed. Where the materials were sent by fax, the originals must be furnished within one month of the date of receipt of the faxed application [12].

It is important to underline that the right of filing an application to the appropriate regional patent office has the applicant of any country, as in this case the regional treaties are open.

So, the unitary regional patent office should save time and money by existence of single unified rules of patenting inventions in the member states. Moreover, the documents granted by such office are also valid for the territory of all member states of the regional patent community. In future these regional communities can enhance the effect of their documents to each other, because at present there is no “international” patent with the effect simultaneously in all countries. Therefore, to obtain legal protection for concrete industrial property object one should, first of all, define in which countries you plan to produce and/or sell his/her products and then to make a patenting in accordance with the above mentioned patenting systems.

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## **PROBLEMS OF ADMINISTRATIVE AND LEGAL REGULATION OF SAFETY IN CURRENT CONDITIONS**

*The paper attempts to disclose the mechanism of administrative and legal regulation of safety. Stressed to the need for the implementation of international law in domestic legislation, and the need to increase public funding of research programs for the development of domestic aircraft.*

Activities concerning administrative and regulatory safety infancy and is characterized by the lack of scientific and theoretical studies of the problem, including the uncertainty of the place of safety in the national security of Ukraine, legal concepts and characteristics of safety. For efficient and stable functioning of the state mechanism in the field of civil aviation should gradually resolve the main factors that directly or indirectly affect directly on safety.

It can be argued that the role of the state in ensuring safety is the most important. According to M. Kravchenko, in recent years, the application of competition law in respect of air transport has become a common phenomenon. It confers on it the function of the regulator of many issues of competitive behavior of participants of the international aviation market. Range of issues whose resolution is necessary in the national competition laws, including airspace, is constantly increasing. As the world practice, at the present stage of development of international civil aviation important to regulate the issue of alliances and associations, lack of jurisdiction under antitrust laws, abuse of a position in the market, dumping in terms of traffic, airport taxes and fees, guarantees of state aid, credits and others. The main problem in addressing these issues, there are different approaches countries participating in the international aviation market and on the division of the usual anti-competitive practices of the actors of air transportation activities. State ownership of a controlling corporate rights leading national carriers is common is common practice controlling the activities of the aviation enterprises in the former post-Soviet space. This provision is also practiced by the state carriers direct financial support and other assistance, which greatly affects the competitiveness of national carriers post-Soviet states, compared to carriers of other countries on the international aviation market. Today, post-Soviet countries form their relations in the field of international air transport agreements on reliable. So they are trying to protect the interests of their national carriers. Such protectionist policies in general characteristic of these countries, since due to objective circumstances of their airlines are not able to compete with the leaders of the international air transport market - the U.S. and EU countries. "The practice of ill-regulation of carriers purpose, determination of transport volumes, the number of flights and routes allowing foreign airlines to restrain the expansion of the markets of the former post- Soviet space" [1, c.78].

As the Government of Ukraine and the Government of the Russian Federation make effective steps to improve and develop the civil aviation industry, as evidenced by the number of accepted legal and bylaws. One such document is the Decree on Amendments to the Federal Target Program "Development of Civil Aviation in Russia in 2002-2010 and for the period up to 2015." Norms of the program provides completion and access to domestic and overseas aviation market for new aircraft not later deployment overseas mass production of their competitive counterparts, which will allow the Russian industry to regain its position in key market niches of aircraft and helicopters. In order to ensure the conditions for improving the competitiveness of Russian aircraft program is planned to allocate within stipulated in the Federal budget allocations of additional funds for the implementation of key projects in the final stages, and the number of new projects of innovative character. [2] Also in this act provided funding for research programs, such as "Air mobility and aviation technology", "New polymeric composite materials and technologies", "Aircraft Materials and Technologies", as well as funding for the development of the experimental base of public research centers. Just Government of the Russian Federation increasing funding for the production of aircraft and helicopters, which proceeds from the sale in the global aviation market every year will increase.

In Ukraine was adopted and subordinate legal act that regulates the same legal questions – Direction Cabinet of Ministers of Ukraine dated 27 December 2008 № 1656-p "On Approving the Development Strategy of the domestic aviation industry for the period until 2020" because Ukraine is a few countries that own a cycle of creation of aircraft, and holds a significant place in the global aviation market in the sector of transport and regional passenger aircraft. This act is implemented in three stages. The results of research potential aviation industry suggests quite the possibility of increasing the development and manufacture of aircraft, in particular areas such as aircraft, aircraft engine, aircraft agregatostroenie, ultralight and light lethal vehicles, helicopter, unmanned lethal devices, etc. So, the basic direction of implementation of the Strategy is to create all necessary conditions for the further development of the aviation industry through the creation enterprise-based aviation industry, along with foreign strategic partners competitive Ukrainian aircraft building complex; providing strategic directions for the modernization and development of the production, design, research and human capacity Aircraft grown; improvement of the system of scientific support of the aviation industry, including the formation of a number of industry research institutions, as well as the establishment and effective competitive system development, manufacturing, sales and after-sales service aircraft. It should be noted that a separate item in this document refers to the gradual reduction of budget expenditures on the development of the aviation industry to further its transition to self-financing. That right spelled out in the ordinance: "... Financial support for implementation of the Strategy in the first phase will be implemented within budgetary allocations, at the following stages - at their own expense aviation industry, as well as loans, investments and other sources ". [3]

Hence, the conclusions can be drawn that what is efficient and stable state policy in the field of civil aviation, in particular, the safety, the more dynamic the

industry will develop in the post-Soviet countries. Thus, enhancing the safety objective requires administrative and legal regulation. Improvement, and in some places require decisive legal intervention aspects that directly affect the safety of air transportation. Among the major: fleet renewal, airfield equipment and modern navigational equipment; create a favorable competitive field of air carriers; increased attention to information security as an essential component of overall safety. One of the most important future tasks remains the implementation of international air law in domestic legislation.

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## **MEASURES TO PREVENT THE BANKRUPTCY OF THE DEBTOR - AVIATION ENTERPRISE AND EXTRAJUDICIAL PROCEDURES**

*The results of the market reforms, which took part in Ukraine, have confirmed the necessity of the further changes, especially in the system of the bankruptcy, which is considered below. Herewith, one of the least regulated practical issues is the process of application of the measures to avoid bankruptcy of the aviation companies.*

Conception thesis of the bankruptcy avoiding mechanisms should be realized in the appropriate directions, such as legal, economical and organizationally-informative. Decidedly, in the sphere taken into consideration, the main issue is legal aspect of the aviation companies bankruptcy avoiding.

Indeed, the legislator made the appropriate changes to the Law of Ukraine about «On Restoring Debtor's Solvency or Declaring Bankruptcy» about usage of the means to avoid bankruptcy of the debtor, but the problem of the bankruptcy still remains. But even the perfection of the regulatory acts does not provide the efficiency of their functioning.

According to the Law of Ukraine "On Restoring Debtor's Solvency or Declaring Bankruptcy" (further the Act) in 2011 version it is said, that the founders (participants, shareholders) of the debtor, the owner of the debtor's property (the authority empowered to manage the property), central executive authorities of the Autonomous Republic of Crimea, local governments within its authority shall take timely measures to prevent the bankruptcy of the debtor. [1] Therefore, aviation companies, determining the absolute or stable insolvency, are required to perform certain actions to prevent bankruptcy.

In case any signs of bankruptcy occur, debtor's head of aviation enterprise is obliged to send information about the evidences of signs of bankruptcy to the founders (participants, shareholders) of the debtor and the owner of the debtor's property (person authorized to administer the estate).

To the founders (participants, shareholders) the debtor, owners of the property (person authorized to administer the estate) of the debtor, the creditors of the debtor and other individuals financial assistance could be provided in order to avoid the bankruptcy in an amount sufficient to repay the money for the debtor's obligations to creditors, including obligations to pay taxes and duties (mandatory payments), insurance contributions to the state pension and other social security and to restore the solvency of the debtor (the debtor's sanation proceedings before the bankruptcy). In case of providing financial assistance to the debtor, he assumes the corresponding obligations to the people, who provide such assistance, in the manner prescribed by law.

One of the most efficient means to avoid bankruptcy of the debtor – aviation company (further the Debtor) is its sanation to the bankruptcy proceedings. Under the term “sanation to the bankruptcy proceedings” the system of the actions to

renew the debtor's solvency is meant, which could be performed by the founder (participant, shareholder) of the debtor, the owner of the debtor's property (the authority empowered to manage the property), a creditor of the debtor and other persons in order to avoid bankruptcy of the debtor by means of taking organizational, management, investment, technical, financial, economic and legal actions accordingly to the regulation to proceedings in bankruptcy.

For instance, under the Article 106 of the Civil Code of Ukraine, merger, accession, division and transformation of the legal entity are made under the decision of its members or legal entity, authorized by the statutory documents, and in the cases provided by law, under the court order or the relevant government authorities. Also, receiving of the consent from the appropriate authorities for liquidation of a legal entity through merger or takeover could be provided by the Law.

In case of a merger of business entities all property rights and obligations of each of them move to the entity, formed by the merger. When connecting one or more entities to another entity, all the property rights and obligations of the associated entities will be acquired by the acceding entity.

In case of division of the entity, all the property rights and obligations are transferred by the separate act (balance) in the relevant shares to each of the new entities, formed as a result of this division. In case of converting one entity to another entity, all property rights and obligations of the previous entity will be acquired by the new entity.

In case of singling out one or more new entities, rights and obligations of the reorganized entity in the respective fractions of the property move by separate act (balance) to each of them (Article 59 of the Civil Code of Ukraine). [3]

The Legislator in Part 3 of the Art. 29 of the Act implies as the restructuring of the company the implementation of organizational, financial, economic, legal and technical measures, aimed to reorganize the company, in particular including its division by the transfer of debt to an entity, that is not subject to sanation, to changing ownership, management, the legal form to facilitate financial recovery of enterprises, improve efficiency of the production, increasing production of competitive products and a full or partial satisfaction of creditors' claims.

Hence, one of the sanation means to bankruptcy proceedings could be the procedure for liquidation of a legal entity by merger, consolidation, division and transformation based on the Civil Code of Ukraine st.107. However, in the part 1 of the Article 59 of the Civil Code of Ukraine is stated, that the liquidation of the entity, carried out through its reorganization or liquidation - to address the owner(owners) or authorized bodies, under the decision of others authorities - the founding entity, or their successors, and in cases, stipulated by law - by court. For example, under the Resolution of the Supreme Economic Court of Ukraine of 15.12.2010 № 8/27 is stated, that the Commercial court liquidates the proceedings in bankruptcy, if the elimination of the legal entity has occurred before initiation of bankruptcy. As the extract from the Unified State Register says, the debtor was able to cease, and according to a report the Department of Civil Registration of Lviv City Council, dated 09.06.2010 № 2-6600/03/01-1251 (a.s.34) state registration of the liquidation of the debtor was held only on 02.06.2010, scilicet - after the



commencement of proceedings in the case of bankruptcy. Thereby, state registration of the liquidation of the debtor after the commencement of proceedings in the case of his bankruptcy was made arbitrarily, disrupting the courts prohibition and current legislation. Therefore, in case about the bankruptcy the court, after finding out the fact of the illegal liquidation of the debtor, have to decide the cancellation of the state registration of the liquidation of a legal entity - the debtor according to the Article 41 of the Law of Ukraine "On state registration of legal entities and natural persons - entrepreneurs» [4].

In our opinion, as the reorganization the new entity should be understood, to which by means of universal succession, all rights and duties or their part, based on the certain legal title (property rights, the right of economic management, the right of operative management) has moved.

A. Cherep notes, that the reorganization (restructuring) might include the following measures: change of the management of the company; partial or full privatization; partial closing; conducting of the bankruptcy proceeding; separation of large enterprises apart; separation of the non-core structural units from the companies; release of the objects of social and cultural significance objects from the companies; sale (or renting) of the part of main company's funds; sale of the excessive equipment, materials, etc.; reduction of the employees quantity of the company.

The main condition to decide on the choice of specific measures of reorganization is the availability of technical and economic substantiation of the expediency of its holding. During the conduction of the restructuring of the company be the means of its unbundling, the availability of the business-plans of the new enterprises is obligatory [5,c.169].

The creditor may require from the entity which stops implementation of the obligations, which are not well-off, liquidation or early performance of obligations or enforcement of the obligation, except as required by law. After the end of the period for filing creditor's claims and granting or rejection of the request, the Liquidation commission of a legal entity issues a transfer certificate (in case of merger, consolidation or conversion) or distribution balance (in the case of separation), which shall contain provisions on succession in respect of all liabilities' obligations of a legal entity, that liquidates in respect of all its creditors and debtors, including obligations disputed by the parties. The Transmitted Act and the Distribution balance are approved by the members of a legal person or person, that made the decision to stop it, except as prescribed by law.

Copies of the transfer act and distributing the balance, signed by the chairman and members of the commission of a legal entity liquidation and approved by members of the legal entity or body that made the decision to liquidate the legal entity are to be transferred to the agency, which issues the state registration of legal entity, which is discontinued, the place of its registration, and to the agency, which issues the registration of the legal entity – successor at the place of registration.

Violation of the provisions of paragraphs 2.3 article107 of Civil Code of Ukraine is the ground to refuse to register in the Unified State Register the record of liquidation of the legal entity and state registration of a legal entity - successors [2].

Legal entity - successor, which has formed as a result of separation bears the subsidiary liability for the obligations of a liquidated legal entity, which moved to another legal entity due to the distribution balance - successor. If there are more than two legal entities – successors, occurred after the separation, such subsidiaries bear the vicarious liability jointly and severally. There are some cases, when there are some successors of the legal entity and it is impossible to define the successor about specific responsibilities of the liquidated legal entities, so the legal entities-successors bear the joint and several liabilities to creditors of the liquidated legal entity. Participants (founders) of the liquidated legal entity, which were responsible for their obligations due to the Law or the statutory documents, will be responsible for the obligations of the successors, which has appeared before the moment of legal entity liquidation in the same amount, in case of the bigger amount of responsibility of the founders, is not stated by the Law or their statutory documents.

Transformation of the legal entity is a change of the legal form. In case of conversion, all assets, rights and obligations of all previous legal entity go to a new legal entity. Emission is a transition under the distributional balance of the property, rights and obligations of legal entities to create one or more new legal entities. Following the decision to emit members of the legal entity or authority, which decided to emit, the distribution balance should be prepared and approved.

Reorganization of the company, which is subject to a forced separation, is performed by a monopolist in its sole discretion, in case of the liquidation of the monopoly formation in the market. Forced separation could not be applied if: a) impossibility of organizational or territorial branching of the companies departments or structural units; b) existence of close technological communication between companies, divisions (if the share of domestic sales in total gross output of the company is less than 30%) [5, p. 170].

The court, which decided on separation, has to determine the member of legal entity or the Supreme body of the legal entity (owner) in his decision, which is obliged to prepare and approve the distribution balance. However, the legal entity, formed as a result of separation, bears the subsidiary liability for the obligations of a legal entity, which has committed emission, which did not go to the legal entity, formed as a result of the separation according to the separation balance sheet.

The legal entity, which has committed emission, bears subsidiary liability for obligations under the separation balance sheet moved to the legal entity, formed as a result of the separation. If there is two or more entities, formed as a result of separation, than they bear subsidiary liability in association with legal entity, which committed emission, jointly and severally.

In case it is impossible to determine after emission the responsibilities of individuals for certain obligations, which existed at legal entity before emission, the legal entity, from which the emission was committed, and the legal entities, which were made as a result of emission, bear jointly and severally the responsibility to the creditor for such obligations (article.109 Civil Code of Ukraine).

The order of legal entity liquidation is conducted in the following way. From the date of registration record of the decision of founders (participants) of a legal person into the Unified State Register of legal entities and natural persons-entrepreneurs, court or agency authorized by them in relation to the liquidation of

the legal entity liquidation commission (liquidator) shall take all appropriate measures for legal entity debt collection, which is being liquidated, and notify each debtor on legal entity liquidation, established in terms defined by Part 2 of Article 60 of the Civil Code of Ukraine - two months, what is common, although the Law establishes a special time - twelve months in bankruptcy proceedings.

During the measures of legal entity liquidation, before the end of the presentation of creditors' claims, the liquidation commission (liquidator) closes the accounts, opened by financial institutions except the account, which is being used to make payments to creditors during the liquidation of the legal entity. The liquidation commission (liquidator) has to undertake an inventory of the legal entity property that is liquidated, and the property of its branches and representative offices, subsidiaries, companies, and property, which confirm the corporate rights at other legal entities, to detect and to take measures to return the property, which is at third persons.

The peculiarity of the sanation of the State companies to bankruptcy proceedings is that it could be provided with the help of the State budget, State companies and other sources of financing. Funds for sanation of public enterprises from the State Budget of Ukraine are established annually by the State Budget of Ukraine. Conditions and procedure for the sanation of the property are approved by the procedure established by the Cabinet of Ministers of Ukraine. Note, that the sanation of the State companies to bankruptcy proceedings is held in accordance to the Article 6 of the Law of Ukraine "On restoring the debtor's solvency or bankruptcy."

Thus, we can consider the means to avoid bankruptcy of the aviation company and the extrajudicial procedures of the bankruptcy as such kind of bankruptcy-preventing tool. The primary objective of measures to prevent the bankruptcy of the Aviation company is the approval of principles and objectives, that should be achieved after the operation of machinery.

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**CRIMINAL AND LEGAL CHARACTERISTIC OF SOCIALLY  
DANGEROUS CONSEQUENCES OF VIOLATION OF TRAFFIC RULES  
SAFETY AND OPERATION OF AIR TRANSPORT (ART. 276 OF CC OF  
UKRAINE )**

*This article provides an analysis of the socially dangerous consequences in the corpus delict (article 276 of the Criminal code of Ukraine). Discusses issues of conformity of the criminal and air law terminology in Ukraine.*

Definition of transport safety, as well as definition of transport so wide that it's not necessary to unite in one article all types of infringement of traffic rules safety or operation of such different transport as railway, water and air transport.

In this article we consider such generic object as safety of aircraft, a human factor influence - the special subject of a crime on flights safety, and also of the maintenance such sign of the objective party of this crime as socially dangerous consequences. Thus, we consider the separate structure of a crime provided in a disposition of Art. 276 of CC of Ukraine. It consists in violation of the traffic safety rules or operation of air transport.

The structure of this crime is formulated as the delict of danger creation (p.1 Art. 276 of CC of Ukraine). And in dispositions of p. p. 2 and 3 of this article are directly specified socially dangerous consequences as an obligatory sign of the objective party of this crime. It can lead certain researchers to a wrong conclusion of rather formal character of structure of the crime provided in a disposition p.1 Art. 276 of CC of Ukraine. We completely share with opinion of V.O. Navrotskyi who points to material character of this structure of a crime [1]. That is the crime will be considered finished when the violation of the traffic rules safety or operation of air transport created danger to life of people or approach of other heavy consequences (p.1), caused heavy injuries averaged weight large material damage for the victim (p. 2) caused death of people (p. 3).

Safety of flights is ensured by a complex of actions, but a key figure in this process is the person who pilots the aircraft - the crew member. It should be considered as one of subjects of the crime which disposition is provided in Art. 276 of CC of Ukraine. That way, criminal liability comes in a case when during flight there are an emergency situation on a board and crew members make mistakes which creating danger to life of people or other serious consequences (doesn't matter a type of a mistake and its reasons). In that case we can say about careless actions or the inaction.

During aviation incident an aviation case may take place. It also creates threat of life and to human health. And about this it is said as about a consequence in

a disposition p.1 Art. 276 of PC of Ukraine and in item 4 p.1 Art. 1 of the Air code of Ukraine [2].

Level of flights safety is defined by probability of that in flight there is such special situation as accident. As it is said in p. 3 Art. 276 of PC of Ukraine accident is most socially dangerous consequence. But violations of flights safety can result less socially dangerous situations. One of them can be considered as a consequence as a part of the crime provided in a disposition of Art. 276 of PC of Ukraine, in other cases, in our opinion, such bases aren't present. That tells us about not any violation of flights safety reaches degree of public danger of a crime.

The so-called special situation which can arise in flight as result of influence of separate adverse factors or their sets is a consequence of violation of flights safety and can lead to decrease level of flights safety. On severity special situations share on: 1) complication of flight conditions, is characterized by insignificant increase in psychophysiological loading at crew or insignificant deterioration of stability and controllability or flight characteristics. Such situation doesn't result in need immediate or unforeseen change in flight plan and doesn't interfere normal its termination; 2) the difficult situation - is characterized by substantial increase of psychophysiological load of crew or considerable deterioration of stability and controllability or flight characteristics. This situation is on the verge, but in itself if it doesn't pass into the emergency or catastrophic doesn't reach degree of public danger of a crime. At this stage the crew has all opportunities to prevent creation of danger of life and human health or other heavy consequences; 3) the emergency - is characterized by substantial increase of psychophysiological load of crew, deterioration of flight characteristics, stability and controllability of a vessel and leads to excess of limit restrictions and the calculated conditions; 4) the catastrophic situation is a serious condition at which it is almost impossible to prevent death of people. Certainly, this situation is the highest manifestation of public danger.

Depending on consequences special situations share on aviation cases and incidents.

The aviation case is the event connected with operation of the aircraft. It occurs during aviation incident, that begins from the time when people stepped aboard the aircraft with intention to make flight and till the moment when all people who are onboard, left it. The aviation case is caused by violation of normal functioning of the aircraft, crew of services of management flights and ensuring flights, and also influence of external factors therefore such consequences (at least, one of them) took place: at least one person who was onboard was lost or harm from which there came death within 30 days from the moment of aviation incident is done to his health; the aircraft received damages of power elements or made landing to territories evacuation from which is technically impossible or inexpedient; at least one person, from those that was onboard, was missing and his official searches stopped. Thus, it is a question of accidents, because all accident is characterized by loss of human life. Such actions in the presence of the sufficient bases should be qualified on p. 3 Art. 276 of CC of Ukraine. In the same time should be noted that in PC of Ukraine of a consequence are formulated insufficiently fully. In the text of p. 3 Art. 276 of CC of Ukraine are a question only of concrete death of the person, at the same time it is necessary to understand as accident and situations when the

person passenger or the crew member, or the personnel of the plane was missing. Cases of death belong to accidents any of number of persons which were onboard, in the course of their emergency evacuation from the aircraft. Signs of socially dangerous consequences, namely causing to the victim injuries of average weight or major weight are accident signs (p.2 Art. 276 of PC of Ukraine). It should be noted that in item 1 p.1 Art. 1 of the Air code of Ukraine in definition of accident isn't concretized, which injuries were caused, and is simply specified that accident is an aviation incident without loss of human life that led to serious damage or aircraft destruction (it corresponds to such consequences as "large material damage"), injuries of passengers, crew members or the third parties.

As the conclusion should be noted that today in criminal law of Ukraine there are no serious scientific works on research of problems of criminal liability for violation of flights safety, some inconsistency in understanding of separate standard designs of the air and criminal legislation that demands further development of this perspective is noted.

Note that in general all aspects of aviation safety get proper criminal protection, but special attention should be paid to protecting the environment and human health from the adverse impact of civil aviation in the area of environmental protection.

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## **MODERN TRENDS OF AIR AND INTERNATIONAL AIR LAW DEVELOPMENT**

*In this paper, the author examines sources of air law and international air law development in the light of the integration processes in the world and Ukraine's participation in them. Also considered the question of contemporary international air law content and its impact on the sources of international air law.*

Features relationships that are governed by air and international air law led to the interpenetration of air law sources every state and the system of sources of international air law. It should be add that the integration processes that develop from the beginning of the 50s of the last century throughout the world greatly influenced the development of these two systems.

We should say that air law in the Soviet Union scientists considered as a complex industry. In the book "The Soviet Air Law", edited by M. Ostroumova noted that air law is a complex branch. Air law has complex nature which includes norms of civil, administrative, criminal, labor law, and as the result inherent similar methods of law regulation [1, p. 12]. That is way air law can hardly be called a branch of public or private law. So can we say the same about international air law?

