

MARKETING COMMUNICATIONS OF SCIENTIFIC AND EDUCATIONAL ORGANIZATIONS IN THE CONTEXT OF DIGITAL TECHNOLOGIES AND ARTIFICIAL INTELLIGENCE IMPLEMENTATION

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ABSTRACT

This article shows that it is possible to choose adequate financing methods for various scientific organizations with different internal structures. By analogy with the spatial-temporal structuring of the system space (based on the system economic theory of G. B. Kleiner), we distinguish such methods of financial support for scientific organizations as object, process, project and environmental ones. For each of the methods, we identify target groups of recipients, select channels for promoting information about the scientific organization and its achievements, and choose suitable marketing tools. Our work also shows how the formation of knowledge market can contribute to the development and implementation of advanced modern digital technologies, including those using artificial intelligence.

Keywords: Marketing of a scientific organization; Communication policy; Marketing tools; Recipients of scientific knowledge; Knowledge market; Digital technologies; Artificial intelligence in education.

INTRODUCTION

A significant reduction in state support for research activities forces scientific organizations, as well as research departments of universities, to turn to the search for additional sources of funding. It is becoming obvious that the solution to this problem is a relatively new type of activity for many research organizations and requires the involvement of employees with non-core qualifications, which are most likely absent in most traditional research organizations.

A scientific organization is forced to perform a number of relatively new and rather labor-intensive types of applied work, and in the future even initiate applied research in the field of marketing. As a result, a scientific organization has to actually create a market for new products (in this case, scientific results) and scientific and applied services (that is, adapting scientific results to the needs of specific consumers) from scratch, win leading positions in this

newly created market, and finally hold them as long as possible (Kotler, 2000; Kotler & Li, 2008).

In addition, it should be noted that in many respects similar processes are observed in the field of educational services, when the marketisation of education (Demin, 2019; Doroshenko & Shelomentsev, 2017) becomes almost a widespread phenomenon, in which economic effects have a noticeable impact on the declared goals of education and the formation of educational policies of organizations. In accordance with such views, education is often considered in the productive instrumental paradigm as the ability to adapt to changes in the economy through training, sometimes lasting a lifetime. Education systems, from this point of view, should also become as flexible and adaptable as possible.

During the marketisation of education, there are processes of organizing market forces in education, which begin to have an impact no less, and in some cases even more, than traditional hierarchical bureaucratic mechanisms. Among the elements that contribute to the marketisation of education are various forms of contractual relations in which an educational (or even scientific and educational) organization acts similar to a contractor providing services to customers, which further encourages competition and the search for new ways to attract and retain customers, including development of new tools of educational technologies – in particular, the ones based on digital technologies and artificial intelligence.

All of the above is often understood as a prerequisite for the commercialization of education, a process in which private commercial institutions and commercial transactions influence or become part of the education sector.

Marketisation of education has long been supported by a number of established tools and practices, such as cost-benefit analysis, benchmarking, and quality control. All this, despite the seemingly undoubted positive effect, is not always evaluated unambiguously, because here it can be noted that educational systems formed by marketisation often focus on reducing costs, which may well be at the expense of quality, especially since customers and consumers of educational services do not always have the opportunity and effective tools to assess this quality.

Also, since with such an approach, educational organizations are considered as offering a kind of interchangeable "product", this leads not only to an aggravation of competition between them, but also to an implicit stratification of them into more or less "elite" and successful, which often does not have the best effect on how they are perceived by "customers", who often complain about the decline in the quality of education, the weakening of the educational function, or the lack of practical orientation of the knowledge obtained (Nie et al., 2020).

In recent years, attempts to cope with the above difficulties often look like a search for quantitative indicators to measure the effectiveness and results of the education received and the activities of teachers, who in higher education are also, as a rule, quite seriously involved in scientific work (Morkovkin et al., 2020). Discussions about the possibility of using various indexes and other quantitative indicators of the effectiveness of both teaching and scientific work have been going on for years. The use of quantitative indicators, on the one hand, facilitates the management of performance results, on the other hand, creates the risk that institutions will focus more on achieving the declared indicators, also at the expense of their qualitative content.

METHODOLOGY

It should be noted that for research, scientific and educational organizations of socio-humanitarian profile, the above-mentioned problems are even more complex than for natural science, production and technical organizations. This circumstance stems from the specifics of education and the obtaining of scientific results of the socio-humanitarian profile.

