

# The role of higher education institutions in the development of intellectual capital

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**Abstract.** This article deals with the questions of intellectual capital, summarizes the results of content analysis of the notion “intellectual capital”, its essential characteristics and basic elements. Authors show the role of higher education system in generating and developing of intellectual capital of future professionals. A high level of intellectual capital is a key element of organization competitiveness and productivity and can be seen as a basis for a leading position in a particular industry. The study focuses on the development of intellectual capital of civil aviation professionals. It summarizes the results of analysis of Rostov branch of Moscow State Technical University of Civil Aviation’s experience in the field of intellectual capital development during the education of future civil aviation engineers.

## 1 Introduction

Intellectual capital along with traditional factors of production is an essential element of competitiveness on macro- and microeconomic levels.

Intellectual capital can be defined as transferable knowledge that belongs to an organization and can be commercialized [1].

According to Stewart T., intellectual capital «is an intellectual material that includes knowledge, experience, information, intellectual property and contributes to creation wealth. It is a collective mental energy...». Another definition made by this author claims that intellectual capital is an aggregated knowledge of all company’s employees, ensuring its competitiveness [2].

According to Brooking A., intellectual capital can be understood as a set of intangible assets which are vitally important for an organization [3].

There are other interesting researchers’ views about the ration of intellectual and human capital.

Saint-Onge H. and Edvinsson L. distinguish human, structural and consumer capital in the structure of intellectual capital. Stewart T. agrees with them.

There is also an opinion among researchers that an implicit capital structure includes human, institutional and market capital [4].

According to the model of Brooking, intellectual capital consists of market, human, infrastructure assets and intellectual property [5].

It appears that intellectual capital has become or is becoming (depends on a particular socio-economic system and exact industry) a decisive factor stimulating

efficiency of the company’s activity and the most important one contributing to achieving high productivity.

## 2 Materials and methods

The role of higher education institutions in generation intellectual capital cannot be overemphasized. The development of intellectual capital is one of the fundamental tasks of any university as one of the most important components of intellectual capital is human capital. One of the most common approaches to assessing its quality is the length of the period of study [6]. By the early 70-s of the XX century the contribution of education and professional training to the overall structure of human capital in the US was estimated at about 85% [7].

Intellectual capital is a key factor for a successful innovative development of both an individual organization and a state as a whole. This allows one to produce high-tech goods which are competitive not only on the domestic but also on the external markets. For now, the Russian Federation is not among the key players of the global market of innovative manufacturing technologies. For example, according to some data, the share of the Russian Federation in the global exports of high-technologies has not exceeded 0.5% in the last decade. Moreover, there is a constant rick of lagging behind the leading nations [8].

One of the few competitive industries of the Russian Federation is the aviation industry (as a part of the aerospace industry). Therefore, it is vitally necessary to

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develop intellectual capital in the sphere of civil aviation more intensely in order to maintain and strengthen national positions on the global level. According to the international accountancy and business advisory network Baker Tilly Aeroflot-Russian Airlines is in the Top-10 ranking of Russian intellectual companies for public (8<sup>th</sup> position [9]). This allows the company to be one of the successful and efficient airlines in the world.

Strong intellectual capital makes it possible for leading companies of a particular industry to get a higher level of productivity in comparison with those who doesn't take in account the importance of this factor. For example, labor productivity among the leaders of the aviation industry in the Russian Federation is 6 times higher than in other enterprises of the same sector. High quality of intellectual capital and specific attention to its development are called among important factors of such indicators [6].

At the same time, there is generally a small share of highly qualified personnel among the outsiders of the aviation industry. The lack of highly skilled staff is one of the main factors of low productivity. Highly qualified personnel are assumed to have intellectual capital vitally important for a company. Consequently, it is possible to claim that about a significant role of intellectual capital in achieving high indicators of productivity, labor results and overall efficiency of a market player.

### 3 Results and discussion

The intellectual capital level from the starting point helps a company to estimate the potential of a candidate, its ability to work in modern circumstances characterized by variability of conditions, life-long learning, rapid changes of professional knowledge and skills. In our opinion, the further investments into the intellectual capital of a particular employee are more effective when the employee has already had a sufficient level of such a capital before starting his work. Consequently, a high level of intellectual capital, which started to be formed at the university, is a strong basement for the development of it during the whole professional life of a person. If this basis for intellectual capital isn't formed during the higher education period, it's the highest level to be achieved.