International air law in international affairs has traditionally been defined as a branch of public international law, and even pointed that the legal norms governing the flight of aircraft and determines the legal regime of airspace called "public international air law" [2, p. 428]. This trend didn't emerge spontaneously, even in the diplomatic dictionary, edited by A. Gromyko in 1971 air law defined as "air law - a special branch of international law, which is a set of legal norms and principles that govern relations among states in the use of their airspace, and the relationship between individuals and legal entities arising the operation and use of international air services" [5, p. 330]. Also noted that the legal norms of international air law governing public and private legal relationships consist of international agreement and international customs regulations [5, p. 330]. Thus, we can make some conclusions. First of all international air law covers public and private legal relations. Secondly, the sources of international air law include traditional sources of international law - international agreement and custom.

It is obvious that as the national air law and international air law should be considered in close conjunction public and private relationships that due to the specific subject and the object of the branch legal regulation. So it can be said that international air law today is called a complex branch of international law.

Development of international air law begins with the adoption of the Paris Convention on Air Transport in 1919, for the first time enshrined the complete and exclusive sovereignty of each State in respect of the airspace above its territory (Article 1) [2, p. 430].

The gradual formation of international air law sources system makes it possible to divide them into several groups. It depends on their content, purpose, number of participants, the scope. We have to remember that international air law is an important complex branch, and accordingly, its system of sources including the rules of public international law: the Chicago Convention of 1944, and the rules of private international law: the Warsaw Convention of 1929, the Montreal Convention 1999. For example, the conventions of private international air law identifies the basic requirements for the document of transportation, the sender right to dispose of the load during the route, the procedure of delivery goods, the responsibility to passengers and cargo owner [4, p. 232]. The complexities of contemporary international air law allow as combining domestic and international law for the effective regulation of the relationship. Based on this we should considered and content of air law within each state. Air law of Ukraine includes not only the legal norms of public law, but also those that govern civil, commercial and other relations.

It should be noted that international air law is a single system. The content of which varies with the change of legal relations regulated. Also national air law of each state develops its own way. For example note the Montreal Convention of 1999, which became obligatory element of international air regulation mechanism of the most countries. However, Russian Federation hasn't yet ratified the document, as the result Russian air law today has behind in to step from global trends.

The influence of the integration process on the development of international air law is that the first documents resulting in civil aviation are regional character (for example Havana (Pan-American) Convention on Commercial Aviation in 1928). Further international conventions that regulate private and public relations in civil aviation have universal character, which facilitates penetration of norms in domestic law of most countries.

Special attention we should be paid to the concepts of regulation of civil aviation and air transport in the European Union.

EU creates air legislation that is common to the States-Member and associated countries, by introducing common standards, minimum or universal, and through universal adherence to international treaties. An important example of this process is the creation of the Single European Sky and the EU Common Aviation Area (these two categories are different). That is allowed to unify and simplify air services between States Member. The concept of Single European Sky based on the principle of liberalization and deregulation of air services in line with the competition and the free market economy.

It was necessary to create a system of technical regulations and standards which had universal character (standards of ICAO, the International Civil Aviation Organization), or regional character (standard European Civil Aviation Conference, the European Agency for Safety of Civil Aviation) for the operation of civil aircraft. Important role in international air law is played by standards, recommended practices, procedures, adopted by the Council of ICAO, which are known as "international aviation regulations" [3, p. 503]. Technical standards should be reflected in the air law of participants and thus directly affect on development of the national air law. It is also important to note that the sources of international air law customary rules formed in several ways. One way of creating international customs



are acts of international organizations. Acts of international organizations don't have obligatory power but imposes certain obligations on the state. So as the result such acts have created practice in regulation of the relationship. The legal acts of international organizations In the process of using them are creating international customs. The brilliant example of the formation of international custom on legal acts of international organization is an international space law - UN General Assembly resolution used by the world as a recognized international customary law to regulate space activities.

We could also consider several groups in the system of sources of national air law. Firstly, international agreements. These include universal, regional and bilateral agreements. According to an air law of Ukraine we should noted that the development of integration processes within the CIS within the European integration influenced the expansion of the base.

In particular, some bilateral agreements have replaced regional documents: Agreement between Ukraine and the EU on certain aspects of air services from 1 December 2005, Decision on the Concept of harmonization of national air traffic management systems of the Commonwealth of Independent States, on September 19, 2003, etc. The second groups of national sources of air law are technical standards that are already mentioned. They need to be separated because they represent the part of the national air law, which ensures the safety of civil aviation in all its aspects and allows the aircraft to make international flights Ukraine. The third part of the air law system up Ukraine national acts. They can also be classified by the legal force in accordance with national legislation. It is important that the development of modern aviation law in Ukraine is carried out according to the requirements of business aviation in the world and according to current economic trends.

It should be noted the adoption of the new Air Code of Ukraine of 19 May 2011. This document is much more progressive than the previous one and is already partially corresponds to global processes and trends. More attention is paid to the activities of air carriers, fixed general requirements and procedures on liability, determined the terms and conditions of certification of operators, aircraft and personnel.

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## **FUNCTIONS OF ADMINISTRATIVE LAW IN AVIATION SPHERE**

*In the article the author investigates the functions of administrative law in the sphere of aviation. The question of the legal nature of the rules about offences on air transport in accordance with the functional orientation, that are in the Code of Ukraine on Administrative Offences, was discussed.*

Air transport occupies an important place not only in the transport system of Ukraine, but also all over the world. The role of aircraft in air transportation of passengers, baggage and cargo can not be overemphasized. However, among many positive features of air transportation there is a question of aviation safety. The question of air transport security was, and still is, the object of attention of international and national law.

Also, accordingly, the security of air transport has been, and still is, the subject of scientific discussions. Legal relations in the transport sphere, and the administrative and legal regulation were studied in the works of V. Y. Razvadovsky [1]. The problems of aviation safety on the scientific level have been the subject of discussions of E. V. Goryan, K. V. Goryan [2], I. A. Kozlyuk [3] and others. The issue of legal regulation of air transport safety was investigated by A. O. Sobakar [4], and administrative liability for violation of the rules of air safety was discussed by T. E. Vysotska [5], S. T. Honcharuk [6], A. V. Filippov [7] and others.

However, there are no scientific works about the functions of administrative law, their role in the aviation sphere, that is why their investigation is necessary.

There are two basic approaches to define “a function of administrative law”. The representatives of the first approach, such as: L. L. Popov, Y. I. Myhachev, S. V. Tykhomyrov indicate that the functions are defined by the aim of administrative law as a regulator of social relations in the sphere of realization of executive power (state governing) [8, p. 40]. The proponents of the second approach, for example, M. Y. Kozlov, Y. M. Starylov suppose that the investigated concept is opened through the main directions of the legal area influence on social relations [9, p. 390] or administrative legal regulation of administrative public relations [10, p. 68].

However, according to O. M. Mykolenko, functions of administrative law as the branch of law is the correspondence of state of law, which is in a society as a result of administrative regulation, to the goals and means of administrative legal regulation [11, p. 40]. In our opinion, the functions of administrative law are the social purpose and the directions of legal influence of this field of law on social relations.

There is no single scientific position to classify the functions of administrative law. The most common is the view of scientists in the sphere of administrative law to divide the functions into the regulative and protective [11, p. 40; 13, p. 391]. According to Y. O. Tykhomyrov this list of the functions should be

supplemented with the organizational and protective functions, and the function of self-realization of rights [12, p. 77-78].

According to Y. M. Kozlov, administrative law performs a regulative function, which manifests itself in the forms of: law executive, law-making (law established) and law enforcement functions [13, p. 10-11]. To the specified list V. K. Kolpakov, A. V. Kuzmenko propose to add an organizational function [14, p. 41]. According to L. R. Bila and S. V. Kivalov, in determining the administrative law it is needful to take into account the unity of the three main functions: a) the administrative (i.e. regulation of administrative activities); b) law realizational (realization of rights and freedoms of citizens); c) law protective (protection of rights and freedoms of citizens) [15, p. 11-12]. The point of view of V. B. Averyanov concerning the discussed theme is very important. He indicates that the main features in the sense of administrative law should not be the “administrative” and “punitive” functions, but such new functions as law providing (which is connected with provision of realization of rights and freedoms of a man) and law protective (which is connected with protection of violated rights.) Two of these functions fully describe the real social purpose of administrative law [16, p. 7].

The rules of administrative law have the special place in the legal support of air transport activities. According to A. O. Sobakar, firstly, the rules of administrative law regulate the most significant part of public relations in the field of aviation safety. Secondly, the stuff of subjects of administrative legal activities of aviation security is much more than in criminal, operational-searching, civil activities. Thirdly, the subjects of providing of safety in aviation realize their authorities in the limits of relations of power and subordination, in which there is a legal inequality of the participants. Fourthly, on the basis of the rules of administrative law the departmental control to maintain safety of air transport functioning is carried out [4].

Nowadays the active Code of Ukraine on Administrative Offences (CUAO) [17] does not contain the separate chapter about offences in air transport. Legal regulation of the mentioned group of offences is carried out by the Chapter 10 of CUAO “Administrative Offences on transport, in the field of road management and communication”. Among the scientists there is the opinion to create the separate chapter to regulate the offences on air transport (S. T. Goncharuk, A. V. Filippov) [6, p. 6; 7, p. 12]. In our point of view, the mentioned proposition undoubtedly deserves to attention and should be supported.

CUAO fixes responsibility for the next offences in the field of air transport: violations of air flight safety (Article 111), violations of rules of behaviour on an aircraft (Article 112), violation of rules of international flights (Article 113), violation of fire safety on air transport (Part 3, Article 120), violation of the rules of transportation of dangerous substances and things on air transport (Part 3, Article 133), violation of rules aimed at ensuring the safety of cargo on air transport (Article 137). In fact, CUAO regulates legal relations that are formed after commission of the offences in the field of air transport. In order to understand the nature of the functions of administrative law concerning the mentioned offences it is needful to make the theoretical analysis of the mentioned rules in accordance with the functional orientation.

CUAO in the mentioned articles does not fix regulations on safety, rules of conduct on an aircraft, etc. However, CUAO clearly defines the compositions of the mentioned offences and penalties. The national regulative rules of administrative law in the aviation sphere, for breach of which CUAO establishes responsibility, are in the following legal documents: The Air Code of Ukraine from 19.05.2011 № 3393-VI [18], The Decree of the Cabinet of Ministers of Ukraine “On approval of the list of dangerous objects and substances prohibited for carriage by air” from 12.05.2007 № 723 [19], The Order of the Ministry of Transport of Ukraine “On approval of the Rules of aircraft operations and air traffic service in the classified airspace of Ukraine” from 16.04.2003 № 293 [20], The Order of the Ministry of Infrastructure of Ukraine “On approval of the Rules of air transportation of passengers and baggage” from 30.11.2012 № 735 [21], The Order of the Ministry of Infrastructure of Ukraine “On approval of the Rules of wrecking and firefighting flight support in civil aviation of Ukraine” from 07.05.2013 № 286 [22], the Order of State Administration of Ukraine for Aviation Safety “On approval of the Rules of air cargo transportation” from 14.03.2006 № 186 [23] and others.

Considering the fact that in case of commission of an offence the regulative rule is broken: an obligative, a prohibitive or a permissive that generates the activity of a protective rule, i.e. a protective rule is not violated. A protective norm of law specifies a certain offence and the degree of responsibility, foresees a prohibition, but does not contain a prohibition because its application is designed to a fact of an offence, to violation of law order [24, p. 304]. Analysed the mentioned offences in the sphere of air transport, we conclude that these rules are not regulative but protective by the functional orientation. In accordance with the mentioned fact, administrative law in this case carry out the protective function. This position corresponds to the point of view of O. F. Skakun, who supposes that a protective function of law is expressed in definition of prohibitions to conduct illegal acts, establishment of juridical sanctions for misconducts [24, p. 246].

Thus, CUAO (Articles 111-113, Part 3, Article 120, Part 3, Article 133, Article 137) contains the protective rules in the sphere of air transport. In accordance with the mentioned, administrative law carries out the protective function, fixed the discussed compositions of the offences on air transport at the level of the codified legal document.

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## FINANCIAL SANCTION IN UKRAINIAN LAW: THEORETICAL ASPECTS

*The article is devoted to the research of scientific points of view concerning to financial law as a branch of law and correlation of such terms as financial legislation and financial law. The author researches the real scientific ideas as to the notions "financial and law sanction", "fine".*

Question of financial offence and law sanction, deeply and scalene probed in legal financial literature during great while. The specific of concept foresees research of this question and by lawyers by theorists, and financiers, and civilest, and those, who is engaged in a criminal and administrative right. But a look exactly of financiers to this question is important theoretical payment in scientific developments of institute of offence.

In legal literature confessedly is approach after which offence is foundation of legal responsibility. Thus, for every type of legal responsibility main, system the concept of proper depict comes forward a formative element. From the review of right, offence is the display of tyranny, to neglect of those rules, which are approved and set the state for maintenance of social order and providing of rights, freedoms and legal interests of citizens [1, s. 138].

In modern scientific literature there is not the unique decision of concept «offence», by investigation what the different understanding of his essence is both in general theoretic and in of a particular branch, researches. Formulation scientifically – the grounded decision of «offence», him the legislative fixing and realization in law activity acquires today the special actuality in connection with the sharp increase of amount of offences and inability of law enforcement authorities always effectively on them to react [1, p.142]. Long time a concept «offence» was examined only as a legal fact. One of the first decisions of offence was given by S. G. Kotlyarevskiy and. L. Nazarov. On their opinion, offence is a legal fact which shows by itself the illegal act of delict person is guilty [2, s. 40]. A. A. Ivanov names offence of good behavior an antipode and determines him as publicly dangerous, illegal act of man, which harms personality, property, state or society, on the whole [3]. N. S. Malein examines offence as «conscious volitional act publicly dangerous illegal conduct» [4, s. 14]. As offence can be both publicly harmful (administrative offence), and publicly dangerous (crime), and a man can come forward the subject of offence not only, it is considered expedient to complement the above-mentioned decision, expounding him in the following kind: offence – it publicly a harmful or publicly dangerous act (action or inactivity), illegal act of relict subject (physical or legal person), which covets on interests of personality, state and society, on the whole, that guarded a law and which legal responsibility is set for [1, s. 145]. Defining a concept «offence» will pass to research of essence of financial offence. Necessity of selection of financial offence as independent foundation for application

of measures of financial responsibility foremost, with the presence of the special legal industry – financial right. One of signs of independence of industry there always is a presence of own institute of compulsion. In the field of financial law such institute is presented in the complex of normative acts, regulative the order of realization of financial activity.

The legislation of Ukraine was contained by the concept of financial offence. It was formulated in p. of a 1.5.3 Instruction about the order of lead through of revisions and verifications by the organs of government control-revision service in Ukraine, ratified the order of Main control-revision administration of Ukraine from 03.10.1997 № 121: «financial offence is an action or inactivity of public, local self-government, subjects of ménage all patterns of ownership, associations of citizens, public servants, citizens of Ukraine and foreign citizens, investigation of which was become by non-fulfillment financially legal norms, authorities». At the use of such approach of realization of financial offence established in the case of violation financially legal norms [5, S. 114]. With acceptance of the Budgetary code of Ukraine, a legislator formulated the concept of budgetary offence - failure to observe of budgetary process a participant set this code et all normatively legal by the acts of order of drafting, consideration, assertion, making alteration, implementation of budget or report, about implementation of budget (item 16). During the analysis of operating normatively legal find the bases of Ukraine next decisions of financial offence.

Financial offence is an action or inactivity on inspect objects investigation of which was become by non-fulfillment financially legal norms [6]. Financial offence is an action or inactivity of public, local self-government, subjects of ménage all patterns of ownership, associations of citizens, public servants, citizens of Ukraine and foreign citizens, investigation of which was become by non-fulfillment financially legal norms, authorities. Financial offence is an action or inactivity of government bodies, Ukrzaliznitsi, Derzhspetstranssluzhbi, inspect establishments, them public servants investigation of which was become by non-fulfillment financially legal norms. As follows from maintenance of norms which are examined, they considerably differ from offered definition of financial offence and, in essence, are the decision of illegal conduct at industry of financial activity, but not financial offence, because does not set legal grounds for the offensive of financial responsibility for the subjects of offence. The in addition, resulted decisions fasten two forms of conduct of subjects (action or inactivity) though, but does not set the sign of guilt of act. Therefore a question of obligatory presence of guilt in composition financial offence already long time is the article of discussion among research workers in the field of financial law.

As the Russian scientist D Makarov, with forming of the field of financial law of concept «financial offence» in the system of classification of types of offences fully logical, but after the character it to this day quite often associates and equates with administrative misconduct [7, s. 120]. Professor E. Dodin on this occasion pays regard to that instability and ambiguousness of current legislation, which regulates financial activity, generates doubts in relation to legal grounds at the decision of question about the selection of offence financially legal character as independent [8, s. 14]. On the whole such remark is actual to Ukrainian realities.



Consequently, until concept of financial offence as unique foundation financially legal it will not be legislatively fastened to responsibility, until then legislative grounds for attracting of person to this type of responsibility it is possible to consider absent.

Analyzing nature of general concept of offence, scientists, as a rule, select the followings signs of offence: offence always is an act (by an action or inactivity); always winy act; an act is publicly dangerous and illegal, that which conflicts with the norms of right; act for the finance of which legal responsibility is foreseen [9, s. 18]. As justly marks O. of E. Leyst, «any offence is a winy and illegal act, harmful or dangerous for public relations» [10, S. 62]. There fore financial offence as has a variety of the special legal fact all signs of illegal act and is violation of the special requirements of financial legislation, which form this industry. A public opinion, as a sign of act, consists in that an act which is determined a crime draws substantial harm public relations which are guarded a penal law, or creates the real threat of infliction of such harm [11, s. 8]. Publicly a dangerous act, as a sign of objective side of corpus delict, must be volitional, that by the display of will of person. Antisocial character is the financial sign of violations of financial legislation. Acts which violate the norms of financial right harm normal financial activity of the state and local self-government.

The next sign of offence is acknowledge illegal of act, that violation of norm of right. Not every act is offence, but only that which is accomplished despite legal orders, that breaks the law. It is or violation of prohibitions, or non-fulfillment of duties. Illegal of financial offence is expressed in broken the participants of financial relations of norms of financial legislation. Offence which contains signs financial is consider a that act which is foreseen a financial legislation only. It can be expressed in non-fulfillment of duties (inactivity) or fiancé of certain actions which do not answer (contradict, violate) normative orders.

The sign of guilt of offence accents attention on that legal responsibility can come only for winy acts. Guilt as sign of offence specifies on existence of subjective connection between a illegal act and his consequences and person which accomplished such action or inactivity in form intention or carelessness [7, s. 115]. Most financial offences are accomplished in form direct intention, however much latent character of financial offences, and also imperfection of legislative registration of judicial, forms of bringing in to financial responsibility, does not allow law enforcement authorities to finish telling intention and correctly to characterize the actions of offender.

The last sign of offence is punish ability. Under «punish ability» understand the condition of application to the person which accomplished financial offence, negative legal consequences which are contained in financially legal approvals [12, s. 84]. Legal investigation of finance of act which contains the signs of financial offence is application of measures financially legal to responsibility. In the aggregate the transferred signs form the descriptive concept of offence. It fixes general external signs in offences of different kinds, deprives in the process of research from reiterations, sends attention to findings out main idea of this public phenomenon on the whole and opening of differences of him separate kinds. However much the analysis of current legislation which regulates public relations in

the field of financial activity enables to draw conclusion, that the norms of current financial legislation do not determine all selected signs of financial offence.

A separate idea deserves attention In. Lisenko, which suggests to go near the problem of selection of financial offence, taking into account composition of offence, which is the aggregate of signs the presence of which grounds to consider a that or other act offence [13, s. 33].

At once becomes clear that this composition is not engulfed the types of offences generally accepted and described in a law. After the object of him it is impossible to attribute to civil, and after a subjective side and subject – to administrative offence. It is the special type of offence, the fiancé of which is foreseen by attracting to the special kind of responsibility with application of unique type of punishment, – financial approvals. For attracting to this kind of legal responsibility in the law of Ukraine or in a code, coming from the theory of right and more main all – from Constitution of Ukraine, there must be the described composition of the proper offence. If there is not composition (all necessary signs), there is offence. Theoretical research of legal nature of violations of financial legislation, and also the direct practical necessities of application of responsibility for their finance propose a requirement in relation to the legislative fixing of constitutional (objective and subjective) signs of these offences.

A model is that, without regard to the ambiguousness of the legislative fixing of concept of financial offence, research workers unanimously carry point in relation to independence of this legal category as foundation financially legal to responsibility. Professor P. Pustoroslev separately in the structure of offences selected financial. To financial offences a scientist in the field of law took above all things tax, in particular, non-payment of tax by a citizen the state after the offensive of term [1].

The row of domestic scientists selects financial offence in the structure of illegal acts. Will mark that majority, both domestic and Russian, scientists are probed financial offence within the framework or tax responsibility, or budgetary, whether in the field of currency legal relationships. Savchenko L. And., Cimbalyuka.v., Shkarupa In. K., Became deaf in the train aid determine financial offence as violation well-regulated financially legal by the norm of order of mobilization, distributing and use of the centralized and decentralizing funds of money, for which a legislation is foresee legal responsibility [14]. Bud'ko, probing financially legal responsibility for the fiancé of tax offences, under tax offence a harmful, winy act (action or inactivity), which violates the norms of tax legislation for the finance of which it is foreseen financially legal responsibility, understands publicly [12].

Independence of financial offences is determined and in an administrative law also. Separate from them the sphere of administrative offences, not because of position of p. 22 st. 92 Constitutions of Ukraine, financial offences in a theory and practice are selected in the sphere of administrative delict. [15, S. 7]. In opinion of O. of Music, financial offence is a illegal act which trenches upon the order of realization of financial activity set the state and draws application of the proper approvals, in particular and financial [16, S. 63].

For research of financial offence the advanced studies have an important value of. K. Voronova. It characterizes composition of offence which includes the followings elements in detail: object of offence; objective side of offence; subject of offence; subjective side of offence. To her mind, by the general object of financial offences well-regulated the norms of financial right public relations in the field of financial activity of the state, that in the process of forming, distributing and use of money, mean of budgets and state having a special purpose funds. These relations are in public legal, well-regulated imperative financially legal by norms.

Consequently, we have a sufficient scientific ground of necessity of existence of such legal category as financial offence, and the legislative selection of financial offence in an independent kind will have an important value for confirmation of independence of all institutes financially legal to responsibility.

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## **CIVIL LIABILITY: CONCEPTIONAL APPROACH**

*One of problematic questions in civil law is the difference between tort obligation and civil obligation. Controversy emerged in the result of changes in the sense of state and transformation of it into a new quality of a legal state (Art. 1 of the Constitution of Ukraine) and rejection of all-judicial justice: justice in Ukraine is executed only by courts and delegation of judicial functions or assumption of them by other bodies or officials is not allowed (part 1 Art. 124 of the Constitution of Ukraine).*

It is a pity, but a large part of researchers or glossators of current legislation's provisions about civil liability omit this principle circumstance and presuppose out-of-court liability. In such a way they ignore the basis of emergence of civil liability, its unchangeable integral part – state enforcement and substantially-procedural components. A priori: civil liability is the result of accumulated legal composition as an attribute of the law of obligations where the breach of obligation itself – failure to fulfill or improper performance of it (Art 61 of the Civil Code of Ukraine) – results in accessorial (additional) obligation to the contract or tort obligation. The last can be fulfilled by the breaching party (tortfeasor) on their own or forcibly by means of court decision and actions of the Enforcement Agency of Ukraine.

The problem is in the absence of systematic doctrinally approved approach: 1) the differences between them are not outlined in the civil legislation; 2) tort obligation, by its composition, is approximated to the civil liability; 3) the light borderline between them is omitted in most cases (tortfeasor and additionally responsible for him person can be held liable only by court in accordance with and on the grounds that are stipulated by our legislation); 4) only the Enforcement Agency of Ukraine can exercise the decision on the subjection to responsibility. At the same time tortfeasor and additionally responsible for him person can voluntary exercise the decision of a court.

The law supposes the imposition of civil liability only in case of existence of enough conditions by the model of full or in some instances inchoate tort (damages, coursed by hazard which can happen without guilt and even without illegality of tortfeasor).

The issue is about integral substantially-procedural grounds of tort obligation in the framework of non-jurisdictional form and civil liability in the framework of jurisdictional form. The difference is only in that the first is realized outside the jurisdictional form and on the grounds of conciliatory (mediatory) procedures which, it's a pity, are proscribed and not worked out substantively and secondly – only by court in accordance with the civil procedure.