It is in order to take this specificity into account as much as possible, that in this paper we have used the concept of ecosystems, which gives certain advantages when considering socio-humanitarian scientific and educational organizations. In particular, we use the definition of the ecosystem, introduced by G. B. Kleiner. According to Kleiner (2018), "an ecosystem is understood as a spatially localized complex of hierarchically uncontrolled organizations, business processes, innovative projects and infrastructural systems that interact with each other during the creation and circulation of material and symbolic goods and values, capable of long-term independent functioning due to the circulation of these goods and systems". In turn, this definition comes from an earlier definition introduced by J. F. Moore (1993) in his work, where he defined ecosystems as "dynamic and co-developing communities consisting of diverse actors that create and receive new content both through interaction and competition".

RESULTS OF THE STUDY

The most effective, systematic tool for finding additional funding, as practice shows, is the marketing of a scientific and educational organization (Figure 1).

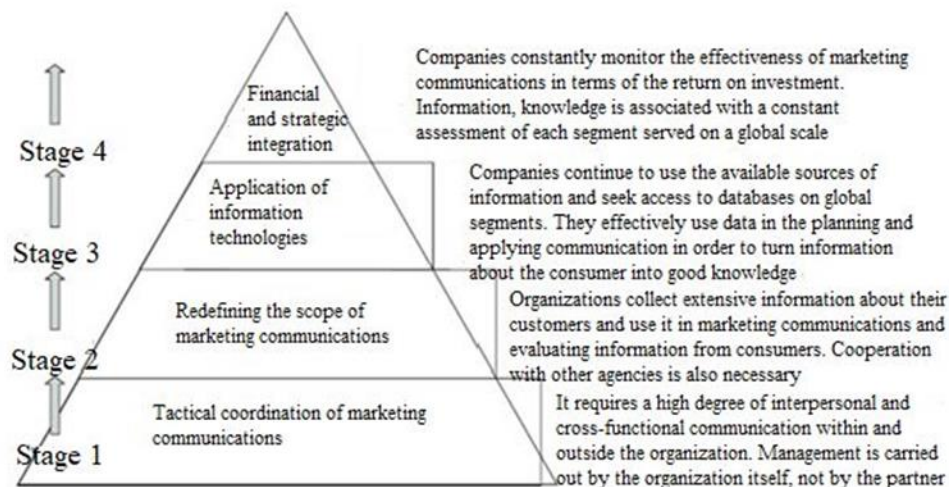


FIGURE 1

THE POTENTIAL OF INTEGRATED MARKETING COMMUNICATIONS AT ALL LEVELS OF MARKETING TASK FORMULATION

Within the framework of this publication, marketing of a scientific and educational organization is understood as a type of activity aimed at creating and maintaining a positive image of such an organization in society, in the scientific environment and in the market of

scientific and educational products, which contributes to attracting potential consumers interested in cooperation or acquiring rights to use the results of the organization's research activities on a commercial basis.

Knowledge of a new product features and promotion requires reference to the main provisions of the theory of innovations.

J. Schumpeter is the founder of the theory of innovations in the early twentieth century. He identified five typical changes Alvarez, (2016) that determine the form and content of the development of industry from an economic point of view (Table 1):

TABLE 1 FIVE TYPICAL CHANGES BY J. SCHUMPETER	
Concepts of innovation theories	Disclosure of the concept
Using new technology	Using new technological processes or new market support for production (purchase and sale)
Implementation of the new	A method of production that was previously unknown in the given branch of industry, and is based on a new scientific discovery and may even consist in a new method of commercial use of the corresponding product.
Development of a new sales market	Such a market, in which the industry has not been represented yet, regardless of whether this market existed or not.
Getting a new source of raw materials	Regardless of whether this source existed before, or was simply not taken into account, or was considered inaccessible, or was yet to be created.
Carrying out the relevant reorganization	Providing a monopoly position, or undermining the monopoly position of another enterprise, changes in the organization of production and its material and technical support.

The essence of innovation, according to J. Schumpeter, is reduced to change in order to introduce and use new consumer goods, new production and transport facilities, markets and forms of organization in industry.

The definition of the term "innovation" in the broad sense is a breakthrough in a particular direction, or a new technological process, or an approach to the provision of services such as social or commercial.