In recent years in Russian society there is an obvious problem linked with the deterioration in the cooperation of employers and universities and colleges. This problem gradually reduces higher education capacity as a main and the strongest source of intellectual capital builders. As a result, companies in different spheres have to become (and has already become) the main and only sources of intellectual capital formation, while higher education organizations play a secondary role or even don't participate at all. It is obvious that colleges and universities have to keep up to date, take into account constantly changing social and economic environment and start to take part in building intellectual capital during the education to fulfill their natural capacity. The establishment of sustainable long-term comprehensive

links with leaders of the industry is also an important factor.

In contemporary economic reality the explosive development of information technologies and the development of the knowledge economy require constant updating of professional knowledge and skills of the graduates. In such circumstances the education system is searching for more effective approaches and forms of teaching future professionals. Intellectual capital becomes the main competitive advantage of a higher education and can be understood as a factor of additional educational services cost. Such "potentially commercialized" intellectual capital contributes to additional profit of the higher education institutions and reduces its dependence on budget funds. Therefore, intellectual capital of a higher educational organization, on the one hand, allows it to gain additional profit, on the other hand, additional profit can contribute to further development of intellectual capital. The rise of the knowledge economy forces universities to accumulate knowledge, skills, competencies and focus on their effective developing, framing a strong basic structure for collective intellectual capital.

Now in the context of postindustrial society when intangible assets become the most important assets of a company, elements of intellectual capital are acknowledged as main competitive advantages of any university. Key stakeholders with the decision-making power such as administration, influential representatives of teaching staff, honorable professors, founders realize this fact and strive to develop the ecosystem of higher education creating appropriate conditions for the development of intellectual capital and increasing its index.

The intellectual capital index provides more precise assessment of its quality. Among the relatively modern methods of valuation of intellectual capital is an IC-index method. It is a method of so-called second-generation and was developed in the 1990s. It differs from previous ones by an integrated approach combining several methods. It gives much more complex valuation of intellectual capital of an organization and helps to understand how it can bring profit.

The development of methods for measuring of intellectual capital has led researchers to creation of a holistic value approach (HVA). This approach takes into account the limitations of previous methods based on accounting approach that is ineffective for strategic management decision-making.

HVA method synthesizes the IC-index and inclusive valuation method (IVM). It assesses the contribution of financial and intangible assets as well as the shareholder value of the company to the final value. As a result, the method values the contribution of intangible assets to the cash flow.

In modern circumstances universities and colleges become the most influential creators of intellectual capital, but not all of them, only those with a certain potential, enabling them to implement several vectors of development simultaneously:

- formation and implementation of up-to-date educational programs and technologies that make

possible to combine scientific and research activities during the process of education;

- project activities (organization, management, realization, group activities) in the sector of industry for which the organization prepares professionals;
- research activity, development of innovations and new approaches.

All these allow universities and colleges to decide the main task of all organizations of such type – to provide well-prepared high-skilled professionals [5].

Moreover, education and training of highly qualified specialists for the national aviation industry are the most important tasks facing the state.

In recent years the aviation industry has gained new impetus as part of national import substitution policy, the domestic civil aviation groups are developing promising components and aircraft vehicles (such as AP-14 family of aircraft engines and Irkut MC-21 airliner).

Despite the strong negative coronavirus pandemic impact on the aviation industry in 2020 the average rise of air travelers amounts during the 2019 – 2039 will be not less than 3.2 – 5.3% in the world and 8.9% in Russia according to IATA (International Air Transport Association) survey [10].

This data predicts the long-term investment prospective of the aviation industry and the rise of request for a sufficient number of well-trained aviation engineers for the industry with high indicators of intellectual capital. Of course, investors and major airline stakeholders, along with the intensification of fixed investment, should also develop intellectual capital. The peculiarity of intellectual capital is in that its systemic formation should take place only with help of specialized universities.