The moment of tort obligation transformation into civil liability is the most problematic in its sense. It is supposed that the reason of it is in the difference in definition given by specialists in substantial law and procedural law. Curiously

enough, practicing lawyer-scientists, especially judges don't deal with these questions and even worry little about it.

Primarily, this question was being decided by the way of transformation of conditions' emergence of tort obligation into the grounds for the civil liability. Accordingly, the terminological contradiction appeared, in which there is no one's guilt: it is enough to scan the manuals on civil law where the conditions of tort obligation and civil liability primarily come down to its basis. It doesn't match the sense of tort obligation as the obligation of tortfeasor to pay damages and the sense of civil liability as a kind of state enforcement in order not only to pay damages forcibly but also to incur additional expenses which are stipulated by procedure and enforcement.

Taking into consideration pointed out questions, we offer our view of the complicated problem decision by the way of inclusion of additional compulsory element for the emergence of civil liability and transformation of tort obligation into such liability. For the transformation of tort obligation into civil liability one more compulsory condition is necessary. This is an accumulated legal composition by its legal nature, that is, the court decision on holding to liability. It is composed of the next facts:

- 1) The tortfeasor rejection of voluntary performance of the main and/or tort obligation or expiration of their performance. At the same time this element may be absent as the non-breaching party has the right to file a suit directly to the court without the announcement of claims to a tortfeasor or persons responsible for him. At this stage the application of an applicant about fulfillment of such requirements is demanded. This can be in the form of petition especially to a tortfeasors – legal persons that are obliged by the requirement of payment discipline: they can comply it with only formal requirements (application, petition) and can debit their account with the announced grounded requirements to the account of an applicant. During the compensation of damages a tortfeasor, a legal person, shall have the formal ground: a) the amount of damages grounded, approved by consumer expertise or other documents; b) written application, which can be complied in the established order. This will allow parties to avoid litigation expenses, red-tape and other inconveniences of litigation;

- 2) Filing of a suit (by non-breaching party or other competent persons) to a court on bringing to the responsibility. This stage has principally important meaning and indicates the intention of a plaintiff to transfer his demands into the publicly-legal sphere and merely private conflict – into the rank of court controversy and apply the possibilities of state enforcement machinery.

- 3) Making a decision about the acceptance of a case to the litigation and/or the implication of measures to ensure a suit, particularly an injunction on the disposition of property. Peculiarly, from this moment the state enforcement concerning a tortfeasor, which can be called as a preventable enforcement. Its consequences can result in fulfillment of accessory obligation, but as a result of the action of two factors: demands of a plaintiff in the form of a suit and a decision of a court on severable securing of a suit.

- 4) Making a court decision on bringing to a civil liability to evaluate its amount, form and responsible person. A plaintiff is placed to the state security by means of

such decision and his demands to a defendant are strengthened due to: obligations of a defendant to exercise a court decision in case of entrance it into force, a court submits the copy of a court decision to a defendant; a plaintiff can present demands to a defendant once more or a defendant can exercise them on his own; to submit it to the Enforcement Agency;

5) Entrance it into force of a court decision on bringing to a civil liability. A court decision doesn't enter it into force when it is appealed and is under the review of an appellate court or a court of cassation.

6) The rejection of accused defendant of voluntary execution of sanctions awarded by court. As a rule LLP abuse, estimating beforehand that their authorized capital is not enough to pay the demands of creditors or persons who formally don't have registered property or other means.

7) Submitting of a court decision to the Enforcement Agency and initiation of a litigation;

8) Enforceable fulfillment of a decision on bringing to a civil liability by the body of the Enforcement Agency.

It is necessary to take into consideration that by the moment of rendering of a decision per se on bringing to a civil liability the parties can conclude an agreement on settlement of a dispute or a plaintiff can withdraw from suit, change the amount of it. Thus, procedural consequences on payment of litigation expenses, informational facilitation are left.

On the contrary, additional consequences take place for defendants during the transformation of the tort obligation into the civil liability. The concern the payment to the plaintiff the compensation of litigation expenses for the filling of a suit, informational facilitation, legal aid and so on. Besides, additional expenses occur in case of extension of enforceable fulfillment of a decision by the Enforcement Agency.

In our point of view, such solution is grounded substantially and procedurally and permits to distinguish exactly where there is tort obligation and civil liability.

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## **INNOVATION IS SUCH A COMPLEX PURPOSEFUL CHANGE**

*In terms of the transformation of the social development of innovations in various areas of society become a necessary condition for the formation of the principles of stability, sustainability, sustainable progress.*

Innovation creates impact not only on the branch which is made, but also on other areas of human, with such influence in a number of cases, is essential and is revolutionary in nature. Innovation is a process that has complementation and directed action.

Innovation as such comprehensive change that makes the environment the implementation of new, relatively stable elements. These items can be material or social, but each of them in itself is only a novelty, that is the subject of innovation. Innovation is the essence of the process, i.e. the transition of some system from one state to another, but this transition includes initiated and controlled change.

Mechanism of translational development advocate innovations. The successes of individual people and organizations, entire people and organizations, countries to a greater extent depends on their ability to product and perceive different kinds of innovation. The propensity to innovate based on experience, and in anticipation of the new, lager.

Innovation in translation from Latin, recovery, update, change, and innovation. Rallying in a meaningful understanding of these concept is «new». It entails a number of historic proto-contents, hidden and overt connotations. The concept of most timeless philosophical problem the problem of change and to attempt to resolve the so-called paradox development. In establishing the European social philosophy had set and, most importantly, positively answered the most important question about the nature of the new\$ or possible occurrence and death of differences surrounding us in the world? Reply eleatov, as know the downside is there is no origin, no distraction, since there is no oblivion. F set of distinctions in the world-steady.

New impossible, every creative work is only an illusion or creation of illusions. The content of the concept of «innovation» had not yet become the property of special analysis in scientific research, and the term itself is absent in the literature. Summarizing approaches, let's consider «innovation» from different angles of view [1].

1. Innovation arises suddenly, at once, is born as an integer, in the extended and dear from, and not in a fragmentary forms can be explained only, post factum, after the event of its occurrence and then perhaps partially.

2. Innovation as a manifestation of potentially mortgaged. Innovation as a consent of old, which is already the past in other forms. Innovation, as a confluence



of result with a hidden installation.

3. Innovation as irrational, absurd. Nils Bor ordered to Yeizenbergu that his theory is not crasy to be true. In an attempt to prove the fundamental ideas of his scientific theory scientist rationality. Active speculation, irrational, even foolish ideas and thoughts, is the mechanism of with drawl beyond the stereotypical thinking and breakthrough to a new. Not to deviate from the absurd, because the absurdity of this pantry of rational, his stimulus and its potential form. Smart is born of stupidity, rational – with the absurd, the order from confusion. In this sense, followed by Erazm Rotterdam-Ski, me must say laudable word «nerozumnjsti».

4. Innovation as a mistake, seduction. Innovation is a fiction, which is already recognized as the only such (not yet recognized scientific association, has already rejected, lost, forgotten). We must recon with the fact that among the thousands of seemingly meaningless and empty to have at least one idea or foresight. Opening a new, possibly opening forgotten, making the marginalized through.

Thus, the innovation of – something that has not previously existed, but was in the phase of formation, i.e. «metamorfozy appearance significantly new» [2].

In general, the innovative theory appeared in the 19<sup>th</sup> century in culture report with changes that occur with spontaneous interactions of different cultures. As a rule, it was about the infiltration of European eating habits and ways of organization in the traditional Asian and African society [3].

And only at the beginning of the 20<sup>th</sup> century were to oncoming studies patterns of technical innovations.

The first interesting, specifically the innovative, observation was made by N. Kondzat'ev in the 20-ies. He discovered existence of the so-called «long waves». Such cydes and waves are formed from each of the basic innovations and represent a set of secondary innovations that are changing. This the idea adjusted to economic theory, in particular, mandated and vindicated cyclic crisis. German economist J. Schumpeter saw here the possibility of expedited removal of another downturn through activation of the radical technical and economic innovations. I.e. science the beginning of the 20<sup>th</sup> century the innovative theory of the economic science [4].

The central category of the innovation of theory is the innovation , which first introduced in scientific theory as the notion and classified according to the criterion of novelty in theoretical developments Schumpeter. J. Schumpeter also made an attempt to explore the possibility of implementing innovations and put for nard the idea of «effective competition», which reflective interaction of the forces of monopoly and competition, which is based on the novels [5].

With all the variety of objects and methods research of innovation enough clearly distinguished three stages of its history.

The first phase is associated with the study of factors that facilitate or hinder success innovation\$ extensive empirical material that exists in the form of a large number of classifications.

The second phase of the main subject of research is an innovative process that includes mechanisms for diffusion and transfer of innovation from one cultural environment to another.

In the third stage, which continues as the present time, the attention of

researchers is mixed toward the analysis of the different types of innovative situations. Development of methods, perhaps more of the early risk assessment, recommendations of the socio-political organization and institutions.

Thus, innovations policy becomes an element of strategy activities not only firms but also to the state, which seeks to promote the development of innovative processes in all spheres of society.

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## **CHALLENGES OF AIRCRAFT MAINTENANCE PERSONNEL TRAINING STANDARDS HARMONIZATION**

*Principal aspects of national educational standards for aircraft maintenance personnel training harmonization with EASA Regulations have been analyzed to show how to adjust the educational and training programs and curricula for training of aircraft maintenance personnel with Part-66 standards.*

Taking into account the forecasts that the volume of air traffic flow will increase twice in the next 15 years, the airlines demand for modern aircraft of various types, classes and functions continues growing. Analysis of aviation industry of Ukraine and the Commonwealth of Independent States (CIS) shows that this problem can be solved due to further growth of the airlines' fleet and the number of aircraft manufactured in Western Europe and the USA. Their operation provides high level of safety, rise in the effectiveness of airlines, as well as an increase in the number of jobs and higher level of aviation personnel salary.

It is clear that changes in the structure of airlines fleet inevitably cause the need for changes in aviation personnel training standards in order to ensure the compliance with maintenance procedures for foreign and national modern aircraft.

Educational standards of aviation specialists training in Ukraine have been stated by the law of Ukraine "On Higher Education". Standards of initial, recurrent and upgrading training are determined by the documents issued by the Ministry of Education and Science and the Ministry of Infrastructure of Ukraine, in particular the State Aviation Administration.

The globalization of aviation activity requires adopting aviation laws and regulations to the standards and recommended practices of the International Civil Aviation Organization (ICAO).

It is worth mentioning that civil aviation of European Union (EU) member states operates according to the ICAO standards as well as European aviation regulations. The regulations developed by EU can be implemented not only by member states but also by other countries of the European and North Atlantic region. The implementation of EU regulations in all countries of European and North Atlantic ICAO region has started the process of more active harmonization of the national regulatory issues with EU region. This process is headed by European Aviation Safety Agency (EASA), which has the function of a European regulatory authority.

The responsibilities of EASA include conducting analysis and research of safety, authorizing foreign operators, giving advice pertaining to the drafting of EU legislation, implementing and monitoring safety rules (including inspections in the member states), giving type-certification of aircraft as well as the approval of organizations involved in the design, manufacture and maintenance of aeronautical products. Besides, EASA will now be able to certify Functional Airspace Blocks if more than three parties are involved.

The National Program of adaptation of the Ukrainian regulatory system to the European Union legislation was developed in order to apply the European rules and standards in Ukraine. "The rules of Maintenance Training Organizations approval (Part-147)" and "On Approval of the Rules for Issuing Certificates of Aircraft Maintenance personnel (Part-66)" EC 2042/2003 from 20 of November 2003 were implemented in 2011, which are fully harmonized with the Ukrainian regulatory system and the National Air Code. If these documents are implemented in the country, the certification of personnel and approval of aircraft maintenance organizations are provided in total compliance with these standards.

In Europe, Aircraft Maintenance Certifying Personnel have to comply with Part-66 Certifying Staff. Part-66 is based on the older JAR system and the required training level follows the ATA 104 system.

There are 3 levels of authorization which are as follows:

- Category A (Line Maintenance Mechanic): Basic A category License, Task Training (Level depends on Task Complexity), Company Certification Authorization for specific Tasks ("A category").

- Category B1 (Mechanical) and/or B2 (Avionics) (Line Maintenance Technician): Basic B1/B2 category License, Type Training (i.e. Line and Base Maintenance).

- Category C (Base Maintenance Certifying Engineer): Basic C category license, Type Training (Line & Base Maintenance).

Type Rating and Part-66 Level I training for subsequent Aircraft Types of similar technology, otherwise Level III training), Company Certification Authorization ("a category C aircraft maintenance license shall permit the holder to issue certificates of release to service following base maintenance on aircraft. The privileges apply to the aircraft in its entirety in a Part-145 organization").

EC № 2042/2003 (mainly Part -147) introduce (in addition to the traditional teaching methods) e-learning (or any digitalized tutor devices at the training facilities), distance learning or Web-Based Training (WBT) (at home or remote from the Training Organizations), Multimedia-Based Training (MBT), and other teaching methods and practical training on virtual training devices, for the benefit of maintenance staff training; consider the potential impacts of these new teaching methods and technologies on the training in terms of content, level, duration, learning objectives, competences to be gained, documentation, assessment, examination and examiners, benefits and limits for the practical tasks.

The proposed changes are expected to fulfill Industry's needs for efficient and cost effective training of maintenance certifying staff, while maintaining or increasing the level of safety.

The problem is how to harmonize the national specialist training standards developed by the Ministry of Education and Science of Ukraine with EASA Part-66[147 Standards in aviation educational institutions providing aircraft maintenance professional training.

Nowadays some aviation educational institutions have not adopted their programs and curricula in order to train specialists capable of maintaining aircraft manufacture in Western Europe and the USA. The number of experts, licensed for maintenance of modern aircraft does not satisfy the growth of aircraft fleet. As a result aviation enterprises have to spend their financial resources for training, upgrading and recurrent training of their specialists.

Along with this, maintenance mechanics (category B1) that are trained according to the Part-66 standards are allowed to provide maintenance of modern foreign and national aircraft, in comparison with their colleagues who are trained according to the educational standards of the Ministry of Education and Science. To get the same license (category B1), aeronautical engineers have to study some special Part-66 modules additionally after graduation from aviation higher educational institutions and several years of practical work.

The higher aviation educational institutions can harmonize their educational and professional training standards with EU regulations, namely with Part-66 and Part-147. It is necessary to analyze existing education process and curricula in order to determine which modules of common aeronautical programs can be credited and which modules should be studied and examined additionally.

Module control is performed in the form of a test or written exam. The test is considered to be passed in case if the number of correct answers is not less than 75% of their total number in the module test.

According to specific requirements of Part-66 Standards, the applicant has no right to take the test again during the year after the failure. His instructor, in this case, is not allowed to continue the training process.

There is another form of studying module. This is the self-study of the obligatory modules by the applicant, followed by the Standard final test. Specified maximum period of all modules examination is 10 years at most from the date of the first module test.

The National Aviation University has got a successful approach to the adjustment of educational standards with EU regulatory system. But nowadays the university can offer only theoretical training of all categories of maintenance personnel (A, B1, B2, C). The next step in training is on-the-job training in maintenance organizations certified in accordance with Part-147.

B1, B2 maintenance specialists should go through 17 educational modules (2440 hours), 50-60% of which is practical training.

The high education standards outline the 4 year aeronautical bachelor degree, which contains 240 ECTS credits. 160 ESTC credits are contact hours and 80 credits – self learning. Note that 1 ESTC credit equals to 40 hours study time. The educational standards foresee 48-60 credits for optional subjects, which can be used for module studies in accordance with Part-66.

So, we can say that major number of Part-66 modules can be studied during bachelor level training.

EASA Part-147 Standards establish requirements for structures that provide training of aviation specialists according to Part-66, including specifications for staff, logistics and related training process. Particularly instructors must take professional training on modern technologies, practical skills, human factor and new training procedures at least every 24 months. Number of students in a group must not exceed 28 students for theoretical classes and 15 per one instructor during practical training according to EASA Part-66.

A positive feature of EASA Part-66|147 Standards is that they are general for all organizations and institutions. The methodology of training requires strict logical approach to presentation of material, continuous dynamic response to change of aircraft operating conditions.

It is necessary to emphasize that the state authorities should play a more active role in ensuring the transition of aviation higher educational institutions to train aviation specialists in accordance with modern international standards by means of administrative, financial and practical support. In order to make this transition possible, the compliance of national education standards with EASA Part-66 standards must be achieved, which does not require significant financial resources.

Those who graduated from aviation higher educational institutions in the past years were not trained according to the standards of EASA. If these graduates are willing to carry out the maintenance of modern aircraft, including aircraft manufactured abroad, they are supposed to go through the whole course of training.

Taking into account that many thousands of graduates of the past years are not allowed to take part in aircraft maintenance procedures, state authorities such as the State Aviation Administration, and aviation higher educational institutions of Ukraine should try to find a legal basis for solving this problem. When referring to the agency of aviation personnel licensing, the applicant must submit not only the appropriate application form, but the professional diploma of relevant educational qualification and its academic record transcript received at aviation higher educational institution, as well as the curricula and subjects which he studied.

Now the problem is not settled, because it is very difficult to determine the number of Part-66 modules the applicant should pass according to the results of prior studying at aviation higher educational institution, and how many modules he should additionally study and pass. Additional training of graduates of previous years for Part-66 modules that have to be passed could be arranged, in our opinion, using the facilities of aviation higher educational institutions and creating separate training structures that would operate on a contractual basis and be regarded as an approved organization according to Part-147 standards.

**Conclusions.** The current state of the aviation industry is characterized by a steady increase in the number of Western European and the USA aircraft in the airlines' fleet structure, which requires the harmonization of national standards of training aviation specialists, including aircraft maintenance personnel, with EASA Part-66 standards. To provide training of aircraft maintenance personnel in aviation higher educational institutions in accordance with the EASA Part-66 standards, it is necessary to:

1. Familiarize all managing and academic staff of aviation higher education institutions with EASA Part-66/147 standards.

2. Organize the certification of specially established training structures at aviation higher education institutions in accordance with Part-147 standards.

3. Adjust the educational and training programs and curricula for training of aircraft maintenance personnel with Part-66 standards.

4. Analyze the possible options for those who graduated from aviation higher educational institutions in the past years to complete an additional training in accordance with the Part-66 standards in order to get license for the maintenance of national and foreign aircraft.

It is clear that both the State Aviation Administration and aviation higher educational institutions are interested in a positive solution of this problem. We presume that implementation of these measures will give an opportunity to aeronautical students and those who graduated from aviation higher education institutions in the past years not to go the whole course of training, but to pass the required modules additionally. As a result, these specialists will be more demanded in their native countries and will get the chance to have a relevant job abroad.

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## CREATING THE SCIENTIFIC SCHOOL MANAGEMENT OF INNOVATIVE DEVELOPMENT

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*Formulated the problem of the scientific school management of innovative development. The ways of formation of the school and its effective functioning factors on the basis of new algorithms and methods for managing innovation processes that ensure the development of science and training of the teaching staff.*

To prepare a new generation of executives, managers, special importance is the problem of unity professionalism and humanization training. Training managers to management activity leads to a number of current educational problems which require scientific substantiation. Today, it is important not only to introduce new technologies, but the presence of creative problem-solving skills of personnel management, management of innovation projects, to achieve understanding with employees, providing high efficiency work organization.

"Training" is considered as a general term used to refer applied problems of education, when we mean assimilation of social experience with a view to applying it to perform specific tasks practical, educational or curriculum, often associated with certain views of a regular activity. The concept is considered in two ways: study - formation of readiness to meet future tasks and readiness - the presence of competence, knowledge and skills necessary to perform the tasks.

To make qualitative modern innovative training professional management project activity required three components educational activities in the unit:

- scientific schools;
- organization of creative environment;
- personality of the teacher.

According to scientific practice, in modern terms, despite the widely available scientific information and significant opportunities for acquiring education, professional formation rarely occurs outside the scientific school. The actual flow of information is so great that one person can not afford to learn it. This task performs a scientific school - informal creative community within any scientific field qualified researchers, associates, joint approaches to the resolution of common problems, work style, ideas and methods of implementation.

Scientific school - a hierarchically organized collective mind, concentrating the experience of several generations. In practice, it represents the clearest manifestation of collective creativity under the direct ideological and practical leadership recognized scientist and teacher who nurtures this collective scientific ideas and determine the content and methods of research.

Explanatory Dictionary defines the scientific school as a trend in science-related attitudes common unity, continuity principles and methods. By definition K.Lanhe, scientific school - is an informal research group, formed around the famous scientist at the research institution that combines for collective development



of specific scientific ideas, problems, direct a number of individual research teams.

M.Semenov defines the scientific school as a kind of thinking and action science approach to the solution of any scientific problems. At the same time B. Kedrov emphasizes that scientific school - is primarily structural link modern science that lets concentrate relatively young scientists under the leadership of the founder of the scientific direction to address a specific, delineated areas relevant scientific issues.

There are two ways of creating a scientific school: evolutionary and commercial. The first one involves the gradual formation and development of research staff and material research base within the development of high school. Commercial presupposes an invitation to third party leader to the current team, which requires the creation of exclusive conditions: a strong resource base and high wages.

Among the factors the effective functioning of scientific schools are the following:

- definition scientific field, the actual profile of scientific topics, perspectives of its development;
- formation of scientific sections (institute, department, laboratory, center), university faculties, departments;
- formation of research groups, thorough planning research;
- establishment of modern logistics research base;
- availability doctoral postgraduate institute;
- publication of fundamental works monographs, scientific manuals, articles in professional journals, including international;
- availability of professional scientific periodical;
- the annual scientific events: workshops, conferences and seminars.

Implementation of proposed association carried higher education institutions for improving training management Master of project activities.

Given the presence of all the factors set out in the system of training specialists can be argued that a scientific school of management innovation.

Only the formation of structured scientific schools, working and developing in elaborate scheme and plan, can provide efficient development of science and ensure its own scientific and teaching staff.

Scientific school concentrates a huge creative energy of scientists coordinate their activities in the process of scientific inquiry, the maximum contributes to the disclosure the creative abilities of young scientists, their education and becoming a mature research, initiate new areas of scientific research.

Obtained results allow to fully implement new algorithms and methods of managing innovation processes.

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## **THE PROBLEM OF FUNCTIONING OF MAGISTRACY ON PROJECT MANAGEMENT**

*The question of the formation of a graduate project management and competence through improved organization and content of the learning process. The requirements to the design of specific skills and areas of improvement of management skills. Generalized ways of improving the magistracy of the specialty "Project Management" in National Pedagogical University named after V. G. Korolenko, Poltava.*

Project management regarded today as one of the most important tools of modern management. Project management method can significantly improve performance in any area. Thus, training in the specialty 8.18010013 "Project Management" educational qualification of "Master" implies the formation of future professionals both management and design expertise, which is reflected in the planning, implementation and monitoring of the educational process in the magistracy.

Modern technologies of preparation of manager used in the course the educational process allow to develop a system of specific project skills, such as:

- Identify the problem and convert it into a goal of further work;
- Determine the future and plan for further action;
- Attract the necessary resources (including successfully motivate people to participate in the project);
- Precisely implement the plan, and if necessary to make quick adjustments to his needs;
- Analyze and evaluate the results achieved;
- To make a presentation of the results of their work and self-own competence.

Much of the training time is given for the formation of practical skills of project activities, its scientific research study. Implementation of coursework and a master's research project allows you to develop thinking and organize their knowledge, skills and abilities as tools of practice under the prevailing conditions.

Individual work with undergraduates supervisors - Lecturer teaching and management skills, problem-organizing study groups, involvement in the organization and conduct of scientific-methodical seminars, conferences, a variety of interactive methods of work during training sessions is also an effective means of forming the ability to work in a team, create the best environment as a communicative context of interpersonal interaction in project activities.