There are three main aspects of the interpretation of the term "innovation" in the Russian economic literature (Figure 2):

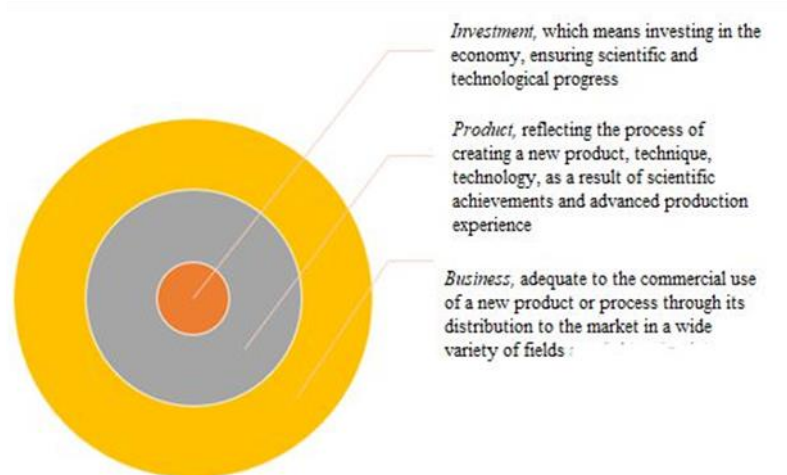


FIGURE 2

DISCLOSURE OF THE TERM "INNOVATION"

For our research, the last 2 aspects are characteristic: product (the specifics of the object) and commercial (the goals of promotion in the service sector).

The key factor in the transition of innovation into a commercial product at the present time is to ensure the innovativeness of the company. Figure 3 shows the formation of the organization's innovativeness when introducing a new product.

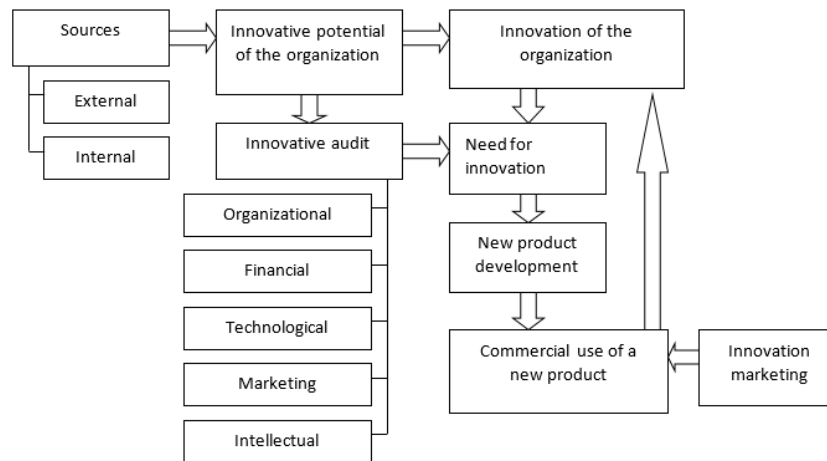


FIGURE 3

THE SCHEME OF THE ORGANIZATION'S INNOVATIVENESS FORMATION DURING THE INTRODUCTION OF A NEW PRODUCT

The development of the main provisions and principles of the marketing strategy of a scientific and educational organization is based on the structuring of its ecosystem, as well as the financial environment of potential consumers of the results of its activities. This opens up new

opportunities for the development of systemically sound recommendations for the search and selection of ways to provide additional funding for the organization's activities.

Further, it will be shown that the systematic structuring of the spectrum of possible results of the scientific organization, segmentation of its target audience, as well as communication tools – provided that the manifestation of possible risk factors is taken into account – can give a significant increase in the resource supply of the scientific organization.

The project method is the implementation of scientific research and development on the orders of third-party, including non-scientific organizations. For the humanitarian sphere, this can be the development of software products, methodological recommendations, educational manuals and techniques, etc. Relatively recently, another way to replenish the budget of scientific organizations has been formed, which consists in obtaining financial resources for research as a result of successful participation in scientific grant contests.

However, the universities now "compete" with each other in the modern market not only for scientific developments, but also for educational services, which is now happening more often, as was shown in the Introduction to this work.

Since the 1990s, student-centered learning (SCL) Ang et al., (2001) has been recognized as one of the most effective approaches in this field, and methods based on artificial intelligence technologies are increasingly being used to develop it.

Artificial intelligence (AI) is perhaps the most important driving force of technology at the beginning of this century and is changing almost every branch of the economy and in general almost all areas of human activity in modern society. Therefore, it would be naive to believe that AI will not have an impact on the field of education – although the depth of this impact and all the accompanying changes have yet to be understood.

So, there is still no consensus, and probably will not be for a long time, even on the fundamental questions: how, and most importantly, why students should be taught some specific subjects and not the other ones in the era of artificial intelligence. If AI can be used not only to find, but in many cases to create information, then what is the role of the person – the student and the teacher? Should we teach and learn only what we can't give away to AI, and if so, what knowledge and skills are these?