Such high-tech products can be operated and maintained only by highly qualified engineering specialists and only if there is no lack of such specialists in the industry it can grow steadily.

Thus, only in 2019 alone the State PJSC United Aircraft Corporation (UAC) recruited 1,187 persons from specialized educational institutions. (16.3% of the total number of employed), 813 specialists came from higher education institutions and 374 from professional colleges. A total amount of students with scholarship for education from aviation companies was 2,899 [11].

Thus, the main sources of the formation and generation of intellectual capital in the field of civil aviation are the educational system and the companies working in the sphere.

In our opinion, educational institutions play a key role in this process. Among other things this happens due to the fact that many aviation companies do not develop the intellectual capital of employees with help of their own resources, fearing to lose specialists because they gain more experience and become more in demand on the labor aviation market and would be able to change the work easily for better conditions.

So, we face emerging of a paradoxical situation: on the one hand, organizations are extremely interested in high level of intellectual capital; on the other, they deal with the issue with caution and fear. Moscow State Technical University of Civil Aviation has a special

opinion about and practice of the formation of the intellectual capital in the aviation industry.

Not accidentally the university's mission specifically states that: "The mission of the University is to preserve and enhance the achievements of the engineering of mankind, to acquire and disseminate advanced knowledge and information, to advance the training of the intellectual elite of society through the integration of the educational process, fundamental research and innovation approaches".

It is important to note that the training of civil aviation engineers takes a special place in the national education system and has a great significance for the industry development.

It is well known that there are 28 thousand settlements in Russia that can be reached only by air transport.

The only and unique aviation university in the South of Russia, created directly for preparing and providing a civil aviation sphere with highly qualified engineers who are able to increase the intellectual capital of the industry, is situated in Rostov-on-Don. Its founder is the Federal Air Transport Agency of the Russian Federation.

The Aviation University was founded in Rostov-on-Don in June 16, 1969. The Higher Education Institute was established with the aim of improving the quality of training of aviation industry engineers in the south region of Russia, the countries of the South Caucasus and other nearby territories of 5 former republics of the USSR with the introduction of distance learning.

Thus, in modern language, Moscow State Technical University of Civil Aviation was created with the purpose of forming intellectual capital among aviation engineers. The university is fundamentally different from the majority of industrial colleges and schools as it realizes unique for the region educational programs.

The Rostov branch of Moscow State Technical University of Civil Aviation traditionally organizes international scientific and practical conference «AviaTrans». The decision to establish the conference was taken in the Rostov branch of institution in 2010, at the International Scientific and Practical Conference «Contemporary Issues of Air Transport Development in South Russia» and now it is held on a permanent basis since 2011 [12].

One of the key participants of the conference is the leading airline carrier of the Russian Federation and one of the best airlines in the world public joint stock company «Aeroflot-Russian Airlines», which is undoubtedly one of the leading domestic organizational structures at the same time forming and using intellectual capital of the aviation industry [13].

Every year, hundreds of experts, scientists, researchers, employees, young professionals and students of the aviation industry discuss current issues and exchange experience and innovations in the sphere of civil aviation at the scientific ground of the Rostov branch of Moscow State Technical University of Civil Aviation. This, in turn, contributes to the transfer of modern and up-to-date views, trends and knowledge to

students studying within the walls of the Rostov branch of Moscow State University.

In 2021 the annual conference for the first time in the history of the Rostov branch of Moscow State Technical University of Civil Aviation and the main university of civil aviation was among the best scientific and practical measures of the industry in general. The university won a special government grant established by the national science funding body of the Russian government the Russian Foundation for Basic Research (RFBR) for the implementation of this project.

This made it possible to conduct this event more far-reaching with the publication of the scientific reports presented on the conference, conference papers were published in two volumes indexed in the Russian index of scientific citations and are available for professionals and students, which is also can be an indicator of the increase of intellectual capital.

Furthermore, the Conference is a way of development of a scientific discourse that also generates intellectual capital.

The main achievement of the conference is the implementation of the ideas discussed on panels of «AviaTrans» into the daily practice. Thus, according to the results of the international scientific-practical conference «AviaTrans» hold on September 27, 2017, the Rector of Moscow State Technical University of Civil Aviation declared the necessity of opening a face-to-face form of education in the Rostov branch of the university.