The reality of today lie in the fact that most institutions of higher education does not prepare its students for a possible management activities without raising the foundations of their professional culture. Switching universities in Ukraine for two-stage training, introduction of educational qualification - Master - the person who

received a higher education, special skills and knowledge sufficient to perform professional tasks innovative character of a certain level of professional activity provided for primary positions found are a number of discrepancies between: a new paradigm of teacher education, which aims to train highly cultured school leaders capable broadcast system human and professional values, and relatively low formation innovative culture of the modern luxury of the head; European requirements for managers and the lack of scientifically sound methodology that ensures proper development of innovative culture of the future leader in the preparation of of the master; the need to improve the professional culture of the future school leaders and the lack of teaching science is developed effective methods aimed at its development in the magistracy.

Achieving high managerial skills graduates from master 8.18010013 "Project Management" We consider in its development and improvement, providing the following directions:

- Develop the content of training courses in accordance with the requirements of modern education and science;

- Develop research activities and teaching facilities, working with the Department of Teacher skills

- Improve the quality and effectiveness (internship) graduate teaching practice through research and dissemination of best educational experience the best directors of educational institutions, educators and innovators Ukraine, the university rector.

- Form the basis of pedagogical skills education managers, the main components are: pedagogical skills as a set of properties of individual teachers; professional knowledge, skills, educational technology; teaching ability; professionally important personal qualities; teacher communication, its optimization; conflict prevention and resolution; pedagogical tact; organization of group activities; designing educational cooperation; active cognitive stimulation and educational activities in the game, training session; extracurricular activities; self-education and self-education as a factor of improvement of professional skill.

- Create consultation centers to improve educational and psychological culture of the future elite leaders. The objectives of the consultancy are: psychodiagnostic of personal and professional skills and emotional and psychological state management; correction of restriction of personal managers; psychotherapeutic work; diagnostic evaluation of socio-psychological situation in the organization and notification of managers; organizing and conducting workshops, seminars, conferences and other educational events.

- Search for new management models that incorporate the principles of convergent educational management, implemented in the school: the priority children and families as consumers of educational services; priority public educational values as a state educational standards; high quality education and the effectiveness of the educational process; reliance on human values; moral relations; helping others to achieve success; focus on development prospects.

- To improve teaching and methods of teaching plans, programs and courses that are taught at the Master 8.18010013 "Project Management" and implemented in the educational process benefits:

- Carry out pre-professional training of future managers by elite educational stimulation implementing organizational skills of students, teachers, leaders within educational environment.

- Develop a strategy for cooperation graduate 8.18010013 "Project Management" on the basis of mutual holding joint seminars.

For further improvement of the magistracy in Poltava National Pedagogical University named after Korolenko need to create a strategic plan for its development, which includes the following components:

1. Dynamic development of logistics department of pedagogical skills and management.

2. Development of a system for monitoring and management of educational resources.

3. System of continuous professional development of the faculty and staff of masters.

4. Availability of government.

5. Strong international and national cooperation with educational institutions and leading scientists.

6. Improvement of forms and methods of attracting talented young people with strong leadership qualities to join the magistracy.

7. Cooperation with nationwide, regional, local authorities, regional authorities and local governments.

8. Development of promoting employment by creating masters of social partnership with employers.

9. Involving undergraduates to fundamental and applied research.

10. Creating programs continued support of scientific activity.

The main components of this program are:

- Conclusion of agreements on scientific cooperation with foreign organizations and educational institutions, co-conducting international and national conferences, seminars and workshops;

- Publication of research papers and monographs;

- Participation in scientific exhibitions;

- Patent-licensing;

- Research trips graduate students, undergraduates and doctoral students;

- Development of scientific schools.

Creating a balanced sustainable development of pedagogical direction of research and development to ensure the relevance of knowledge of graduates competitive on the national and international market.

Improving the efficiency of the magistracy and graduate school as a result of the development of basic and applied research and effective communication of science and industry.

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## IMPLEMENTATION OF THE STATISTICAL METHODS INTO THE PROJECT ACTIVITY OF THE AVIATION PRODUCTION-AND- MAINTENANCE COMPLEXES

*The present article considers the issue of the development of aviation production-and-maintenance complexes and their transition to the new production standards using modern statistical methods. For the project of production improvement using "six sigma" method, it defines most effective statistical methods for every stage of the project life cycle and "six sigma" tasks.*

The topicality of the issue is connected with the necessity of comprehensive tasks solution of enterprise activities improvement with the aim of satisfying consumer demands and standards in competitive conditions. Such tasks are solved through detailed analysis and decision making on the basis of the facts, which are most effectively realized using modern statistical control method [1]. Statistical methods help to choose improvement directions, monitor the level of processes and product stability, and define the deviation of obtained characteristics of rate within tolerance [2]. Stability augmentation of production and maintenance processes in aviation production and enterprises is interlinked with the flight safety and preservation of airworthiness of aviation technology.

Enterprise development is stipulated by the transition to new production standards, increase in the level of consumers' demands and wishes and by the competition aggravation on the aviation services market.

The transition process may be effected in two ways: the first is ensuring the increase of product characteristics within the framework of the current external standard with subsequent development of the internal (the most rigid one as compared to the present) standard; the second one is implementation of the new external (international, state, branch) standard, which is connected with the provision of the defined by the standard improved characteristics of the product. The first way of transition may be viewed as a preparatory stage of implementing the new external standard implying the realization of a series of successive improvement steps, which meets the methodology "Kaizen". The second way of transition requires simultaneous extensive changes within the framework of limited steps and may be solved by means of using large resource and investment, which meets the methodology "Kairyo" [3].

The most effective way of monitoring the changes of production processes is using the universal statistic methodology, called "six sigma", which enables the decrease of the deviation level from the nominal to the one set by the standard. The statistic characteristic of  $\sigma$  defines mean square deviation of the product/process characteristics at the normal distribution of product/measurement number of units:

$$\sigma = [\sum(X-T)^2]^{1/2}/(n-1),$$

in which X is the measured characteristic value, T is the nominal

characteristic value,  $n$  is the number of measurements.

For the first option (increase of the product characteristics within the framework of the current external standard) the function of the normal distribution is being changed according to the successive steps of improvement.

For the second option (provision of the product characteristics in compliance with the new standard) the change of the function of the normal distribution means the transition to a new standard level.

The first option allows conducting the changes most economically but with greater time expenditure than in the second option, when cardinal changes are needed in many directions of the activity simultaneously. But both options imply attraction of defined resources, their distribution in time in accordance with the defined directions, tasks and operations, monitoring and analysis of the accomplishment of work stages. The complex of analytical and organizational tasks of activity improvement this way is most effectively realized by means of applying methodology “six sigma”, adopted by the leading global companies as a development strategy [3,4]. Deployment of the system tasks “six sigma” is connected with using the complex of statistical methods, which employ considerable organizational and material costs, require big investment and may be most effectively solved by the project management technology. Planning such a project for production-and-maintenance enterprise is connected, first of all, with defining main directions of changes, which are necessary for the specific type of the product/service. Such directions may be presented by separate business-processes, which are realized on the basis of defined technologies, materials, production equipment, tools, staff competence. Solution of the current problems and regulation of the processes in this case is carried out exactly in project logic. Every such a project has univocally defined time constraints and resources. Moreover, executing the project in line with “six sigma” strict logical succession of stages is followed: “definition – measurement – analysis improvement –monitoring”, which corresponds to the method OIASK [4]. Each of the enumerated stages of the project has its own tasks for the solution of which specific statistical methods and tools are employed. The international standard ISO 10017 [1] advises to use statistical methods in the system of manufacturing quality management. The implementation of the project in line with methodology “six sigma” considerably extends the number and types of statistical methods and tools, which can be applied on each step of the project. While implementing the methodology “six sigma”, the project may include the following stages:

Stage I. “Preparatory stage” at which a seminar is held for the top management and out of the number of top management the “management council” is elected (who are taught statistical methods).

Stage II. “Project selection”. The project should be aimed at the solution of an essential for the company problem within the time limit. The project should be local by nature of the problem. Its solution should lead to the real economic effect, besides, it should be not big by the amount of finance and the number of members (specialized statistical methods are employed).

Stage III “Pre-project preparation of the staff”.

The pre-project stage starts from the selection of the staff, who will be

required for the realization of the chosen project and ends with teaching most essential statistical methods and tools.

Stage IV. “Execution of the project”. The immediate execution of the project is effectuated by the staff who completed pre-project training and were advised by the external consultant (if needed). In the process of the execution the complex of statistical methods is used for defining key consumers, problem statement, aims and basic parameters of the project, measurements of the indices of the problem process, analysis of the problem causes, process improvement, monitoring the stability of the implemented process improvements.

Stage V. “Experience and knowledge generalization” is the key advantage of the post-project training, gain in experience by the staff participation in the particular project. The task of the post-project training lies in the analysis of the work team experience and consolidation of knowledge, skills, and practices in using statistical methods, which is carried out jointly with the consultant.

Stage VI. “Expansion and integration”. A successful project is characterized by the real economic effect; assurance in the efficiency of the methodology “six sigma”; obtainment of the important experience and knowledge; extension of the implementation initiative; selection of the following topical projects in the context of further implementation of the methodology “six sigma”.

From the point of view of introducing different types of projects, including the ones on the basis of “six sigma” tasks, of importance is their standardization in line with current standards of the project management, such as PMBOK [5]. In this respect it is reasonable to present the stages of tasks solution “six sigma” within the structure of the project life cycle with the peculiarities of the selection and usage in them of the statistical methods and tools. Such a structuring will allow to more accurately define the succession and hierarchy of the works both on the production and management processes, determine the resources of the project and its budget, execute the management of the works and cost of the project in time while using the technology of project management and statistical control methods. The suggested distribution of “six sigma” tasks in line with the corresponding stages of the project life cycle and most effective statistical methods and tools are introduced in the Table.

Most effective production decisions may be adopted on the basis of modern methodologies: the methodology of quality function development (QFD) at which necessary product characteristics transform into particular measures for their provision, reengineering (process modification) and methodology FMEA (Failure Mode and Effect Analysis) [3]. The measures may concern the analysis and stability provision of the current technologies or implementation of the new ones. The importance and rating of the measures, in their turn, may be defined with the help of particular statistical methods, for example, Pareto distribution. Components for each measure (direction) and their influence on the project characteristics may be defined on the basis of cause-and-effect Ishikawa relations. For the adequate usage of the statistical methods and tools participant of the project implementing “six sigma” (company’s top managers, project managers and ordinary project members) should undergo corresponding training. The exact role structure of the team is developed for the project execution.

**Conclusions.** To resume, the implementation of the project tasks management of improving activity processes of the aviation production-and-maintenance complexes presupposes the usage of the universal statistical methodology “six sigma” with the tasks distribution by the stages of the life cycle of the standardized project and defining the usage of the corresponding statistical methods and tools for proving the maximum project efficiency. The defined statistical methods shall be included into the training system of project teams.

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## **TRADITIONAL METHODS OF DIAGNOSTICS LEARNING OUTCOMES WITH THE HELP OF INNOVATIVE TECHNOLOGIES**

The most important feature of modern education is its focus on how to teach students to not only adapt, but also to act in situations that have undergone social change. Its core - developing, culture-dominant, education of responsible individual who is able to self-education and self-development, a person who knows how to think critically, to process a variety of information, use the acquired knowledge and skills for creative problem solving.

Some authors define pedagogical innovation as a specific form of excellence that is radical, contains new solution actual problem, gives a qualitatively new results that apply to other components of the educational system.

Building up of education, which harmoniously combine professional competence with personal value orientation a person is only possible through the use of leading innovation and humanistic teaching methods higher educational community. In this regard, there is an urgent need to develop adequate existing socio-economic situation of real innovation plan methods of diagnosis of learning outcomes, which would be aimed at the development of modern high-quality value-ideological, personal and professional skills.

The urgency of this article is caused, on the one hand, the great interest in this topic in modern science, on the other hand, its lack elaborated. The combination of definiteness and flexibility are applied to social development, as it can provide long-term development prospects and functional richness.

The learning process - a nonlinear situation of open dialogue and direct feedback, awakening their powers and abilities of the student, his initiation into one of their own development paths. It helps opening of the student himself through cooperation with itself and with others.

After analyzing the curriculum of basic and specialized courses in all disciplines taught in higher education, we see that the specific feature of modern education requirements are threefold solve the problem: 1) transfer of knowledge by teachers; 2) the assimilation of knowledge obtained by students; 3) develop students' skills of independent acquisition of knowledge.

Today knowledges are not just in their traditional, narrow professional sense and act as the determining factors of educational regulatory processes, and certain personality traits of participants in educational activities, a system of relations that develop between them. Accordance with its psychological and pedagogical literature point of view, the concept of "competence" includes knowledge, skills and ways of doing business (A.P. Zhuravlev, N.F. Talyzina, R.K. Shakurov, A.I. Shcherbakov and others).

Taking into account fact that the system includes an innovative technology skills, providing design and implementation of the educational process, teacher

professional school should learn the skills of each stage of vocational and educational activities based on consideration of several factors: the priority objectives of vocational training, specific training content, age and educational level of the students, the physical condition of teaching and logistics.

A significant number of major methodological innovations associated today with the use of interactive teaching methods. Online training - is primarily dialogue training, during which the interaction between teacher and student. Its essence is that the learning process is organized in such a way that almost all the students involved in the process of learning, they are able to understand and reflectivity about what they know and think.

In the context of our study, we focused on the following principles the application of new learning technologies: 1) focus on collaboration; 2) the development of personal potential; 3) the unity of theory and practice; 4) The principle activity that leads to active position of personality in learning.

Modern trends in higher professional education:

- a better understanding of each educational level as an organic part of the system;
- solving the problems of continuity of different levels of continuing education;
- the transition from informative to active learning with the inclusion of the learning process and problematic elements of scientific research, various forms of self-employment;
- computer assisted technology training;
- the transition to an organization of interaction between teacher and student, where the focus is shifting from teacher training activities on the cognitive activity of the student.

A special place in the implementation of the pedagogical approach to diagnostics of the learning process. From this diagnosis begins planning the teaching process, checking and accounting knowledge. Diagnosis is made during training, and always studied the results of training activities. With this diagnosis involves tracking student achievement as for the acquisition of knowledge and the level development their abilities on the basis of clear parameters effectiveness of training. Learning outcomes occur when preparing course projects, reports, passage and protection of teaching and practical training, writing research papers and attending conferences. Ultimately, writing interdisciplinary qualification examination and defense of the thesis.

A variety of innovative technology makes the learning process really creative, exciting the interest of students, improve understanding and learning. Computerization is a necessary condition improving the teaching process, because of its development is a restoration of the contents and forms of educational activities as teaching staff and students. Computer technology is an effective tool for the development of new forms and methods that improve the quality of education.

The current financial crisis has led to massive changes in higher education, and our values and look for flexibility should certainly also be carefully monitored. Flexible learning and a desire to offer more flexible access to education is not new, and was not even a new flexible concept twenty years ago, when the Internet and its

possibilities presented more opportunities flexibility.

Ideas of flexibility and flexible learning described in the works of Fleming (1993), Kirkpatrick (1997), Kirkpatrick and Dzhakuppek (1999) and Thomas (1995) in 1990. Colleges and universities want to increase the flexibility of access and opportunity, whether we are talking about joining an educational institution, or of opportunities to learn in a more convenient and personalized ways.

The main role is played, of course, the Internet as a powerful media tool that seeks to devour all other means of mass communication. Social networking has become one of the most famous and popular tools training and information sharing. Social networking sites provide the conditions for democratic forms of self-expression and interaction between users. New methods in the educational space "Cloud computing" allows sharing service and technical support around the world.

Already, many employees and students interact in an online collaborative environment. There is no doubt that information technology, networks and digital onslaught can change radically the training of future professionals, our goal is that we have not lost sight of what's important in terms of pedagogy and teaching experience.

Attracting of these technologies harmoniously supplement stages of the training project as one of the diagnostic methods of learning outcomes.

The first step is to explore the topic of the project and determining the main directions of work. During brainstorming are determined predictable problems and are formed affinity groups. Students in groups are distributed tasks of everybody website design and planning terms, gather information on the presented problem. The purpose of this methodological procedure - simulation alleged actions to implement them, repeat until they are completed confidence in the final result.

The second stage - the process of integrating received data and discuss the middleware material found in groups. Developing a general point of view in the debate. Correcting disadvantages in the work and prior approval of the project plan. The organization of work and further setting the timing the next stage. The purpose of this methodological procedure - bringing "product" to the circumstances at the maximum consideration of all requirements.

The third stage - a further discussion of the collective group and eliminate drawbacks. Planning the presentation of results of the project and the modeling of possible issues. Protection project carried out in class in the form of presentation. The purpose of the reception - meet the optimal amount of true needs in a complex environment.

In conclusion, worked out the totals of the work performed. The aim of these teaching methods is the transition from the existing facts to future possibilities, creative activity that promotes the emergence of new and useful, something that had not existed.

In monitoring the quality of education and assessment processes that occur in it, using different indicators system, created on the basis of the principles of rationality, consistency, consistency, and complementarity relationships, accessibility, innovation, relevance, simplicity, adequacy and more. In particular, the indicators of effective business schools include: learning content and educational software, teaching effectiveness, teaching staff, physical infrastructure, financing,

employment and so on.

**Conclusions:** The effectiveness of higher education involves creative innovation in the training of future professionals in general to the acquisition and use of knowledge gained. This can only teach a teacher who not only transmits knowledge are ready for digestion, but also draws them to cooperate in the process of learning. It is desirable that the teacher also demonstrated his scientific achievements, attracting students to carrying out research.

Methods of diagnosis as a professional preparing qualified specialists should be implemented through the creation of conditions for the achievement of students a high level of professional competence and consciousness that reflects their ability to carry out activities in accordance with the requirements of the present stage of economic development, taking into account social and professional responsibility for the work.

The study of quality of education and innovation processes of diagnosis of learning outcomes involves the examination of the complex issues that encompass the essence clarify basic notions of issues of quality of education its importance, structural components, properties, criteria and standards; determination procedures and performance evaluation of the quality of education as a process.

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## **TRAINING FUTURE HEADS OF EDUCATIONAL ESTABLISHMENTS IN TERMS MAGISTRACY SPECIALTY "MANAGEMENT OF EDUCATIONAL INSTITUTIONS"**

*The question of training future heads of educational establishments a Master's degree in order to ensure their innovation. Attention is paid to creating a professional and education standard on the national framework of qualifications. One of the ways to improve the professional standard is increasing administrative (managerial training).*

Training future heads of educational establishments according to the Law of Ukraine occurs by training individuals who hold leadership positions in education, preparation of and special master. In 2000, the profession of "educational institution manager" was singled out as a separate specialty, Ministry of Education and Science of Ukraine introduced a new classifier to the specialty "Management of schools' educational qualification of" Master ". By this time the leadership positions in education embraced people who had higher education according to the profile of the institution to which they are managed.

In 2000, the Ministry of Education and Science of Ukraine approved educational qualification characteristics Masters degree in 8.000009 (since 2010 specialty code changed to 8.18010020) - "educational management", which corresponds to state standards of higher education and is a component of the sector.

Problems of professional training for master programs examined T. Tolkova [1]; commitment to research and development of future Masters - I.Bopko [2]; preparation of future heads of educational establishments in terms magistracy - V. Bereka [3], O.Lebid [4] and other authors. Training of reserve managers of secondary schools as an example of "School Reserve" and "School teacher-researcher" in Kyiv and "School of reserve management personnel" in Chernigov organized and researched L.Vaschenko [5], B. Zhebrovsky [6], H. Tymoshko [7].

The authors point out that matched master's degree graduates continue their education of undergraduate and graduates. The peculiarity of the Master training is a deeper focus on fundamental and technical expertise, focus on the development of skills of independent scientific research, professional make informed decisions and gain knowledge. Theoretical, practical and personal skills are developing master closely with education and training in management, planning, improvement and implementation of the curriculum based on common European approach and the circumstances.

In the analyzed sources regarding the isolation group to solve problems which directed the study, the terms "reserve management personnel", "future leader educational institution", "school leaders of the future", "young school manager" that requires clarification.

A "reserve" in L.Vaschenko studies [5], B. Zhebrovsky [6], H.Tymoshko [7] considered candidates for the position of director of an educational institution, which raised a level of professional excellence in "schools reserve" "schools reserve management personnel. "

The term "head of the educational institution of the future" (M.Holovkova, A. Korobchenko) refers to a mental image, like the head educational institution more or less distant future are generally better, or excelling at a number of indicators of contemporary heads of educational establishments, improving them (indicators) offered in post-graduate education.

The term "young leaders school" is used with respect to categories of existing managers, who by age and time spent in the position (1-2 years) require special attention and use appropriate methods and techniques in the system of postgraduate education.

The term "future Heads of educational establishments" we mean students graduate specialty "educational management", which based on their own desires and the results of preliminary tests carried out training in higher vocational education in Ukraine.

We subjected to analysis of regulations governing the training of magistrates future heads of educational establishments.

Industry Standard of Higher Education of Ukraine to prepare Master's Degree 8.18010020 "management education" training 12 "head, institutions and organizations (in education and industrial training)" issued officially by the Ministry of Education and Science of Ukraine in 2006. The standard applies to bodies of higher education, universities and ministries, departments, associations, enterprises and organizations of different ownership forms, which are prepared or used by specialists with higher education mentioned educational qualification, specialization and training in generic object activities "technology of educational management."

As already noted, it is called upon to graduates from master to innovate (according to the Law of Ukraine "On Higher Education"), any of the positions which qualify graduates from master (according to the industry standard) provides activities using sophisticated algorithms that require design solutions and manipulation of large amounts of RAM and additional information; includes not only solve challenging enough, but the nomination of problems, finding innovative ways to solve them, for change, implementing innovations in the activities of agencies, divisions and departments at different levels. In turn, the innovation activities (including management) apply known algorithms for finding a solution. Therefore, in the formulation of professional standards unit (basic work functions), we focused on the 5-8 skill levels of the National Qualifications Framework.

The analysis above appointed industry standard found that it provides a "managerial" training of future heads of educational establishments and eliminate the condition in which the heads of schools do not have special administrative (managerial training). At the same time the specified industry standard defines similarity specialty training educational qualification levels of Bachelor and Master study predicting generalized object of specialist production functions and typical elements of the professional activities of satisfying the demands of the world of work to the profession, which contradicts Law of Ukraine "On Higher Education"

from 17.01. 2002 according to which: "Master - educational qualification of higher education person on the basis of educational qualification of a bachelor received a higher education, special skills and knowledge sufficient to perform professional tasks and responsibilities of the innovative nature of certain professional activities provided for primary positions in some kind of economic activity. "That is, the master's program should provide training to the components of innovation management education (and can be embodied through the provision of innovative component programs of existing disciplines; transcribing some disciplines hours due to the variable part of the training).

The above industry standard states that according to the positions that can hold a graduate student, they are suitable for carrying out functions and typical tasks of this function that comes into conflict with the demands of time to heads of educational establishments - to provide innovative development of the institution. Resolve of the contradictions found, in our opinion, can be added innovative component in the master's program to prepare future heads of educational establishments.

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## **MASTERING THE BASES OF PROJECT ACTIVITY AS A RESOURCE OF GENERAL PEDAGOGICAL TRAINING IN HIGH SCHOOL**

*The problems of learning the basics of project activity in the preparation of future teachers, heads of general educational institutions as a necessary component of a qualified teacher. The question of teaching design as a combination of research and action on solving pedagogical situations.*

A major problem with which we meet in the course of general training of future teacher, the head of the university, the students singled out the lack of systemic vision of its future activities fragmentation in their minds of numerous components of the educational environment of the educational institution, amorphous ideas about ways and means of pedagogical influence on personality.

However, considering the purpose of education all-round development of human personality and the highest values of society, the development of talents and mental and physical abilities, enrichment of the basis of intellectual, artistic and cultural potential of raising the educational level of society, providing the economy with qualified professionals, as provided by the Law Ukraine "On Education", each teacher should reflect on their activities as a holistic process, itself considered in the context of the educational system, ie in multi-environment, the efficiency of which depends primarily on the interaction of its components.

Quite consistently and clearly the problem of consistency in the teacher disclosed yet by A. Makarenko, who argued that the most effective learning environment also school-wide staff training is based on the creation of a "single opinion, a single system, a common tradition in the team. While school staff becomes extremely powerful tool" [5].

However, an outstanding teacher understood and consistently emphasized that the idea itself is rallying a team and manage it effectively is empty argument, if not instrumented properly. And this instrumentation should not be left "for later", it must be at least broadly known and subject to the head of school and all his companions. But Makarenko clearly seen that contemporary teaching staff had prepared for the guidance of this magnitude. In the "Education for family and school," he says, "... and in school, you can create a team. At least if I gave out school, I first set the task to create a single school community. What is needed? I am sure that this requires the only school interests, the only work uniforms, the only school authorities, and finally, communication, mutual touch (members) of the group.

The question of primary-school team and we have not developed in the methodology, but I think this question is extremely important, "- says the teacher and emphasizes that the work by children at detachment named after Gorky Colony main concern has always been in its internal integrity and organic entry to the integral collective colony [5].

This organic unity can not be achieved by means of ordinary administration.



Necessary that children's team combined on the basis of joint activity to each student was in relationships with other students, teachers, feeling the importance of personal relationships and the need for their existence and strengthening. And so we find ourselves inevitably need to design a system of relations as in the broader sense (training and educational environment of the institution), and in relation to specific situations infinite set which is a daily life of our students.

This view was articulated its time one of the followers of Makarenko Ivanov. "As demonstrated by our long-standing practice, - wrote the scientist at the end of 1980 - only a common cause for joy and benefit to others creates and strengthens a team of educators and students in which each reveals and grows best in themselves. But this does not happen automatically and through the designated caregivers caring for creation and development of collectivist, moral, educational relations "[3]. Analysis grounded him "Kommunarskiy methods", aimed at creating a system of relations shows that kind of organizational unit of pedagogical relationship collective creative thing - is, in contemporary language, nothing like design, development and implementation of the entity which acts joint team of pupils and teachers.

Modern national pedagogy which is largely built on the positions individually oriented approach to education, but takes into account the collective nature of the educational process, can not potsinovuvaty significant potential pedagogical design that attracts increasing attention of scientists.

Thus, S. Izbash defines pedagogical design as a set of actions that are motivational in achieving this goal obviously is exploring and solving pedagogical situations designed to develop business education process [4]. The researcher notes that it is not the only way to achieve educational goals in working with children, but also can be seen in the context of general teacher training as a means of "solving the problem of adaptation of students to vocational training and education, which in the future will accelerate the achievement of young professionals optimal results in independent professional activities "[4].

E. Pomytkin considers the potential of the project activity in terms of teacher professional fulfillment in close conjunction with the student's personal self-realization. That "search relevant psychological and educational measures to ensure the fulfillment of this joint project has led us to practice" - said the scientist. [6] He concludes that in today's school implementation of pedagogical skills into practice requires a corresponding update approaches, forms and methods of educational activities; it allows the project activity largely put into practice the professional skills of the teacher, and "among the defining conditions of implementation of creative projects should include coordinated psycho-pedagogical workers' efforts that take part in them" [6], the emphasis on the importance of professional management of project activities in educational institution.

However, according to the researchers, "we must recognize that in school practice used mainly management techniques, which provide the majority of a single entity - the head of school ... theoretical and technological methods is developed individually as the nature of decisions taken, targets to ensure the stable operation of the school is partly explained by the historically conditioned prescriptive national system of internal control school, "but today is growing 'need for new management methods to identify actual problems of the educational process and the collective search for effective means their solution" [1].

Preparation of the teacher as the manager of the educational process once again put us to the need to update the content of teacher education in that part relating to the development of organizational and pedagogical skills, the ability to provide not only the manager, and any teacher to find effective forms of interaction between students, partly mastered past experience, in part - producing ways of organizing activities of students in accordance with current professional goals.

Pedagogical design elements traditionally included in the content of practical training courses "Fundamentals of educational mastery" and "educational technology. Theory and Practice ", studied at the Poltava National Pedagogical University named after V.G. Korolenko future bachelors, and masters in training - during the course of "Pedagogy of higher school", "Management of Universities", "Management in Education ", which sets out the Department pedagogical skills and management. Especially not now avoid the problem of mastering the basics of project activities to prepare future school leaders, which is connected with the magistracy.

Magistracy in educational preparation of future managers operating in PNPV involves their involvement in the development of educational projects in the process of writing the qualification master's work, which is concerned with the study and analysis of the conditions of the project activities in educational institutions, ways of their improvement, their own project developments. Both theoretical and practical component of the work focused on systematization of management activities on a project basis. This greatly contributes to the functioning of the department in teaching and management skills magistracy, specialty 8.18010013 "Project Management", joint research and teaching seminars conducted by scientists and students both graduate and numerous publications on the problems of project activities and other activities of the department for improved project competence of future teachers.

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## **DESIGN CONTENTS OF COMPETENCY ORIENTED EDUCATION IN HIGHER EDUCATIONAL INSTITUTIONS**

*The question of competence-based approach to the provision of modern quality assurance in education interrelation of logic and the logic of identity. The analysis of the existing system of higher education and its problems. Ways of legislative and regulatory support education initiatives based on social groups and employers.*

Higher education is an area that greatly affects how society is formed. Education as a system - is unique social institution designed to develop and enhance human capital, creating ideas, socially significant ideals, outlook, constituting as the future of society as a whole, and the fate of individuals. Education, therefore, - is a system of designing future [4].

Today, higher education is on the the way of modernization when changing conception about the meaning of it. It should be noted that the conventional understanding of education as mastering social experience of the past, accumulated by mankind today comes into conflict with their need to achieve their goals, self-realization and requirements. Given the rapid changes associated with scientific technology and new forms of economic and social activity, it is necessary to combine a fairly broad knowledge of the pan with the possibility of a deep understanding of a limited number of disciplines - must learn how to learn, learning to work, learning to coexist, learn to live. Necessary to acquire competencies that give an opportunity to deal with different situations, most of which impossible to predict.

One of the conditions to overcome this contradiction is subject to change of emphasis for the purposes of education: towards assimilation of knowledge, skills and abilities in the form of scientific and theoretical content of science to support the development of the student's personality, his ability and creativity [3, p. 19]. Accordingly, education - formation and personality development (E.V. Bondarevskaya, V. Surikov, N.V. Klaryn, I.S. Yakymanska).

The need to ensure the quality of modern higher education and the inability to solve this problem in a traditional way by further increasing the amount of information to be mastering actualizes the idea of competence-based approach (V.A. Bolotov, A.V. Hutorskoy, B.D. El'konin, E. J. Kogan, V.V. Serikov, A. Novikov, S.E. Shishov et al.). According to I.D. Frumin, exactly the formation of competence becomes in present conditions the most significant factor largely determining educational policy [5]. To prepare competent professionals, it is necessary to identify the content of training.

A competency based approach provides a set of general principles defining the goals of education, selection of educational content of the educational process

and assessment of educational outcomes. Among these principles are the following provisions:

- Education aims to develop students' ability to solve problems in various fields and activities on the basis of social experience, part of which is their own experience;

- Organization of educational process is implemented by creating conditions for the formation of students' experience of independent tasks that form the content of education. [1]

Thus, the logic in the context of teaching competence oriented approach consists of two complementary parts: the teaching of logic and logic of development of individual by means of subject.

In the long-known concept of pedagogy curriculum (IJ Lerner, V. Krajewski, V. Lyednov), which focuses on the development of social experience, providing along with the knowledge, abilities and skills also experience emotional value relationship to creativity. However, so far in pedagogy and management activities in the field of education remains the dominant understanding of the term "educational content" as "program-information" training content. Thus there is a paradoxical substitution major categories of education. The combination of information from a particular subject to be studied is called the curriculum.

According to the traditions of national education curriculum and content of plans is defined as learning content. In this context, education acts identical to the concept of training or is it the result. This approach, which treats education as a body of knowledge and skills of students what are easy to control, creates the conditions for student-estranged education [2].

Legislation implementing the necessary changes in the content of education is still not fully formed. Analysis of the Ukrainian education system shows that the main tool that will ensure the success and effectiveness of planned changes should be the practice of forming new attitudes participants in the educational process, supported at the state level regulatory provision that would allow the space to expand social contract in education by means of legislative and regulatory initiatives regulation of the social groups and employers.

The task of educational institution lies in the fact due to subjects logically and analytically construct create an image that reflects the socially necessary level of training and professional capacity to perform professional functions. Ensuring the integrity of specialists training necessitates adherence to a single approach to curriculum development, which should be designed based on the selection of tasks aimed at analyzing competencies most sought after by future employment environment.

So, when creating programs must prioritize differently: in the first place rendered properties competencies as objectives of the program and then suggests ways of their formation and development of further selection is made information that helps solve some problems and development of competencies. If the curriculum is consistent with this logic, its essential components are, first, the context inclusion of students in the content of professional activities, and secondly, the creation of communicative teaching field, resulting from the exchange of meanings and forms competence.

According to the theory of L.S. Vygotsky, learning should outpace the development of the student. He argued that the cognitive development of the individual occurs when it is included in the activities, which is slightly higher than its competence, and gets help from a teacher or a more experienced people. There is a cause and effect relationship and interdependence of learning and development: learning based on the current level of development and promotes the development of student's personality, his transition to a higher level. However, the development depends on the content and organization of learning.

The aim of the educational process and the result is a competent person, and content of modern education - becoming a competent individual as the subject of work and social relations, its professional culture, professional skills and professional competence. The content of education - a measure of the initiation of human culture to the developing world.

The content of education - not just a set of training data, it is determined by the personal and professional qualities that are to be formed as a result of joint efforts to mastering the necessary information, the acquisition of certain skills.

Thus, the ideal outcome of modern education should be a competent specialist and purpose - creating the conditions for its development in an educational institution.

Let us give a comparative description of traditional and competency-oriented education to illustrate the above stated (see Table 1.):

Table 1

*Comparative characteristics  
traditional and competency-oriented education*

| <i>Parameters</i>         | <i>Traditional education</i>  | <i>Competency-oriented education</i>   |
|---------------------------|---|--|
| University                | educational institution where students are prepared for independent life and performance of social roles  | space vital activity the individual, where the student resides its formation   |
| Aim                       | extroverted, (center of education - a subject is itself educational process), education of the individual with predetermined properties   | introverted, (in the center of the educational process - the identity of her interests, needs and abilities), the creation of conditions for development of the student's  |
| Subject                   | Lecturer ( $S \Rightarrow O$ ), dominates the focus on the subject, pedagogical activity that creates equal conditions for all  | lecturer and student ( $S \Leftrightarrow S$ ), dominates the humanistic orientation, creating the conditions for personal development and formation of competencies   |
| Object                    | student who needs to acquire knowledge and skills   | various student activities, functions, competence, organization of educational process   |
| Nature of the interaction | dominates the authoritarian type of pedagogical guidance that leads to the subject-object relationship in training in communication styles dominates distance and intimidation position | dominates the democratic type of pedagogical guidance that leads to subject-subject relations in education, communication based on capture common activities and friendships, position of communication is personal- |

|                           |   |  |
|---------------------------|---|--|
|                           | communication functional-role   | included   |
| Integrity of schooling    | dominates the teaching actions are performed: teacher directs students complete learning    | dominates the, harmoniously combined with teaching interact: collaboration teacher and student       |
| learning tools            | dominate explanatory, illustrative learning tools   | included in the activities, problem teaching, educational technology, creating situations of success |
| Assimilation of knowledge | mainly on the cognitive level   | three levels: motivational, cognitive and operational  |
| Result                    | knowledge of - a model knowledge of-value mastering program higher educational institutions | gaining personal experience, values, knowledge - meaning, enjoyment of life competence               |

Thus, the specific form of personally oriented education was to find promising approaches to improve its quality, one of which is competitive approach. Its implementation at this stage will ensure that the primary purpose of vocational training - training of competent professionals and, therefore, competitive job market, capable of successful social adaptation and efficient operation of the specialty at international standards. Competence approach, being focused primarily on the new vision of goals and evaluation of the results of professional education, its demands and to other components of the educational process - the content of educational technology, control and evaluation. The problems of design and implementation methods of content competency education remain relevant and require further study.

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## **CHILD LABOUR CORPS AS AN INNOVATIVE PROJECT**

**A.S. MAKARENKO**

*Analysis of teaching activities Makarenko as experience of creation and implementation pedagogical and educational projects. Positive and negative conditions for the creation of educational projects and educational institutions to interact with government education authorities at national and local levels.*

At each stage of the educational activities of A. Makarenko consistently enrich its educational experience, there is one, hardly marked episode by connoisseurs in the creative biography of the teacher, who holds a special place in the formation of his profession genetic points of view - is the realization of projects of national child labor Army (1925 - 1928).

In our view, the key factor of contemporary pedagogical confrontation A. Makarenko is to promote and implement his own ideas about the organization of Ukrainian child labor army with the production of education as a "mass production". It is well known that half-hearted but practical form of this idea was the creation of child Labour Corps Kharkov district, went down in history as the more prosaic name of Managing children's residential institutions. Although, a number of objective reasons, this project was able to be realized only in a rather narrow range of residential institutions Kharkov Management District in July 1927 - February 1928, he holds a special place in the formation of attitudes of A. Makarenko for several reasons:

1. For importance and public resonance goals level of complexity of tasks and responsibilities of child labor during corps is a new level of administrative activity A. Makarenko, qualitatively higher than the previous one.

2. During this period, A. Makarenko faced a much greater extent with the problem of staffing the educational process in institutions, in other words, the problem of matching the skills of managers and staff of child care facilities characteristics and nature of the work. That is, Makarenko had on a wide public stage also check the realism and practical effectiveness of own ideas in such a complex and controversial area, as educational qualifications.

3. Distribution invented in the colony named after M. Gorky educational system on the basis of the general boarding network created an opportunity to objective testing it as a universal pedagogical innovation. Such testing in a sense served as a diagnostic function on the level of professionalism Makarenko as an educator, and on the quality of teaching he established the professional environment in the colony named after M. Gorky.

The undoubted achievements of the colony named after M. Gorky gave reason to hope for universality created and tested a five-year experience of work of the educational system. August 8, 1925 Makarenko as Head of Poltava labor colony

named after M. Gorky refers to the General Directorate of Social Education of the People's Commissariat of Education of Ukraine with the famous letter. The original proposal of the teacher posted on 9 sheets, was a carefully drafted using accumulated unique experience. In the article Makarenko carefully substantiates unreasonableness also inefficiency of small educational labor institutions and offers the idea of "big educational enterprise," which brings together thousands of students in the united labor groups, based on large-scale production. Specifically, his proposal was expressed that "all re-offenders to Ukraine or at least for the Kharkiv region is concentrated in a labor camp, located near Kharkov" [1].

You can not argue that the idea of large social institutions of education belongs exclusively Makarenko - from the early 20's, for example, successfully operated Odessa playground named Third International children for 2250 - but it should be noted that the idea of consolidation and amalgamation of boarding institutions was one of the most exciting social and educational projects of Makarenko, a kind of refrain his teaching career. To it in the process of his career, he returned repeatedly: in August 1925, October 1926, March 1932 and in mid-1934

The beginning of the practical work on the creation of the Labour corps researchers usually consider spring 1927 [2].

The first known program of A. Makarenko to merge children's boarding schools around the Kharkiv Gorky "Metropolis" is a letter to the Chairman of the Kharkiv Commission on Minors G. Salko for May 4, 1927 It has significantly peeps of Makarenko position as a future leader also probable "Children of the labor corps Kharkov district" and put forward very specific conditions of such a union: the concentration of all appropriations for child care centers in his hands, the right to decide personnel issues, and determining staff salaries for each colony, and the prohibition of the first two years to instruct the form of the colonies and the the distribution of material data [3]. Business also objective tone of the letter suggests that at this time unification of colonies District has emerged as an organizational problem.

July 8 the OIC deputy chairman S. Kantorovich drawn with a note to the Area Executive Committee Secretary Ivan Moroz request to the protocol of the Presidium resolution on Makarenko Head of "all without exception orphanages."

So July 11, 1927 the Presidium of the Kharkov Area Executive Committee decided to to involve A. Makarenko Okruhovoyi State Inspectorate of National Education and appoint an inspector without exception orphanages. Soon he became head of the specially created district structure - Manage children's residential institutions.

It was the first filed in the district authorities offers is "Project of child labor corps of Kharkov District" written about in the second half of July 1927. This project is developing unprecedented in their scope of child agencies, probably more than once attract views of researchers. He and presented certificates were the first signs of official cooperation with local Makarenko in the specified direction. In the document, the author defines the purpose of child labor corps (Raising Healthy, working, disciplined and politically literate citizen) and lists those components of Gorky, and there are, in fact, should be an organization of all child care centers the district: Division of trainees to productive units with commanders at the head ,



Council of commanders as the main governing body of the institution; manager by institutions such as the head of council commanders belonging to the executive branch and the right punishment; sole responsibility of the commander for the economic work of each unit; teachers participate in all the activities children's groups. Here he is again, as in a letter to Salko, stresses the need for concentration of all resources as fundamental condition specifies the technology of their costs.

In fact, the new system of institutions like this: All child care centers to be only one of case management, which is in possession of certain branches of activity: employment, educational, etc.; in education the most important role of the economic base; reeducation is only through involvement of children in the workplace experience; allocated funds are transferred to the Office and given him the right to freely dispose of them within an overall plan; organization of strong teams for child care; workshops and clusters together to develop small factories or plants; most disorganized agencies assisted the colony named after M. Gorky; OKDD to assist in the selection of street children, a special police; Some child care centers completely reorganized.

Immediately after his appointment also before the approval of the work plan, Makarenko had taken a number of specific arrangements. Around the end of August falls (first known at this time) as his official letter head - a plan of reorganization Komarivskoyi child colony. This project is for all the short history of the Labour corps remained, unfortunately, one of the few completed his administrative initiatives. The essence of the plan was not suited to perform educational tasks Komarivska child colony for transition the hostel for temporary workers residence in producing graduates of residential institutions.

In terms of project administrative work management of interest is the operating plan for the 1927 - 1928 year, undeniably, is based on these projects. Discussion of Financial and Budget Section of the District Plan "Conclusion on Operational Plan" for the current operating year was an afterthought until the end of November.

Plan proposes to eliminate the cost for a year's weakest institutions have no manufacturing base. The movement of children in child care centers planned as follows: during the year to pick up and release 960 people in 1460. Reduce the number of children in residential facilities for 500 people. Release scheduled in the following figures: employment in manufacturing - 400 people. Seniors training to artisans - 200 people. Return to parent - 285 people., Call the Red Army - 50 people., Admission to schools trade schools - 200 people., introduction of the working faculties and professional schools - 100 people., the patronage to peasant families - 225 people.

Characteristic resistance activity was that caused by the local authorities of his entrepreneurial initiatives. In this case, the district authorities insists report on work over time and submit a plan for the 1927 - 1928 year, highlighting to the question of the measures to be taken to increase enterprise profitability children's villages, the distribution of production units and to reorganize the dormitories.

Creating children's towns initiated collision pedagogical basis of private and group interests, styles, activities, life and professional ambitions with the rest of the world views of many people. Clearly, frustration, and sometimes open conflict later

became constant circumstance of activity of Makarenko [4].

The actual ending of the Labour corps history is Makarenko removal from office. Such a move was premature the district administration no means not could not be due to the falsity of any makarenkivskyh ideas, because none of them, in fact, was not brought to its logical end. Publicly known practice of 20 years was the replacement of leadership positions at all saber power structure communists. It is not surprising that the party leadership is not enough staff children's colonies was necessary to find a head-communist, also was soon made. February 14 offices Kharkiv District Committee of the Communist Party (Bolsheviks) decided to withdraw from the Sukharev t work OKDD and approve the head of childcare. The same decree deputy in the new position is designed Sukharev S. Zaichyk. The next day, the Presidium of the OIC dismissed from his post as head of Makarenko Office of child care centers, leaving his charge named after M. Gorky Colony and appointed Sukharev.

Immediately after his release Makarenko in the district began destroyed all the features introduced his system. Final disposition Management dates from the late March 1928 [5].

So, the idea child labor Ukrainian army never destined to become a reality. Even attempts Makarenko realize their project in a limited scale of Kharkiv district, in fact, have been eliminated from the beginning, even before the time when it was possible even to estimate their efficiency.

In the modern Makarenko expertness still lacking a final assessment for the dramatic events Makarenko 1927 - 1928 years - the causes and nature of its conflict with the official pedagogy and the resulting destruction of almost unprecedentedly effective educational system named after Gorky Colony. However, this is the head of the drama teacher Anton Makarenko, it is likely conceals the key to understanding the following, most questions about his legacy. In contrast with what was a teacher - a reality, time, ideology, political expediency or corporate ambitions of individuals? At least, these unresolved issues prevents us towards an objective and unambiguous assessment established its educational system.

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## **ON THE STATE OF AVAILABILITY SECONDARY EDUCATIONAL INSTITUTIONS UKRAINE WITH COMPUTERS AND INTERNET ACCESS**

*The problems of maintenance of educational process information technologies. Computerization of the educational process examined at the level of secondary educational institutions I-III, which is associated with the level of knowledge and skills to entrants of higher and specialized secondary educational institutions. Problems of information technology discussed at the level of state and local governments.*

### Regarding computerization

The spread of digital technology makes continuous learning, individually oriented, flexible and dynamic process. Such technology should serve as a powerful tool for education - and they must be properly embedded in the educational process and accompanied by new models of learning.

System saturation educational institutions with modern computers and telecommunications equipment in 2011 - 2013 pp. Was carried out according to the State Program implementation in the educational process in secondary educational institutions Information and Communication Technologies "One hundred percent" until 2015, approved by the Cabinet of Ministers Ukraine of 13 April 2011 p. № 494.

The activities of the program provides equipment cabinets science and Information and Communication Technologies of secondary schools teaching computer systems, as well as the modernization material and technical base secondary schools.

As national standard primary education, approved by the Cabinet of Ministers of Ukraine dated 20 April 2011 p. № 462, provides review of primary school pupils in information and communication technologies, faced the problem of computers of secondary schools and degree, which at the beginning of 2013 / 2014 in Ukraine there were 1 587 general educational institutions, of which 1 278 general education institutions - in rural areas, 309 secondary schools - in urban areas.

According departments (offices) of education regional administrations as of January 1, 2014 there was a positive picture of the availability of secondary schools with computers.

Despite the overall positive picture of the provision of secondary schools and the degree of personal computers in Ukraine (68.24%), 504 of them are equipped with computers in general. Especially critical situation in Lviv, Transcarpathian and Ivano-Frankivsk regions where there are modern facilities secured over 50% of educational institutions and degree.

At the same time, although the National Program of Informatization and computerization supposed to equip computers mainly secondary schools-III levels in rural areas, remains uneven in the provision of secondary schools both in the context

of rural and urban areas and different degrees.

In percentage terms provided with the best secondary educational institutions-III levels in urban areas - by 99.71%, the lowest index of 65.1% - in secondary schools and degree countryside.

It should also be noted that the centralized supply of computer equipment for the state budget in 2009, 2010, 2012 and 2013 committed not prevented obsolete and aging equipment available in schools (Fig.1).

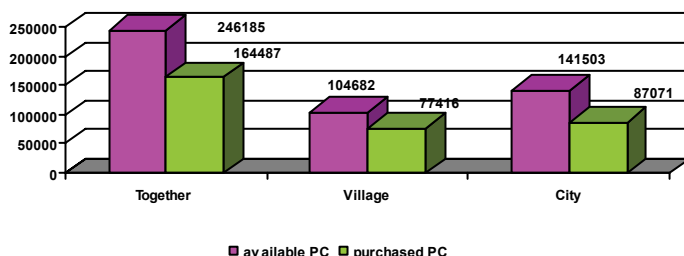


Fig. 1. Number of PCs used in the educational process, units

In connection with this situation before educational institutions there is an urgent task of finding alternative funding sources to replenish and upgrade computer equipment fleet, and to leaders of education authorities and educational institutions - the task to ensure optimal educational process necessary teaching aids and training equipment by rational and efficient use of local resources, attracting extrabudgetary resources using new economic opportunities in modern market economy.

Thus, in 2013, at the expense of local budgets and other funds had purchased 12,096 PCs (hereinafter - PC) that includes a 502 as part of teaching computer systems, PCs and 7733 for use in the educational process in secondary schools institutions. This contributed to the decline in the number of pupils per 1 computer, which is 17 students on average in Ukraine, the ratio of student PCs ranging from 11 to 22 people.

This PC has a more than 60% general educational institutions and degree, over 80% of secondary schools and II and over 99% of secondary schools I-III, the educational computer complexes provided less than 20% of secondary schools and degree, about 70% of secondary schools and II and about 95% of secondary schools I-III. Indicators of secondary educational institutions rural areas compared to secondary educational institutions in urban areas is very low.