This strategic decision is directly related to the aspiration of Moscow State Technical University of Civil Aviation to become a leader and to further strengthen its positions as a global scientific and educational platform for the formation of intellectual capital in the sphere of civil aviation of Russia.

As a result of the joint efforts of the Head University and the Rostov department, on September 1, 2018 more than 20 students of a full-time form of education in the direction of «technical operation of aircraft and engines» have started to learn.

After opening of the full-time face-to-face education program in 2018 (20 budget students and a commercial one) the management of Rostov Branch of Moscow State Technical University of Civil Aviation set itself an ambitious goal of recruiting 50 full-time students in 2019. This figure was very symbolic because that year the Rostov branch of the university celebrated the 50th anniversary.

Since the opening of the face-to-face form of education in the Rostov branch of the Moscow State University the teaching and educational process has been substantially modernized. The shift from the usual distance learning modality has required from the administration and teaching staff the adoption new approaches in the learning process. Students has become more actively involved in various projects and events that contributes to the development of professional skills on theoretical and practical level as well.

In a relatively short period of time students of the Rostov branch took part in 14 scientific, scientific-

cognitive, public-political events as a part of additional activity.

Our students take part in conferences and other competitive activities and become winners. By the recommendation of the Ministry of Transport of Russia a first-year student Dmitry Egorov reached the final stage of the International Olympiad on Aviation History, where he was the only representative of the South of Russia.

On the meeting of students and applicants with the Minister of Transport of the Rostov region took place in the Rostov branch of Moscow State University on the March 15th 2001, the head of the relevant department gave a high evaluation of the students' activities and their contribution to the potential development of the aviation industry in the region.

The Open-Door Days held by Rostov branch of Moscow State Technical University of Aviation have a significant meaning and become a decisive event for future applicants and aviation professionals. These events attract a great number of concerned teenagers seeking for professional education. The Open-Door Days is an important instrument of building a gradual personal intellectual capital trajectory, starting from school through higher education till working environment.

One of the most important criteria demonstrating the existence of high-level intellectual capital in the structure of a higher educational organization is not merely the formal achieved indicator of the demand for graduates in the labor market, but the actual state of affairs, when the vast majority of graduates get the work according to their education in the civil aviation industry. This indicator shows better that all skills, important professional ideas, mission and basic rules are shared and well comprehended by the students during the education, students are highly motivated and ready to apply all their knowledge for the development of the industry.

## 4 Conclusion

In order to be a powerful stakeholder in the industry, to gain public reputation and make its activity popular and open for society, the Rostov branch of Moscow State Technical University of Civil Aviation regularly promotes its brand via the mass media not just as a classical university, but as an advanced center of intellectual capital formation in the aviation industry.

Well-built relationship with mass media allows the university to regularly take place in regional news stimulating recognizability and interest of potential students and other stakeholders.

In the framework of the intellectual capital development the Rostov branch of Moscow State Technical University of Civil Aviation actively cooperates with various government and public organizations working in the field of civil aviation, including the Southern Interregional Territorial Air Transport Authority and the Federal Service for Supervision of Transport (Department of State Aviation

Supervision and Transport Security Supervision for the Southern Federal District).

Joint conferences, open-door day, organizations, involvement of employees from industry into the educational process make it possible for all participants of the formation of intellectual capital constantly receive practical and advanced experience.

The contemporary short-term goal of the University is to start the full-time form of education in another area of training, which is currently realized in distant format - «Technical operation of transport radio equipment».

Of course, this results and qualitative modernizations has become possible due to the acquisition of a new building for the Rostov branch of Moscow State Technical University of Civil Aviation, which is now being put into operation.

The new educational building will serve in the future for realization of innovative projects, deepening and broadening of cooperation links with aviation enterprises, raising the image of the university among the broad public, applicants and students. It will provide more comfortable conditions for fruitful work of professors and teaching staff. A new building will give a space for training students at an even higher and more modern level required by employers in the field of civil aviation, which will consequently lead to a qualitative increase in the intellectual capital of both the university and its graduates.

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