Percentage of secondary schools providing personal computers in Ukraine is 95.38%, and the percentage of educational computer software complexes - 81.25%.

In general, Ukraine is equipped with a PC at all at the end of 2013 868 secondary schools (1 542 in 2012, the difference between 2012 2013 ∴ - 674 secondary schools, excluding equipment of secondary educational institutions and art.), Of which 504 secondary educational institutions and art., 262 secondary educational institutions and II c., 102 secondary educational institutions I-III. In this

case, the possible presence of secondary educational institutions the PC not equipped properly staffed NCC at the end of 2013 are 3520 CEI (3 386 in 2012, the difference between 2012 2013 .: + 134 CEI - due to beginning in 2013 accounting equipment of CEI and art.), of which 1 312 CEI and art., 1590 BIS I-II century 618 BIS I-III.

However, the Cabinet of Ministers of Ukraine dated 5 March 2014 p. № 71 "Some Issues optimization of targeted programs and national projects, budgetary savings and ceasing to void certain acts of the Cabinet of Ministers of Ukraine" terminated the State Programme implementation in the educational process in secondary educational institutions Information and Communication Technologies "One hundred percent" until 2015, approved by the Cabinet of Ministers of Ukraine of 13 April 2011 p. № 494. As a result, currently in Ukraine the national system and re-equipment program educational institutions with modern computers.

Thus, to solve the problem of guaranteed right to secondary education in terms of material and technical equipment of educational institutions without financial support from the state impossible. Therefore MES considers necessary to carry out maintenance of secondary schools with computers at the expense of both the public and local budgets, which consider the possibility of renewal of the state target program implementation in the educational process educational institutions ICT within their respective organizational forms and the projected financial capacity of state and local budgets.

#### Regarding access to the Internet

To implement informatization of education is not as important as equipping educational institutions with computers is to provide connectivity to the Internet NCC. At the beginning of 2014 78.92% of all secondary schools in the country are connected to the Internet. Thus 56.3% of secondary schools are connected at speeds of 512 kilobits per second.

The lowest rate of connection in secondary schools and degree rural areas (8.84%) and the highest rate – in secondary schools-III levels in urban areas (97.33%), which is a few notches better than the previous year (in 2012, these figures were 2.6% and 95%, respectively).

Thus, given that the organization of high-speed access to the Internet is successfully carried out at the expense of local budgets without the involvement of central government funding we support the practice developed, and promoting appropriate local authority to resolve mentioned issue.

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## **RESEARCH ACTIVITY OF FUTURE MANAGERS IN PROJECT MANAGEMENT**

*The problem of organizing and stimulating research work of Master students in project management. The ways of research skills based on the use of organizational principles of educational - teaching process and self work of Master students.*

It is believed that scientific - research activity of Master students ensures the formation of intellectual activity that is part of the professional competence of future specialists [2].

I. Ermakov, G. Klovak, A. Pechota argue that training and research and the scientific and research work of Master students - the two main areas one concept: "Scientific research activity of undergraduates in universities is carried out in the following areas: 1) training and research, which is an integral part of the learning process and enters into calendar and content and curriculum as mandatory for all Master students; 2) research work, carried out within the educational process of student research and creative society "[1].

The development of research skills of future managers is a lengthy process and involves four consecutive steps:

1 The situation theoretical – experimental study in class, to the interest of Master students in research.

2 The situation of partly – search activity, study designs based research new information.

3 The situation research activity. Basis for such acts of investigation of uncertain meaning.

4 The situation of scientific – research work. Master students reveals subjective attitude to facts studied independently seeking contradictions defines the research problem and ways to achieve their goals.

A. Pechota and I. Ermakova emphasize the differences between "research" in teaching and research in science:

- In the case of scientific research scientist independently selects the research topic and methodology of work of while magistant research activity of carried out under the guidance of a teacher;

- Opening of the scientist is prepared special meaning, as in the case of educational research itself selects a teacher training content that directs undergraduate to opening;

- Scientific passes all stages of research and undergraduate performs only some of its elements;

- Patterns that are derived researcher is new to science, and as a result its undergraduate studies - known science facts and laws;

- Scientific research usually has no time limit, educational research is limited time.

It is important that in the course of scientific - research activities in the future specialist develops creative thinking, and brought up the need to apply the theoretical knowledge acquired during the study of natural sciences in practice. Follow-up study contributes to the personal involvement of environmental issues and responsibility for the consequences of their activities.

The process of applying research Master students in teaching - educational process of higher school shall be subject to the following principles:

1. Focus on the educational interests of undergraduates as research as a creative process comes from internal needs.

2. The development of knowledge in the unity of the ways they receive - in the process of undergraduate research not only learns the final product in the form of positive knowledge, but also acquainted with the ways and means to open it.

3. Support the development of skills of independent search of information - on what basis can provide knowledge conversion tool for magistrant creative development of the world.

4. Forming ideas about the dynamics of knowledge - learning process should be structured so that the undergraduate experience of mankind is not perceived as the sum of immutable rules, dogmas, laws, and as a dynamic system that is constantly evolving.

5. Formation perception research as lifestyle. Teachers worry that undergraduate research examined the process not as a set of methods and techniques of training, and saw him as the nature and content of teaching and leading way to interact with the world.

6 The teacher must be facilitated learning, not the translator of information - the teacher himself must be a researcher, to be able to explore different issues and teach Master students.

7. Use Copyright curricula, designing their teacher models the use of research in teaching Master students - educational process of higher education.

8. Formation Master students research skills, which begins with the mastery of reproductive elements of methodology and ending independent research activities Master students.

V. Chornobrovkin singled out the conditions under which scientific - research activity of Master students will strengthen their professional competence: the formation of motivation research, which provides free choice of research problems magistrant own interests; organization problematic range of studies that meets the psychological needs of society living space; succession stages of scientific future professional growth; unity of theory and practice; creative - professional and personal oriented scientific management; the relationship of individual and collective forms of research and creation of a single reflexive - dialogic space scientific research.

Realization of possibilities scientific research work to improve the quality of training, and most importantly, in shaping the future of design competence of the project manager, the task entrusted to it, perhaps in the case of compliance with such requirements to its organization and implementation:

- 1) if it is carried out based on field of study (specialization) magistrant;
- 2) undergraduates involved in research realize the importance of this activity for their future development as a professional;
- 3) research activities have focused on the search and study of their own position;
- 4) development and use in the course of scientific - research activities of forms and methods;
- 5) stimulation of Master students to research activities.

Important for the formation of project management competence is to use NDDS in three main areas. The first direction advocates element of the educational process and implemented at all stages of training. This direction is carried out during the workshops, educational and industrial practices undergraduates perform research tasks of the problem and search for the nature of the study subjects, writing term papers, dissertations and master's theses.

The second scientific - research work seamlessly complement of classroom training, implemented outside the educational process and includes activities clubs, creative problem research groups, organizing and participating in conferences Master students young scientists on the faculty at the University; participate in competitions of student and master works.

The third area work of research involves Master students participated in the intercollegiate, national student, international scientific conferences and meetings with leading scientists, research in environmental organizations of the city and the region, participation in international research programs.

The department of pedagogical skills and management Poltava National Pedagogical University named after VG Korolenko undergraduate specialty "Project Management" in the process of training are organized and active participants in conferences, seminars, round tables, workshops, lectures, workshops, educational tours and more.

Undergraduates taking part in national and international scientific conferences and seminars publish results of their research in the collections of materials issued by the Department, as well as the original collection of scientific papers included in the list LHC, "Sources of pedagogical skills", known among the educational community Ukraine and other countries.

Clarify areas work of vocational training in the specialty "Project Management" helped Initial Workshop to improve curricula, programs, and scientific methods of the learning process for masters project management 17-18 November 2011.

Training "Technology construction projects in student government" hold graduate Ternopil National Pedagogical University V. Hnatyuka. Organized annual training within school youth project "Leader of the Future."

The system of training management project is the epicenter of design practice, new models of project activities.

NDDS within the process of preparing the project manager includes the following forms of training:

- Summarization of scientific publications of certain topics in the study of natural sciences - scientific and professional cycles, special courses, elective



courses;

- Laboratory and practical work, seminars and independent tasks that contain elements of problem-finding;

- Performance of scientific papers and presentations at seminars;

- Writing works that contain elements of scientific research;

- Conducting research at runtime degree and master's works;

- Carrying out scientific research during teaching and assistant practice.

Problem is of a higher degree of NDDS. The work they are involved undergraduates. In their task is to discuss theoretical problems solving current scientific and technical issues, conducting a series of studies. In problem groups undergraduates learn about the methodology and planning of the experiment, participate in the discussion and design results with specific topics, the Department is working Team Leader.

Thus, the scientific and practical training of project managers, based on professional modeling processes seems to us a third condition that will ensure quality improvements in the practice of project management, significantly improving the efficiency of work in the preparation and implementation of various projects and programs.

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## FACILITATION OF THE TRAVEL DOCUMENT SECURITY CHAIN

*Facilitation of the Travel Document Security Chain is the key factor ensuring the security of specific types of documentation. This factor is based on security features used in travel documents in order to prevent the falsification of these documents. Due to the increasing number of crimes committed in the area of document forging, facilitation of the Travel Document Security Chain may be extremely important.*

There exist a wide variety of security features used in travel documents. These features are considered to be the basis for facilitation of the Travel Document Security Chain. The most known of them are the following: Security Fibers, Security Threads, Watermarks (Shadow Watermark), Offset Printing, Hologram, and Changeable Laser Image. It would be appropriate to describe all these features in details. The first one is Security Fibers.

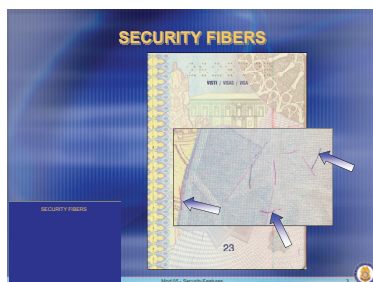


Fig.1. Security Fibers

Security fibers are frequently inserted as an additional safeguard during the paper manufacturing process. The fibers may be colored and visible to the naked eye (as seen here) or they may be colorless and visible only when exposed to ultraviolet light.

A characteristic of security fibers is that they may be detached from the paper with tweezers and are randomly located. Forgers often resort to “painting” the fibers onto a document to mimic security fibers. The error, however, is normally detected by the repeating pattern of simulated security fibers. In this example (Fig.1), the interior pages of the Italian machine-readable passport contain numerous visible security fibers.



Fig.2. Security Threads

The interior pages of the machine-readable Iranian passport (Fig.2) also contain security threads. A security thread is a synthetic thread or strip embedded in the paper during the papermaking process.

There are a variety of security threads found in travel documents, including the following: multi-colored, fluorescent, microprinted, chemically sensitive, machine readable, widowed, and thermotext.

The thread is an integral part of the paper structure, it is very difficult to simulate. Magnification reveals microprint on the tri-colored thread which reads “ISLAMIC REPUBLIC OF IRAN”, as shown in Fig.2.



Fig.3. Watermarks (Shadow Watermark)

Watermarks are security features that are produced during the papermaking process and are an integral part of the paper. The paper fibers are made less dense in certain areas than others, which allow more light to pass through at that point thereby forming an image.

In this Iranian passport (Fig.3), the interior pages are printed on security paper containing a shadow watermark of Ayatollah Khomeini, which becomes visible when viewed with transmitted light. A shadow watermark creates an image with light and dark areas of shadowing (the darker areas represent areas where there is a greater density of fibers). A shadow watermark is more detailed than a line watermark, which consists of text or simple line designs.

A critical point to remember when examining watermarks is that a genuine watermark does not fluoresce when exposed to ultraviolet light. When this security page is viewed with ultraviolet light, multi-colored security fibers become visible.

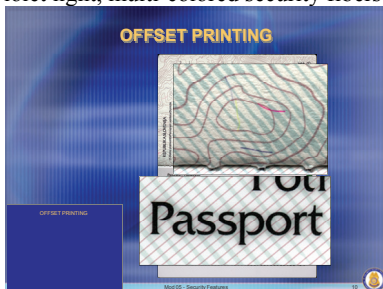


Fig.4. Offset Printing

The biographical data page and interior pages of most genuine passports contain intricate line designs in the background printing produced by offset lithography. The biographical data page (including the polycarbonate portion) and the adjacent page of genuine Slovenian passports illustrated here contain detailed line designs created by offset printing.

Magnification of the background printing of the biographical page indicates multi-colored geometric lines and the adjacent page depicts the topography of Slovenia.

In offset printing or offset lithography, ink is transferred from the image plate to the paper by means of an intermediate drum. The process uses printing surfaces which are ink receptive and non-printing surfaces which are ink repellent. As a result, the print appears uniform and consistent.

Offset printing is frequently used in the background printing and pre-printed data descriptors of passports and national identity cards. In this example the overprinted text (the word “Passport” shown in Fig.4) is also printed in offset.

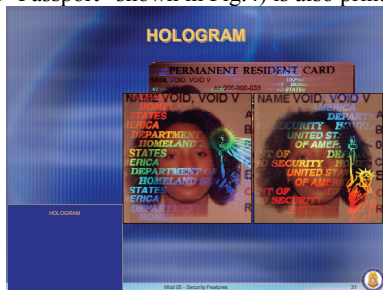


Fig.5. Hologram

A hologram is a three-dimensional image of varying shapes and colors depending on the angle at which it is viewed. A hologram is also a type of an optically variable device (OVD). Holograms are created by a photographic process and, hence, are iridescent under only a limited number of angles.

In this example (Fig.5), the Permanent Resident Card contains both a holographic layer and a protective laminate which are applied over printed data to hinder photo-substitution and data alterations.

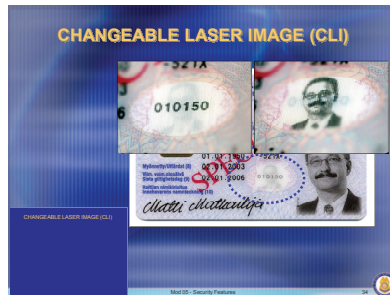


Fig.6. Changeable Laser Image (CLI)

A multiple laser image (also called a changeable or tilted laser image) is a laser engraved image or text that changes depending on the angle at which it is viewed.

In this Finnish passport (Fig.6), the CLI images consist of the bearer's date of birth and "FIN" (denoting Finnish nationality).

In the latest model Finnish national identity card illustrated here, the CLI which previously consisted of alternating images of the bearer's date of birth and "FIN" to denote Finnish nationality now incorporates a CLI with the bearer's photo alternating with the holder's date of birth.

Having described the most known security features used in travel documentation, we should mention about their importance and significance. In the last few years, organized crime has been applying extensive financial resources and the latest IT and printing technologies in order to forge many kinds of documents, including travel documents. The purpose of this is to create a global market covering all areas of criminality from illegal immigration to money laundering. One of the effective measures to eliminate the possible risks related to forging of documents is updating of the security features used in travel documents. Due to the high level of modern technologies, it has been extremely difficult for organized crime to forge and falsify travel documentation in recent times [1].

International Civil Aviation Organization (ICAO) leads the politics against document fraud. ICAO's objective in introducing global standards for Machine Readable Travel Documents has been based on the growing need to facilitate increasing numbers of international travelers in terms of passenger processing time. Of course, the politics against document fraud should consider the threat posed by organized crime and terrorism. Using of Machine Readable Travel Documents decreases the risk level of unlawful interference onboard with the help of falsified documents.

The invention of electronic passports has given rise to new security features that allow today's passports to be secure travel documents. An electronic passport is a Machine Readable Travel Document (MRTD) with an embedded chip that stores

electronic data from the passport, and biometric data of the passport holder. There are two generations of electronic passports. The first generation included one biometric (facial) image stored on an embedded data chip. The second generation, which European Union countries are adopting, includes the incorporation of fingerprints. Both are protected with Public Key Infrastructure (PKI) technologies and access controls. With the introduction of electronic passports, the security of travel documents has been greatly enhanced [2, 3].

The next important thing is relative costs and benefits of Machine Readable Travel Documents. Experience with the issuance of machine readable passports indicates that the cost of producing this type of travel documents may be no greater than producing conventional documents, though the cost will be higher when biometric identification and electronic on-document data storage are implemented. As traffic volumes grow and more States focus on how they can rationalize their clearance processes with the employment of computerized databases and electronic data interchange, Machine Readable Travel Documents play the main part in modern enhanced compliance systems. Equipment to read the documents and access to the databases may demand a substantial investment, but this can be expected to be returned by the improvements in security, clearance speed and accuracy of verification which such systems provide. Use of Machine Readable Travel Documents in automated clearance systems can also make it possible for States to eliminate both the requirement for paper documents, such as passenger manifests and embarkation/disembarkation cards, and the administrative costs associated with the related manual procedures [4].

**Conclusion.** To ensure the security of specific types of documentation, in particular travel documents, facilitation of the Travel Document Security Chain ought to be applied. Security features used in travel documents are the basis for facilitation of the Travel Document Security Chain and help to prevent the counterfeiting and forging of these documents. Updating of the security features used in travel documents is an effective measure to eliminate the possible risks related to forging of documents. Due to the increasing number of crimes committed in the area of document forging, facilitation of the Travel Document Security Chain has become extremely important.

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## **RISK MANAGEMENT IN CIVIL AVIATION**

*Assessment of national or even local risks, in conjunction with the overall risk factors, provides important and useful information pertaining to potential terrorist methods and types of attack. It is the duty of each Member State to make its own assessment of the risk applying to its territory and assets, and to establish appropriate risk mitigation measures.*

The basic principles and philosophy of aviation security are as follows:

- civil aviation shall operate in a safe and secure environment free from unlawful interference;
- states shall develop and implement the legislation and procedures necessary to ensure a safe and secure environment;
- security measures implemented by states to safeguard civil aviation against acts of unlawful interference (AUI) shall be consistent with the Standards and Recommended Practices contained in Annex 17 to the Convention of International Civil Aviation as promulgated by ICAO;
- States shall prosecute, in accordance with national laws, any person(s) who attempts to or commits an act of unlawful interference and/or extradite such person(s) to States which are prepared to prosecute such offenders.

### **Civil Aviation as a Target**

The civil aviation is a very attractive target because it may be related to:

- an ability to inflict mass casualties;
- an ability to inflict damage to economy or travel;
- an ability to disrupt scheduled air travel;
- vulnerability due to high passenger traffic levels;
- limited risk to perpetrators;
- symbolic statement generating media imagery;
- generating public anxiety.

In Annex 17, ICAO defines Acts of Unlawful Interference as follows:

- unlawful seizure of aircraft;
- destruction of an aircraft in service;
- hostage-taking on board aircraft or on aerodromes;
- forcible intrusion on board an aircraft, at an airport or on the premises of an aeronautical facility;

- introduction on board an aircraft or at an airport of a weapon or hazardous device or material intended for criminal purposes;
- use of an aircraft in service for the purpose of causing death, serious bodily injury, or serious damage to property or the environment;
- communication of false information such as to jeopardize the safety of an aircraft in flight or on the ground, of passengers, crew, ground personnel or the general public, at an airport or on the premises of a civil aviation facility.

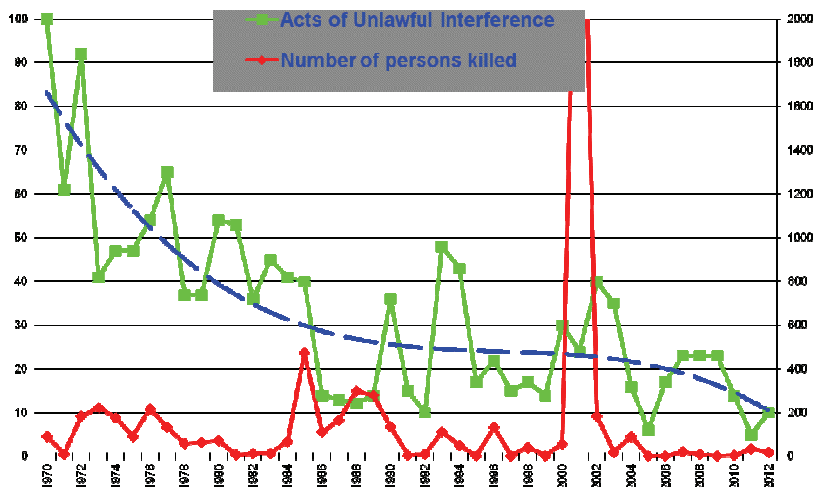


Fig.1. The most significant Acts of Unlawful Interference

Due to analyzing the graph we can presume the following:

- first recorded incident occurred in Peru 1931, a small aircraft was hijacked in order to distribute antigovernment pamphlets from the air;
- second incident occurred in 1947 between Romania and Turkey and involved a group of political dissidents fleeing the Romanian Authorities and seeking political asylum;
- the next 20 years no significant activity were seen, relatively minor incidents up to a total of 61 incidents in 20 years;
- following the Communist Congress held in Cuba in 1967, in which communist delegates from the region were encouraged to overthrow their governments and come to Cuba, an increase in hijacking began. This increase peaked in 1969 with 73 separate incidents, mainly to Cuba;
- profiling introduced in 1970 dramatically reduced the total numbers. 100% pre-board screening began in 1973;
- In 1980 there was a re-emergence of hijacking to Cuba occurred following the Mariel boat lift of 1979;



- In 1980 -1985 there was the emergence of Palestinian and other Middle Eastern terrorist groups hijacking aircraft on a worldwide basis;
- In 1990 there was a peak due to the fall of the USSR, with the majority of hijackings from the States of the former USSR during that year.

Regarding the number of persons killed:

- the number of fatalities is not related to the number of incidents, pointing to the fact that the perpetrators can aim to cause maximum casualties to achieve the desired publicity;
- individual peaks were caused by Air India & CP incident 1985, Pan Am 103 1988, UTA 1989, Xiamen Airlines 1990, Ethiopian Airways 1996, and 11 September 2001.

The threat groups/perpetrators:

- terrorists;
- criminals;
- refugees;
- employees (disaffected, and those with criminal motive);
- mental disorders; and
- other governments.

Attention must be paid to the possibility of connection between criminal activity and terrorism. Criminal activity in the aviation and transportation arenas, when recognized, may point out vulnerabilities in security practices and expose weaknesses in security posture.

Criminals and terrorists use all modes of transportation, including commercial aviation, to carry out their missions.

Criminal activity may provide funding and/or financing for terrorist groups and activities. As States continue to seize terrorist assets worldwide, extremist groups resort to criminal activities to fund their operations of violence and terror. Identifying criminal activity in the aviation security environment may lead to identifying terrorist activities or evidence of support of terrorist missions. Any unusual or increased incidents of criminal activity in transportation sectors should be noted, and where practicable, shared amongst relevant State agencies and jurisdictions, such as law enforcement, and between Member States.

Motives of Threat Groups:

- gain publicity for their cause;
- gain release of prisoners or other terrorists;
- change government or international policy;
- undermine and discredit authorities who oppose their cause;
- target individuals for assassination who are possibly unsympathetic to their cause;
- frighten the public and disrupt normal life;
- obtain money by threat or blackmail;
- escape or evade-capture/arrest/persecution.

According to ICAO Annex 17:

- each Contracting State shall ensure that such an organization and such regulations, practices and procedures:
  - a) protect the safety of passengers, crew, ground personnel and the general public in all matters related to safeguarding against acts of unlawful interference with civil aviation;
  - b) are capable of responding rapidly to meet any increased security threat
- each Contracting State shall ensure that measures designed to safeguard against acts of unlawful interference are applied to domestic operations to the extent practicable, based upon a security risk assessment carried out by the relevant national authorities.

The methodologies of threat assessment and risk management employ three core principles of security: *identify*, *implement* and *sustain*. When making a threat assessment, analysts mainly use the first principle, *identify*, while the other two principles play a significant role in the risk management process. The main purpose of any security countermeasure is prevention. The first step is to *identify* the threat or threats to civil aviation and the next task is to *implement* an appropriate security response commensurate with that threat.

If the assumption is made that potential perpetrators with the intention to interfere with civil aviation can defeat a security system if given enough information, time and opportunity, then the logical objective is how best to deter perpetrators from carrying out a successful act of unlawful interference. It is therefore essential that the implementation of suitable preventive security measures be considered.

Operational intervention leads to the third principle, *sustain*, which can be described as a State having the political will and accompanying capability to maintain appropriate reliable security practices.

Without a commitment to sustain effective aviation security measures, the efficacy of the other principles is diminished. In taking steps to prevent acts of unlawful interference and other criminal activity directed against aircraft operators and airports, the sustainability of security measures should be evaluated through inspections, audits and surveys, such as provided by an national quality control programme (NQCP).

#### **ICAO global risk context statement**

The ICAO global Risk Context Statement (RCS) provides a high-level description of the global risk picture. The statement presents high-level statements for Member States for an improved approach in creating and maintaining their National Civil Aviation Security Programmes. The RCS explains the importance of a risk-based approach, suggests a risk assessment process map and explains its methodology, and discusses the nature of the threat, terrorist methods, types of attack, terrorism and criminality.

#### **Importance of threat and risk assessment approach**

The continuing threat of terrorism is most effectively managed by identifying, understanding and addressing the potential risks both to and from civil aviation in general and its specific goods (passenger, baggage, cargo and mail)

transported. Therefore, the RCS has been developed to assist Member States in their efforts protect air transportation and prevent its use for unlawful acts.

#### **Risk assessment methodology and process map**

The purpose of the risk assessment methodology and process map is to assist States in performing a risk assessment of possible and/or potential concerns and to ensure that careful thought is given to the evaluation of risks.

The risk assessment methodology used by the WGTR in the evaluation of possible security concerns comprises three primary processes:

- a) identification of the inherent or theoretical problem;
- b) residual risk assessment; and
- c) recommendations.

Risk assessment is a series of processes that evaluates the risks of the collected or arranged hazard reports and security concerns and assigns priorities to them, including evaluations of the following:

- a) **threat** – identify the target, such as people, an airport terminal, associated infrastructure or aircraft, as well as the means and methods of possible attack, such as through construction, concealment, conveyance or placement of an IED;
- b) **vulnerabilities** – consider the inherent vulnerabilities or exposure of operations;
- c) **likelihood** – consider the probability of the threat occurring;
- d) **consequence** – assess the nature and scale, whether minor, significant or substantial, of the impacts of the specific attack, in human, economic, political and reputational terms.

For States wishing to apply this methodology to their risk assessments, any resulting residual risks that are uncovered should be reviewed, and possible additional security measures implemented and evaluated to see whether they are commensurate with the threat and whether they are effective, practicable and sustainable.

**Conclusion.** It is necessary to emphasize the seriousness of threats to civil aviation and the necessity of appropriate, effective and sustained security measures for the effective detection and prevention of acts of unlawful interference including identifying, understanding and addressing the size and nature of potential risks both, to and from, civil aviation.

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## ANALYSIS OF LASER ATTACK IMPACT ON PROFESSIONAL PILOT ACTIVITIES

*Laser attacks on pilots must be considered as criminal actions against people and regarded as severe acts of unlawful interference into civil aviation activities. The paper contains analytical approach to the events of laser attacks and considers psychological and physiological aspects of laser impact on pilots as well as laser power relations vs harmful effects.*

ICAO has become the world leader in developing aviation security policies and measures at the international level, and the enhancement of aviation security worldwide remains a key objective of the Organization. Provisions for international aviation security were first introduced into the Chicago Convention in 1974 as Annex 17 – Security, and since then have been improved and updated. Highlights of the Organization’s security-related priorities moving forward include identifying and preventing new forms of attack before they occur, streamlining security checks so that they remain effective but are not duplicated unnecessarily, and improving the capabilities of all States to implement and oversee effective aviation security measures.

Aviation Safety issues are highly dependent on human factor which can be defined as many functional psychological, physiological and cultural effects influencing different types of aviation personnel activities. Laser attack is endangering the safety because of distraction, visual effects, eye injury, creating the highest risk during critical phases of flight. It is recognized that the problem warrants attention, given the growth in incidents and potentially serious consequences of laser attack on flight crew members [1, 2].

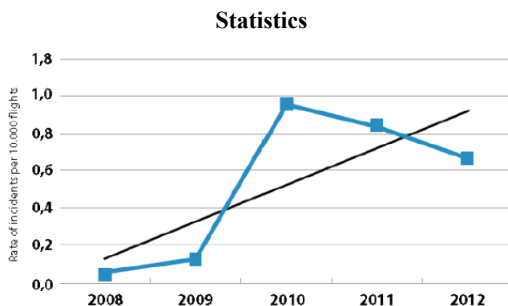
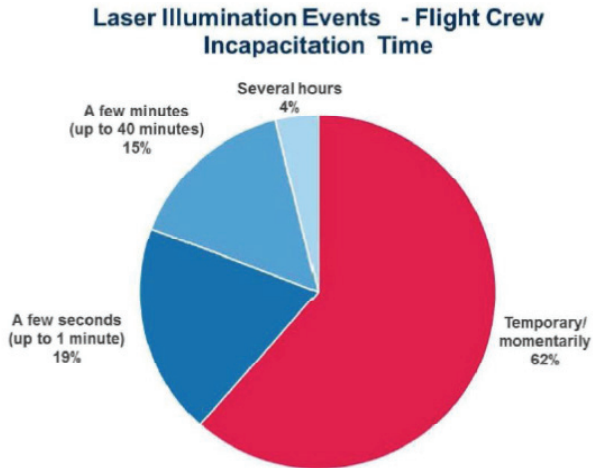


Fig. 1 Rate of incidents per 10.000 flights due to laser attacks.

If we analyze laser occurrences per different phases of flight in 2008-2012 we can definitely say that the majority of events took place during approach to land, and the largest number of attacks was recorded in 2011. According to the information given by Russian Aviation Authorities, more than 30 laser attacks on crew members were recorded in 2011. All these attacks referred to the most critical phases of flight-take off and landing. During these phases, pilots constantly change focuses of their attention from flight instruments to the runway, to approach lights, etc. If the laser beam strikes a pilot's eye he cannot see anything for some time. He needs the time for adaptation after the impact but he does not have this time during the mentioned phases of flight.

Laser attacks on pilots must be considered as criminal actions against people [3, 4]. According to Article 1 of the Beijing Convention, any person commits an offence if that person unlawfully and intentionally performs an act of violence against a person onboard an aircraft in flight if that act is likely to endanger the safety of that aircraft [5]. The Beijing Convention and Beijing Protocol, together with the Assembly Security Declaration, highlight more than anything else the strength and scope of the political will which exists today in support of more robust, comprehensive and collaborative aviation security and legal frameworks.

If we look at the effects of laser attack on flight crew members we can state that the most often is the incapacitation followed by distraction and averted eye inside the cockpit.



Source: STEADES Analysis - Laser Illumination Reports

Fig. 2 Flight crew incapacitation time due to laser illumination events

The published information shows critical growth of laser attacks. For example, in the USA, the 14 times increase of laser incidents has been registered (283 events in 2005, 3960 in 2014).

Hazard of laser attack is primary related to power. If the power of a device is less than 0.5 mW, it can be considered normally safe, while 0.5 – 1 mW deliberate exposure may not be safe, from 1 mW to 5 mW we can determine as risk for injury at short and accidental exposure. More powerful lasers are extremely hazardous. Hazard factors depend on laser characteristics (power, output, beam divergence), operational factors (laser stability, location of beam to aircraft, cockpit), situational factors (day/night, motion and speed of aircraft, distance to the aircraft flying predetermined routings), pilot/aircrew factors (flight phase, head up display, pilot awareness and response). We must also stress effects of colours:

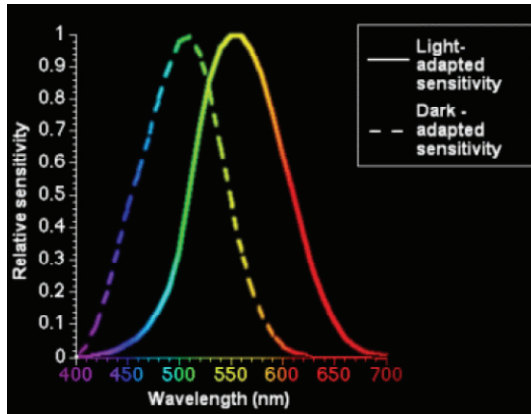


Fig. 3 Effect of colours

The statistic data analyzed during research allow us to make a conclusion that the eye and visual hazard distance increases with the square root of the power increase.

It is highly dangerous due to:

- Distraction;
- Glare;
- Flash blindness;
- After image;
- Eye injury;
- Psychological effects.

Everything mentioned above can lead to the highest level of risk in critical phases of flight [6]. Pilots can be unable to complete landing safely. They cannot see instruments reading clearly and feel difficulty in taxiing.

What flight deck procedures can be recommended?

- Shield the eyes (look away from the laser);
- Avoid rubbing of eyes;
- Turn up cockpit lighting;
- Check for dark/disturbed areas in vision;
- Inform ATC;
- Seek aeromedical or optometrist advice (after landing).

**Conclusions:**

- Laser attacks are directed intentionally to aircraft and negatively impact aircraft safety;
- States should enact specific legislation and criminalize laser attacks with proportionate responsibilities and penalties;
- ICAO state letter would promote awareness amongst regulators and consider specific legislation;
- Regulate the possession, trade of lasers > 5mW and consider such lasers as a weapon.

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## **SECURITY ASPECTS OF AIR CARGO AND MAIL TRANSPORTATION**

*The basic principles of secure cargo and mail transportation were considered. The key links of the secure supply chain were determined to provide effective protection of the air cargo and mail against acts of unlawful interference.*

The global air cargo system is a complex, multifaceted network for transporting vast amounts of freight, packages and mail on both passenger and all-cargo aircraft. The world's airlines transport more than 50 million tonnes of freight and mail annually and more than a third of the value of world trade relies directly on air transport and related trade volumes are expected to grow over the long term.

The October 2010 plot to insert improvised explosive devices (IEDs) into the air cargo supply chain illustrated vulnerabilities of the global air cargo security system, which were exploited by terrorists.

Cargo and mail may be perceived as a potential medium of attack because:

a) the environment in which the air cargo and mail industry operates is growing and is becoming increasingly complex;

b) the capacity of the industry to respond to this growth and complexity is challenged by the presence of multiple actors who handle air cargo and mail entering and exiting the supply chain;

c) security measures that are applied to cargo and mail vary among States and are often based on risk assessments conducted by national authorities, resulting in differing approaches to implementation. This creates potential vulnerabilities in the air cargo supply chain and difficulties for aircraft operators having to implement different standards;

d) awareness of the vulnerabilities of the air cargo supply chain is increasing, as a result of information disseminated by terrorists and the media.

Air cargo and mail operations face two main threats, namely:

a) placement of an improvised explosive device (IED) in cargo or mail to be loaded onto an aircraft;

b) use of all-cargo aircraft as a means of attacking a ground-based target through the unlawful seizure of the aircraft.

Since the secure transport of air cargo is a critical component of barrier-free and facilitated trade, efforts to strengthen air cargo and mail security measures globally must be conducted as a priority in a coordinated way [1, 2].

The International Civil Aviation Organization (ICAO) has adopted and endorsed a set of principles on air cargo and mail security, to serve as a cornerstone for ICAO and all stakeholders in taking action to secure the air cargo and mail supply chain [3, 4].

The air cargo supply chain is a combined set of interconnected parties, locations, procedures, and information exchanges that enables cargo to move from its origin to its destination by air. All parties have a shared responsibility to ensure that air cargo moves safely and securely through this chain.



In practical implementation, supply chain systems vary based on operational business models. Some entities may control one or multiple nodes of the supply chain and therefore carry out many functions. A simple model of the air cargo supply chain is demonstrated in Fig.1.

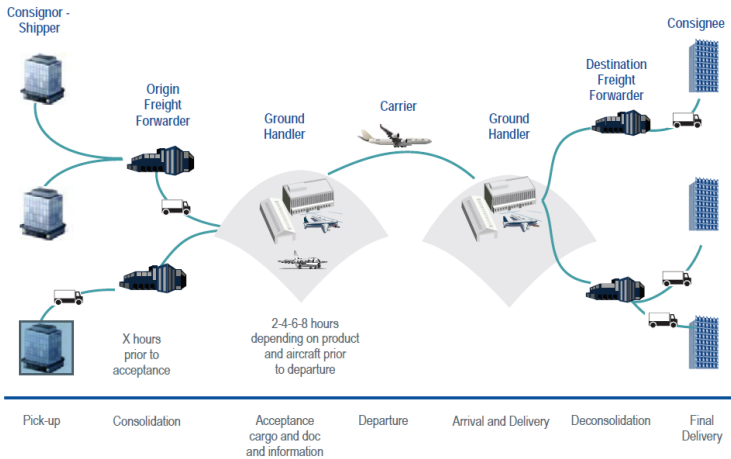


Fig.1. Air cargo supply chain

Air cargo and mail should be processed for transport by air in an operating environment that meets the following objectives:

- a) cargo and mail should come from a secure supply chain or be screened to effectively detect prohibited items;
- b) additional security measures beyond baseline procedures should be applied to cargo and mail that are deemed high risk;
- c) once secure, cargo and mail should be kept secure throughout their entire journey, including at transfer and transit points;
- d) cargo and mail operations should be subjected to oversight and quality control activities; and
- e) unnecessary duplication of security controls should be avoided.

The air cargo secure supply chain is a set of interconnected security procedures that are applied to a cargo consignment to maintain the integrity of such a consignment from the point where screening or other security controls are applied until it arrives at its last airport of arrival, including through transit and/or transfer points.

Regulated agents, known consignors, account consignors and aircraft operators represent the primary entities in the implementation of a secure supply chain process. Fig.2 illustrates the flow of cargo through a secure supply chain until it is loaded onto a commercial aircraft for transport by air.

States should enact appropriate legislation or regulatory frameworks that establish security requirements for these key entities. The legislation or regulatory

framework should define the approval and revocation process for entities wishing to operate within the secure supply chain and clearly outline the roles, responsibilities

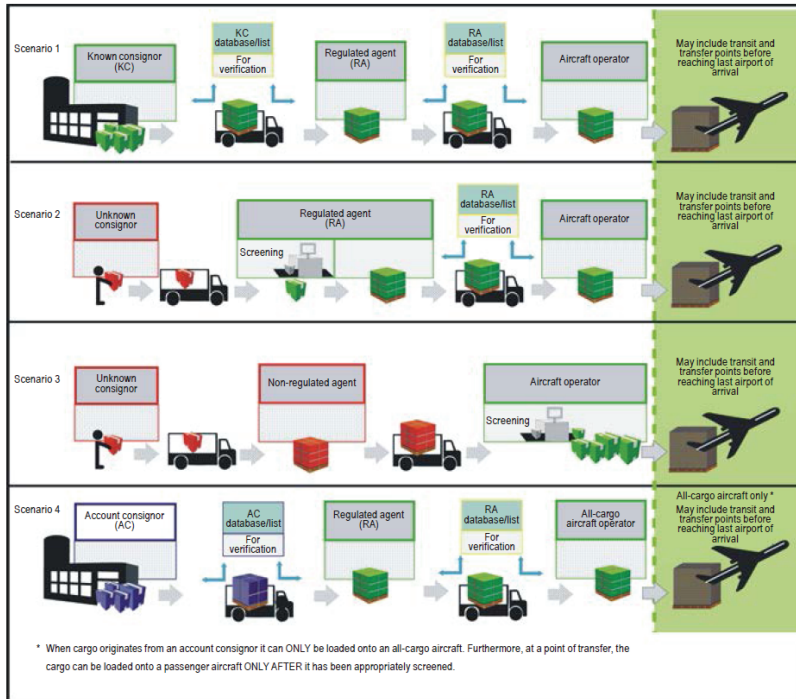


Fig.2. Movement of cargo and mail through a secure supply chain

and security measures to be applied by these entities to enable the effective implementation of each entity's security programme [1, 2].

A regulated agent is an entity such as a freight forwarder that conducts business with an aircraft operator and provides security controls that are accepted or required by the appropriate authority in respect of air cargo and/or mail. States should establish a process for the approval of regulated agents and establish a database or list of approved regulated agents.

The purpose of the regulated agent concept is to place the emphasis for the practical implementation of security controls on regulated agents and ensure the security of the movement of air cargo and mail through the supply chain, rather than screening all cargo at the airport of departure.

A known consignor is a consignor who originates cargo and/or mail for its own account and whose procedures meet common security rules and standards set by the appropriate authority sufficient to allow the carriage of cargo or mail on any aircraft.

The purpose of the known consignor concept is to place the emphasis for the practical implementation of security controls on the actual shipper or originator of

the goods and to ensure the security of air cargo and mail as they move throughout the supply chain. This requires goods to be produced, packaged, stored, transported and handled in a manner that ensures their integrity and protects them from unauthorized interference from the point of origin and throughout the secure supply chain [3].

A State may elect to establish relevant legislation that authorizes a regulated agent or aircraft operator to designate a customer or consignor as an account consignor [1, 2].

An account consignor is a consignor who originates cargo or mail for its own account for carriage on all-cargo aircraft only and who applies procedures that meet common security rules and standards set by the appropriate authority sufficient to allow carriage of its cargo and mail only on all-cargo aircraft [5].

Harmonized and commonly agreed security controls throughout the supply chain are essential to ensure that air cargo and mail are subjected to appropriate security measures. These measures should be designed to deliver effective security while facilitating the movement of cargo through the entire secure supply chain. The advantages of implementing a secure supply chain model include:

a) shared responsibilities and application of security controls, which may include screening, amongst supply chain stakeholders, thereby reducing the strain on airport operations;

b) the secure movement and transfer of consignments from one entity to another; and

c) the assurance that appropriate security controls are applied at each node of the air cargo supply chain to ensure that cargo shipments are protected from unauthorized interference throughout.

The key pillars that characterize a secure supply chain are: facility security, personnel security, training, screening, chain of custody and compliance/oversight (quality control). The appropriate authority should ensure that the appropriate security controls associated with each pillar are fully implemented by each of the entities operating within the secure supply chain.

**Conclusions.** The implementation of the secure supply chain is an efficient solution, built on a risk-based approach that allows to meet the following objectives:

- respect existing obligations of businesses operating in the air cargo supply chain;
- share costs and responsibilities among all stakeholders and allow cargo to be secured upstream in the supply chain to reduce the burden of security controls imposed on aircraft operators;
- facilitate the flow of cargo transported by air and reduce or limit possible delays generated by the application of security controls;
- apply appropriate security controls for specific categories of cargo that cannot be screened by the usual means due to their nature, packaging, size or volume; and
- preserve the primary advantages of the air transport mode: speed, safety and security.

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## **IMPLEMENTATION OF SECURITY PROCEDURES IN AIR TRAFFIC CONTROL**

*The first decade of the twenty-first century has seen an increase in terrorist activity against a range of targets using a variety of methods. As a result, States have expressed concerns about the possibility that the air traffic control (ATC) system could be subject to attack, and safeguarding the air traffic management (ATM) system from security threats has become an issue of increased concern.*

Aviation security, aiming at preventing acts of unlawful interference, has at all times been of high priority. Because of the international nature of aviation, effective security requires the participation of all States. In order to achieve a uniform application of security provisions, several international legal instruments have been developed. They provide the basis for the uniform implementation of security provisions worldwide.

On a global level, the International Civil Aviation Organization (ICAO) Annex 17 is binding for all contracting states. On a European level, the European Civil Aviation Conference (ECAC) Doc 30 sets up standards ruling aviation security regulations in the form of a manual. The activities of ECAC are merely of an advisory nature, though they are just recommendations without a binding effect on the ECAC-Member States. The regulations adopted by the Conference only gain legal validity if they are converted into national legislation. ECAC Doc 30 is based on the international ICAO Annex 17. All of the regulations serve the purpose of protecting civil aviation from and preventing acts of unlawful interference.

The most important legislative function performed by ICAO is the formulation and adoption of Standards and Recommended Practices (SARPs) for international civil aviation. These are incorporated into the 19 Annexes to the Convention on International Civil Aviation, also known as the Chicago Convention. Of critical importance to the future of civil aviation and to the international community at large are the measures taken by ICAO to prevent and suppress all acts of unlawful interference against civil aviation throughout the world. SARPs for international aviation security were first adopted by the ICAO Council in March 1974, and designated as Annex 17 to the Chicago Convention.

The Aviation Security Manual (Doc 8973) provides detailed procedures and guidance on aspects of aviation security and is intended to assist States in the implementation of their respective national civil aviation security programmes required by the specifications in the Annexes to the Convention on International Civil Aviation. Also Doc 8973 has training programme models for non-security staff involved in implementing security measures. All non-security staff, in addition to security awareness training, should undergo both initial and recurrent specialized training so they can perform these duties adequately. Training should be adapted to their specific needs and tasks and should reflect the policies, practices and

procedures of the organization. Non-security staff can be defined as any air traffic control (ATC) provider, technician, or staff member that has duties related to civil aviation operations and could be involved in the implementation of security measures. Thus, Attachment F to Appendix 11 to the Aviation Security Manual contains security training programme for air traffic controllers.

The objective of a security training programme for air traffic controllers is to ensure that air traffic controllers and their supervisors understand aviation security principles and are knowledgeable of the procedures to be followed in emergency situations.

A National Civil Aviation Security Training Programme should specify the training requirements related to air traffic control responsibilities, hijackings, bomb threats, alerting and contingency procedures.

An unlawfully seized aircraft or one subjected to a bomb threat should be deemed to be in a state of emergency and treated accordingly. A notification system should be developed. If such an aircraft is not fitted with a transponder able to transmit a code setting of 7500 to alert all radar stations equipped with secondary radar, the flight crew should, if possible, use plain language to inform ground control authorities, though this is not always possible during acts of unlawful seizure if there is an intrusion of the flight crew compartment. The flight crew should also use visual signals and other suitable methods.

Specific ATC instructions should be published. When controlled an aircraft has been unlawfully seized an ATCs should be discreet in communications with the pilot, and responsive to the pilot's requests, monitor the aircraft flight path and use normal procedures without requiring transmissions or responses by the pilot unless the pilot has established communication, and provide all possible assistance to military aircraft dispatched to intercept and escort the unlawfully seized aircraft, in order to aid in placing them in a strategic position in relation to the seized aircraft.

The air traffic service providers (ATSPs) have been more frequently involved in supporting roles in national security and law enforcement situations, including disaster prevention and recovery operations that are not intentionally directed at the aviation system, but could have profound, negative impacts on the aviation system if not managed effectively. These situations often require use of ATM procedures such as temporary airspace/flight restrictions that provide required safety and security measures and minimize the impacts of security events on flight operations in the ATM system.

ATM security differs from aviation security in the sense that ATM security has dual requirements of protection of the ATM system against threats and vulnerabilities and the provision of ATM security services in support of organizations and authorities engaged in aviation security, national security, defence, and law enforcement. Thus, the ATM security role has a traditional internal role of protection of the ATM system itself and an operational role in the support of certain aspects of aviation security as well as national security and law enforcement.

In addition to requiring ATSPs to implement a security programme, States have an oversight responsibility in relation to ATM Security. Although, aviation security oversight is defined as a function by means of which States ensure the effective implementation of the security-related Standards and Recommended

Practices (SARPs) and associated procedures contained in the Annexes to the Chicago Convention (Annex 17) and related ICAO documents, aviation security requirements should also be accompanied by security procedures appropriate for all aspects of air traffic management.

An ATM security framework is the combination in a system of organization, means and doctrine (policies, regulations, procedures) established to protect the ATM System (people, aircraft, airspace, infrastructure and information) against attacks and acts of unlawful interference. It is the responsibility of the national aviation and ATM security authorities to establish a national ATM security framework in support of the national aviation security programme. This framework is the reference for all involved parties e.g. ANSPs, Aircraft Operators and Airport Operators (when applicable). As part of the framework, these organizations must establish their own security programme compliant with the national programme. This obligation could be better achieved through the implementation and operation of security management systems (SeMS).

An effective SeMS would include the following core components:

- Security Management Policy - the organization's top management should authorize an overall security management policy, which establishes commitment to security sets out strategic security aims and provides a framework for security management activities.
- Security Risk Assessment and Planning - security risk assessment and the identification of necessary security control measures will form the basis of the whole security system. This includes an ongoing identification and assessment of asset criticality, security threats, vulnerability and risks, the identification and implementation of necessary management control measures. Once completed, it provides a total appreciation of the significant security threats, vulnerabilities and risks within the domain of the organization. The security risk assessment should include active consultation with all relevant stakeholders.
- Management Review - top management should review the organization's security management system, at planned intervals, to ensure its continuing suitability, adequacy and effectiveness. Reviews should include assessing opportunities for improvement and the need for changes to the security management system, including the security policy and security objectives and threats and risks.

### **Conclusions.**

- ATM Security are very complex and important elements of Aviation Security and a priority issue for further coordinated activities/developments in partnership with national, European and international institutions, organizations and stakeholders.
- ATM Security is concerned with threats that are aimed at the ATC directly and ATM System generally, such as attacks where ATC plays a key role in the prevention or response to threats aimed at other parts of the aviation system (or national and international assets of high value) and limiting their effects on the overall ATM Network.
- The civil-military dimension in security is an important aspect; and particularly relevant in the context of cyber and CNS security. Recently,

ICAO has launched a strategic campaign to improve civil-military cooperation at a global level. ATM security has been identified as one of the main areas of work. Involvement of all civil and military stakeholders in the consultation processes on ATM Security is a necessity according to their roles and responsibilities. ATM Security developments must ensure full civil-military cooperation and coordination on all relevant levels.

- While it seems likely that commercial aviation will remain a high-profile potential target, spending billions on static defences at airports every year is almost certainly a poor use of resources. At the same time, the training of aviation personnel is a much more efficient spending of finance. ATC will often be the first to be aware of a case of unlawful interference on-board the aircraft. That's why they should be well educated and know exactly what to do, because ATCs are important elements in providing of ATM security.

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## TRAINING AND UPGRADING OF AVIATION SECURITY PERSONNEL

*Effective measures against terrorism on air transport significantly depend on the availability of highly qualified personnel in the aviation security system. When training and upgrading aviation security personnel, aviation security is considered as a system category related to the activities of all civil aviation organizations.*

Ukraine, as an ICAO Member State, must follow international standards and adhere to recommended practices (SARPS) on aviation security as contained in Annex 17 «Security: Safeguarding International Civil Aviation Against Acts of Unlawful Interference». Annex 17 requires States to develop and implement regulations, practices and procedures to protect civil aviation against acts of unlawful interference with the requirements of safety, regularity and efficiency.

According to ICAO international standards, ICAO Member States form and constantly improve recruitment, selection and training of aviation security personnel, including staff that does not belong to aviation security service, aircraft crews and those who operate at the airport.

Aviation Security (AVSEC) Personnel Training is performed by ICAO European Regional Aviation Security Training Centres [1]. Annually, in coordination with ICAO Headquarters, the ICAO European Regional Aviation Security Training Centre (National Aviation University, Kyiv, Ukraine) holds at least two international ICAO Sponsored Courses in English or Russian, courses of Standardized Training Packages (STP) and more than twenty national AVSEC training courses. More than 1,500 specialists of aviation security are trained at the center each year.

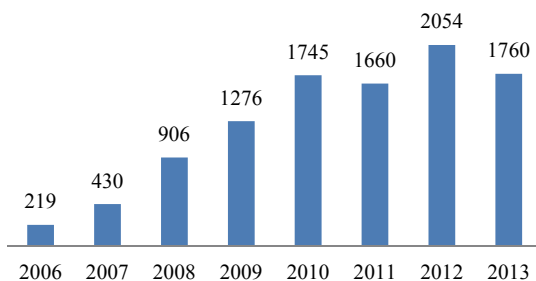


Fig.1. AVSEC Personnel Training statistics (ASTC, NAU, Kyiv)

The proper recruitment, selection, training and certification of security staff are the key aspects to establish an adequate and effective security system.

Basic training of AVSEC personnel shall result in the following competencies [2]:

- knowledge of previous acts of unlawful interference with civil aviation, terrorist acts and current threats;
- knowledge of the legal framework for aviation security;
- knowledge of the objectives and organization of aviation security, including the obligations and responsibilities of persons implementing security controls;
- knowledge of access control procedures;
- knowledge of identification card systems used at the airport;
- knowledge of procedures for challenging persons and of circumstances in which persons should be challenged or reported;
- knowledge of reporting procedures;
- an ability to identify prohibited articles;
- an ability to respond appropriately to security related incidents;
- knowledge of how human behavior and responses can affect security performance; and
- an ability to communicate clearly and confidently.

AVSEC Personnel competence may diminish over time and it is therefore essential to have an effective recurrent training program. All personnel should undergo recurrent training at regular intervals to ensure that they maintain or improve their competence. [3]

It is possible to increase the effectiveness of AVSEC Personnel Training if we consider the needs of the staff.

Analysis of Course Opinion Questionnaires showed that aviation personnel have the need to acquire knowledge in the field of Psychology, Pedagogy and Law.

Also, much attention is paid to the problem of interaction of security staff with representatives of law enforcement agencies, such as Security Service of Ukraine, Ministry of Internal Affairs. This interaction can be the basis for establishing of individual courses where knowledge in the field of Law and Psychology may be applied.

The need to use legal, psychological, educational and partially medical skills in the AVSEC Personnel activities is supported by the data obtained from the responses of course participants. According to the audience, questions concerning the actions of crew members in case of hijacking during the negotiations should be considered in the scope of modern trends of Applied Psychology, using the methods of observation and communication in order to detect persons that intend to commit crimes. In security services of airlines, lawyers are required to deal with various legal aspects, to consult on legal instruments, in particular, on interaction (functions, duties, responsibilities, rights) with law enforcements. According to the participants' opinion, these aspects are not specifically defined elsewhere.

It should be noted that management staff feels the need for psychologists and lawyers in the AVSEC system.

Course participants noted the lack of basic knowledge about the provisions of legislation pertaining to suppression of unlawful passengers; the unavailability of rights of AVSEC Personnel; unclear and unspecified role of the police in cooperation with AVSEC Personnel; a large number of contradictory regulations relating to the Aviation Security (security check and units of aviation security service).

To provide an effective training process, it is necessary to find the ways and opportunities to regularly involve experienced profilers, dog handlers, educators, health professionals, specialists of defense and law enforcement agencies in order to increase the capability of aviation personnel.

It is still considered to be an open question: do aviation personnel have the right to take legal action to neutralize terrorists prior to arrival of law enforcement?

It is necessary to ensure the process of improving methods of AVSEC personnel training in order to improve security within the existing provisions and appropriate regulatory framework in the aviation industry.

Management staff should pay much attention to the "human factor" to increase the level aviation security. Nowadays, under a constant threat of act of unlawful interference, Aviation Security Personnel must not make mistakes. Heads of aviation security services should acquire the necessary knowledge in the field of psychology management to carry out competent professional selection of applicants for particular positions.

Recurrent training programs can be adapted to the individual needs of AVSEC personnel on the basis of regular monitoring of their specific functions performed in aviation security service. Recurrent training should be a combination of web-based training and training based on practical skills, including threat updates, local issues and changes in procedures and equipment.

To establish and clarify the legal basis for aviation security personnel, specific laws, regulations and orders should be adopted. This allows supervisors to effectively carry out their activities. When performing duties, aviation security personnel must follow the instructions and requirements that regulate dealing with passengers.

Insufficient funding is one of the greatest issues affecting aviation security. After applicants being employed, their initial training at the specialized courses often took a month or two, and sometimes more, due to financial problems of the airport/airline. In addition, the actual problem is the outflow of staff owing to lack of financial motivation. Many believe that a salary increase can foster the renewal process of employing aviation security personnel.

Imperfect technical security controls are an additional constraint for the development of AVSEC personnel training. This requires finding new ways to develop techniques to maintain professional competency of airport security personnel and to improve the Aviation Security system simultaneously with the re-equipment of passenger control units.

## Conclusions

- Management, Psychology and Pedagogy play an important part in AVSEC Personnel Training. Heads of aviation security services are interested in the activities related to dealing with "human factor". These activities are considered to be the basis for improving the quality of aviation security.
- Instructors should use practical teaching methods, lecture materials must be illustrated with good examples (priority should be given to national practices); more gaming and training exercises ought to be applied in the educational process.
- When training and upgrading aviation security personnel, aviation security should be considered as a system category related to the activities of all civil aviation organizations. At the same time, attention ought to be paid to both individual questions that pertain to aviation security and on interconnection between these questions.

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## **CIVIL-MILITARY COORDINATION IN AIR TRAFFIC CONTROL**

*The topic of civil/military coordination has been discussed over the years in the ICAO Assembly. Both aviation sectors are essential; however, both of them cannot operate simultaneously within the same block of airspace, requiring the establishment of the system of civil military coordination in Air Traffic Management.*

There are two major airspace users in the world today – civil and military. The civil aviation sector includes private, commercial and government-owned aircraft that are primarily transporting cargo and passengers, both nationally and internationally. Military aviation comprises State-owned aircraft engaged in transport, training, security and defence.

Civil aviation has a significant impact on the global economy and environment. Over the last decades, there has been increasing pressure on ATM to meet civil aviation growing demand.

On the other hand, State aircraft operations respond to national/international security and defence obligations and cannot be compromised. In the current evolving security environment, States have to face asymmetric threats and the security forces must maintain military effectiveness and be ready to conduct air operations in an ever more congested airspace.

States are therefore faced with the challenge of managing their limited airspace in a way that safeguards both civil and military aviation requirements.

In order for international aviation to operate as a safe and harmonious system, States have agreed to collaborate on a common regulatory infrastructure and, among others, have agreed on the air traffic services rendered, which includes the access and use of airspace.

In October 2009, ICAO hosted the Global Air Traffic Management Forum on Civil/Military Cooperation, which was attended by more than four hundred high-ranking civil and military participants from sixty-seven Member States, six air navigation service providers and forty-six industry organizations. Realizing that there was no existing international framework to bring civil and military authorities together, the Forum recommended that ICAO should play a pivotal role in improving the level of cooperation and coordination between civil and military authorities and should serve as the international facilitating platform.

Recognizing that the growing civil air traffic and mission-oriented military air traffic would benefit greatly from a more flexible use of airspace, the Forum recommended that civil and military experts should jointly develop advice and guidance on the best practices for civil/military cooperation.

The ATM Operational Concept presents a vision of an integrated, harmonized and globally interoperable ATM system – a system that meets agreed levels of safety, provides for optimum economic operations, is environmentally

sustainable and meets national security requirements for all users during all phases of flight. The vision does not discriminate or make any exceptions about the type of traffic it is designed to serve.

Ukrainian airspace and airspace over the high sea where the air traffic service is delegated to Ukraine by international agreements, defined and applied in accordance with the Standards and recommended practices of ICAO, EUROCONTROL documents, the Air Code of Ukraine, the Regulation on Use of Airspace of Ukraine, consists of the following structure:

5 Flight Information Regions (Dnipropetrovsk FIR, Kyiv FIR, Lviv FIR, Odesa FIR, Simferopol FIR)

- 46 Control Areas – 23 CTA Sectors, 20 TMAs, 3 military TMAs
- 46 Control Zones (CTR), which include 20 military CTRs
- 5 Aerodrome Flight Information Zones (AFIZ)
- Aerodrome Traffic Zones (ATZ) – usually established for each airfield
- 115 (approximately) ATS routes and routes established for crossing the state border of Ukraine
- Total ATS routes length – approximately 56 000 km
- 32 Prohibited Areas (P)
- 221 Restricted Areas (R)
- 76 Danger Areas (D)
- 193 Training Areas (T), 63 of them are stated as temporary airspace reservation (TSA, TRA)
- Special rules zone airspace – established along the state border and around Prohibited Areas (P)

Ukrainian airspace and airspace over the high sea where the air traffic service is delegated to Ukraine by international agreements, is divided into the controlled ATS airspace and airspace which is outside the controlled ATS airspace.

Controlled ATS airspace is classified as Class C and Class D airspace in accordance with ICAO Standards within which all types of ATS are provided.

The airspace outside controlled ATS airspace of Ukraine is divided into ATS airspace, where flight information service and emergency services are available on request (ATS airspace class G), and non-classified airspace where air traffic services are not provided.

Management of airspace of Ukraine and airspace over the high sea with the air traffic service responsibility delegated to Ukraine by international agreements is fulfilled via FUA principle on three levels: strategic, pre-tactical, tactical.

Three levels of airspace management cover the civil-military coordination tasks.

Airspace management at Strategic level is fulfilled by State Aviation Administration of Ukraine approved by Ministry of Defense of Ukraine.

Airspace management at Pre-tactical and Tactical levels is fulfilled by [UKRAEROCENTER](#) and ACC within their responsibility.

Airspace management at Pre-tactical level means planning, coordination procedures and daily airspace allocation among airspace users on a temporary basis in accordance with the State priorities.

Airspace management at tactical level means procedures on the day of operation, of activation, deactivation and real time reallocation of airspace, allocated at Pre-tactical level. Tactical level also means civil-military coordination procedures between appropriate ATS units and controlling military ATC units concerning possible conflict resolution during the air traffic service for GAT and air traffic control for OAT.

Civil- military coordination is carried out between the competent civil and military authorities, other competent state aviation authorities in order to ensure safety in the event any activity potentially dangerous to the flight of civil aircraft is planned by any military authority, other state aviation authority, which is located in Ukraine or abroad.

This civil-military coordination is carried out in case any potentially dangerous activity is planned and implemented in Ukraine or in the airspace over the High seas with the air traffic service responsibility delegated to Ukraine by international agreements.

Civil-military coordination is provided by UkSATSE at international, interdepartmental and operational level.

Civil-military coordination at international level is provided by UkSATSE in the process of state policy realisation regarding the airspace use and air traffic management. Operational issues are under the responsibility of [UKRAEROCENTER](#) and ATM Centers.

Civil-military coordination on interdepartmental level is provided by UkSATSE together with the appropriate State authorities, organizations and airspace users to solve the issues concerning airspace use and air traffic management.

Civil-military coordination on operational level is provided by UKRAEROCENTER, ATM Centers with appropriate authority bodies of Armed Forces of Ukraine, law enforcement bodies, other military units, ATS units and departmental ATC units to address operational issues during planning phase and airspace use activities in order to ensure safety and effectiveness of air traffic during simultaneous civil and state flights, other airspace use activities and to control the order and compliance of Ukrainian airspace use rules.

Civil-military coordination within integrated civil-military ATM system (ICMS) is provided by UKRAEROCENTER and ATM Centers to resolve the operational issues concerning air traffic management and airspace management.

Civil-military coordination during ATS/ATC at common-use aerodromes is provided by Joint Group for Flights Control (JGFC). Civil and military ATCOs of JGFC provide safety and effectiveness of air traffic during simultaneous civil and state flight operations of civil and state aircraft in the same airspace.

Integrated civil-military air traffic management system (ICMS) provides the fulfillment of tasks of ASM, safe and regular air traffic in the airspace of Ukraine and in the airspace over the high sea, where the air traffic service responsibility is delegated to Ukraine by international agreements.

Business structure, objectives and functions of ICMS are defined by the Decree of Cabinet of Ministers of Ukraine №1281 dated 19.07.1999

CMS is headed by UksATSE Director General.

ICMS includes:

- UKRAEROCENTER, the main operational unit of ICMS
- KYIVCENTRAERO (Kyiv RB)
- Dnipropetrovsk RB
- KRYMAERORUKH (Simferopol RB)
- Odesa RB
- Lviv RB
- Aeronautical Information Service (AIS)
- Professional Training Centre (refer to Training and Certification Centre of UksATSE)

• Medical Certification Commission for Aviation Personnel (MCC) (refer to Medical Center)

**Conclusion.** Historically, State agreements between military aviation units and ANSP have focused on the needs of State defence, security and emergency procedures as well as military readiness and response requirements. There is now a clearly defined need to establish procedures that support the efficient integration of military and civil aviation in day-to-day operations.

Collaboration begins with good communication. ATM stakeholders should meet regularly to better understand the needs, desires, constraints and challenges that each operator and service provider faces in operating within State airspace. Good communication and mutual understanding enable building collaboration upon a solid foundation. Good civil/military communication and collaboration are the key to success for ATM around the world.

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## **CRISIS MANAGEMENT CONCEPT**

*The paper considers the analysis of the crisis management concept. Different phases of a crisis development, strategies for each phase and crisis solutions are analyzed. It is presumed that crisis management is based on an effective decision-making process.*

According to ICAO Security Manual (Doc.8973, Chapter 17), States should develop crisis management measures and procedures, which should include identifying a crisis, planning appropriate responses to the crisis and confronting and resolving the crisis.

What is a Crisis? A crisis is defined in the dictionary as follows: “decisive moment, time of danger or difficulty”. In daily life, personal crises, in most cases, appear without warning and challenge our sense of what is normal and well-managed. State that panic and confusion are normally associated with crises.

No matter what type of crisis occurs, the gained experience shows that they all have common characteristics:

- surprise;
- lack of information when you need it most;
- events outpace response (real or perceived);
- escalating flow of events;
- loss of control (real or perceived);
- important interests at stake;
- intense scrutiny from the outside (national and international media);
- panic;
- development of siege mentality;
- disruption of regular decision-making process;
- persons responsible for decision-making focus on short-term planning/decisions/actions.

The ultimate objective of any crisis management process in aviation is to attain the successful solution of an incident with minimum casualties or damage to property.

The key factor in responding to any crisis situation is to proceed in an organized and pre-planned manner rather than to react to the initiative of hijackers or terrorists, in other words, to manage the response, to take the initiative and/or advantage away from hijackers or terrorists, and to maintain such advantage in order to direct and/or influence the outcome of the incident.

Considering the management of aviation security crises, the following basic principles should be kept in mind:

- Containment;
- Isolation;
- Preparation;
- Strategy.

**Containment.** Surround the incident area and secure the cordon in order to control access to the incident and prevent unplanned movement from the incident site. Ensure that offenders are completely isolated from all influences other than those created by response elements. When surrounding such an incident area, it is necessary to create two controlled access barriers or cordons. These should be designated the inner cordon, which immediately surrounds the incident, and the outer cordon, located at a greater distance from the incident. The area between the inner cordon and the incident should be kept sterile and free of movement unless sanctioned by the incident commanders. The area between the inner and outer cordons should be reserved for essential personnel who are part of the planned response. The outer cordon is designed to keep all non-essential personnel away from the incident. Located on the inner cordon is the forward control point (FCP) which is a command and control centre for controlling movement through the inner cordon. Ideally, the incident control centre (ICC) should be located in the area between inner and outer cordons.

**Isolation.** Once the incident site has been surrounded and secured, then the process of isolating the hijackers or terrorists should commence. This can be done by restricting the communication equipment available, such as closing down telephone lines, establishing interference to radio or television broadcast signals (if necessary), shutting off electrical, heating or ventilation systems (if necessary). The objective of this is to make the offenders totally dependent upon the authorities, thus creating a situation in which negotiations can be carried out. It should be remembered that each situation must be addressed based on the prevailing circumstances, as a strategy may be effective in one incident, but may not be effective in a similar incident.

**Preparation.** Advance preparation of all of the facilities that could possibly be required should be undertaken. Such preparation may include inter alia:

- identification of an isolated aircraft parking position (IAPP) for parking of aircraft subjected to an act of unlawful interference;
- closed circuit television coverage of such isolated areas;
- preparation of potential sites for a forward control point;
- hardwiring to remote areas for future communication equipment use, such as jack plugs on telephone line;
- identification of alternative accommodation/ facilities to minimize disruption to normal airport operations;
- establishment of an Emergency Operations Centre (EOC) identification of holding areas for specialist support units (armed intervention team, bomb disposal unit or other specialists).

When dealing with crises, one must act in accordance with the pre-determined strategy and plan.

Although most crises follow the same pattern or phases, irrespective of what the incident is, it is most pronounced in the case of the politically or religiously motivated terrorist with hostages.

In any given crisis situation, there are certain constantly changing levels of behavior due to anxiety or excitement on the part of the offender that can range from exhaustion to highly emotional, beyond which the behavior of the terrorist becomes uncontrollable.

Specialists distinguish three phase of psychological crisis.

Phase 1. At the beginning of the incident, the offenders' anxiety level is high. They are nervous, pumped-up and irritated. Their excitation level rises to the hysterical stage quickly and they become very aggressive and border on the uncontrollable. As soon as the hijackers or terrorists feel that they have gained the initiative, and that the incident appears to be progressing towards their objective, then this anxiety/excitation level decreases and their emotional graph drops.

Phase 2. This phase is the longest phase of any crisis situation and it is during this time that both the offenders and the authorities are trying to gain and maintain the initiative and/or advantage in order to direct or influence the course or the outcome of the incident.

It is important from the point of view of the authorities to keep the emotional state of the offenders within the stress stage because it has been shown from a study of past incidents that this makes the possibility of successful psychological attrition relatively high.

If the stress becomes too emphatic, the emotional curve rises closer to the hysterical stage at which time the offenders' behavior verges on the uncontrollable, whereas if stress on the offender is reduced, the emotional curve drops below the agitated stage and the offenders become complacent. If this stage is reached in an incident and attempts are made by the authorities to re-establish control by the introduction of new factors and stipulations, this is likely to raise the suspicion of the offenders, who will become agitated and whose emotional state will quickly rise to uncontrollable levels and possibly precipitate extreme action on the part of the offenders, that is the possible execution of hostages.

It therefore follows that the best course of action is to keep the offenders in a constant emotional state, within the stress zone, eventually tiring them out mentally.

Phase 3. This is where psychological attrition is achieved and the authorities realize their objective and neutralize the offenders.

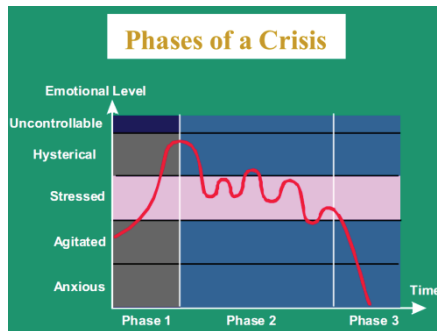


Fig.1. Phases of a Crisis.

A typical sequence of events during the incident in the following stages:

#### Phase 1

- incident stabilized, communications established, reduced initial tension;
- offenders identified;
- confirmation that hostages have been taken;
- rapport established between negotiator and offenders;
- details of demands received and relayed to policy group (more on this term later);
- early intelligence gained (identification of hostages, hostage-takers, and other vital information).

#### Phase 2

- procrastination on demands, attempt by authorities to gain the initiative;
- negotiators take a firmer line (however, make minor concessions);
- negotiation on major demands begins
- offenders begin to be worn down by negotiating process and effects of the isolation;
- continue to gain tactical intelligence, listening/ observation devices;
- psychiatric evaluation of offenders;
- development of tactical option plans (more on this later);
- policy decision on offenders' demands and/or proposed tactical option plan.

#### Phase 3

- implementation of the policy decision and termination of the incident.

We should not forget that each crisis is different and it is impossible to lay down clear strategies or hard and fast rules on how to respond to each crisis. The general principles and strategies advocated concern the most dangerous of crises, where offenders have taken hostages as a bargaining item. When contemplating what strategy needs to be deployed to deal with this kind of crisis and the obvious need to preserve human life, the responding authorities will need to consider international reaction to their handling of the incident, cooperation and communication (or lack of) among involved States and the options available to terminate the incident. In this case, there are two basic choices:

- to secure the release of the hostages unharmed whilst conceding as little as possible to the hostage-takers – referred to as hostage negotiation;
- to attempt to rescue the hostages and neutralize the hostage-takers by offensive action - an armed assault.

Considering the two basic strategies available to authorities and the passive nature of hostage negotiation compared to the active offensive nature of an armed assault, it is common sense to begin with negotiation first as it is virtually impossible to return to negotiation after taking any other course of action.

**Conclusions.** Most contemporary views of management in a non-crisis situation are moving away from individual decision-makers to the point where managers are facilitators who work as part of a team and facilitate that team's ability to solve their own problems and manage themselves. Thus, in the management of crises, there is a need to designate an individual as the principal decision-maker who will be advised and counseled by the crisis management team. If we refer to the Model National ICAO Civil Aviation Security Programme, Doc 8973 Vol. 1 Chapter 4 and Appendix 1 we see that where an aircraft is involved and there is a safety implication, the senior aviation authority figure should exercise command, deferring to the police/military or other designated authorities once the aircraft is static and no longer under air traffic control direction.

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