AI technologies in the field of education currently include a lot (Lee, 2020): AI-driven step-by-step personalized learning systems, AI-supported research training, intelligent agents in game environments, chatbots for student support, AI-mediated interaction between students and teachers allowing for better control of learning – the latter can be done not only by the teacher, but also by the student himself or herself.

At the moment, the development of AI in education includes both the creation of AI-based tools to support learning, and the use of these tools to understand the progress and features of learning as a process; and finally, the evaluation of learning outcomes can be considered a separate area.

The intelligent tutoring systems (ITS) can be called one of the most common forms of AI application in education (Ma et al., 2014; Kleiner, 2008). They can provide training materials step-by-step and individually for each student. Moreover, the participation of a human teacher in the process may not be required at all, or it may be more focused on direct classroom work with students, while the system "takes over" the generation and verification of tasks, as well as the formation of feedback for students. As the student progresses through the course, the system automatically adjusts the level of difficulty, provides hints and recommendations for more

effective mastering of the material. In fact, we can say that the original goal of these systems was precisely the desire to make available a format of training to each student that would be close to the effectiveness of individual classes.

We can see that AI is now changing the educational landscape quite quickly, although it is unlikely that it will ever completely replace the entire traditional educational system. Probably, this replacement should not be desired, because the educational process must necessarily include social interaction – both between teachers and students, and students with each other. Now an increasing number of specialists are more in favor of blended learning, which combines various forms of online education with classical forms of classroom work (Bryan & Volchenkova, 2016).

It is also impossible not to mention the massive open online courses (MOOCs), which are now considered by many scientific and educational organizations as one of the important competitive advantages in the fight for the "consumer", i.e., the applicant.

The introduction of AI technologies also provides many opportunities for the development of MOOCs, in particular, for checking a large number of tasks, identifying gaps in students' knowledge and quickly receiving feedback on the exercises performed.

One of the most important tasks that AI technologies are designed to solve in education is to provide timely feedback to a large number of students. To do this, nowadays many modern universities are implementing interactive learning environments (ILE). ILE is a complex term that implies the use of e-learning technologies, such as learning management systems (LMS) and interactive learning approaches. The main idea of the interactive educational environment is to teach students how to gain knowledge and form a deeper understanding of the subject based on their previous experience of completing tasks.

Thus, we see that AI tools are already embedded in many parts of the educational process, including content development, teaching methods, student performance assessment, and teacher-student communication.

Moreover, many universities see the introduction of these technologies as an important advantage, and this trend is likely to continue in the future.

At the same time, the experience of the last year clearly showed that very fast digitalization, which some authors called "shock", revealed all the potential and real difficulties faced by modern educational institutions during the introduction of digital technologies in the educational process.

According to the data given in the study by HSE University in March 2020, more than 80% of universities started to work in a remote format, though for a number of industry-specific universities, for example, in the field of culture or agriculture, it was difficult for objective reasons related to the specifics of their educational process (Ministry of Science and Higher Education of the Russian Federation, 2020).

At the same time, it became clear that not all universities alike were ready for this transfer for a number of reasons, as can be seen in Table 2.

TABLE 2 DIGITAL INFRASTRUCTURE OF RUSSIAN UNIVERSITIES IN MARCH 2020	
Universities that had a digital infrastructure sufficient for the full organization of online education and the placement of content on their own facilities	11%
Universities that had licenses for synchronous collective work software (such as ZOOM)	44%
Universities that declared that they had LMS	88%

Universities whose indicators corresponded to the actual use of LMS for the organization of educational activities	45%
Student campuses that were provided with an Internet connection	88,51 %

Source: Ministry of Science and Higher Education of the Russian Federation, 2020.

The readiness of teachers for the new format of classes also turned out to be very different. So, back in 2019, 60% of teachers rarely or never conducted classes in a remote format or in the format of webinars, and in 2020, 96% switched to online mode of work, which caused many of them to be skeptical (88%) and concerned about a possible decrease in student motivation and depersonalization of teaching work (Ministry of Science and Higher Education of the Russian Federation, 2020).

Another subject of quite fair concerns (70% of teachers) was the possibility of increasing the practice of dishonest behavior of students during exams, since it is more difficult to control and prevent this in the online format (Ministry of Science and Higher Education of the Russian Federation, 2020). Thus about 60% of teachers in general doubted the quality of online learning, and only 15% were in favor of the fact that the quality of education has improved (Ministry of Science and Higher Education of the Russian Federation, 2020).

Students' evaluations also differ. On the one hand, 55% of students noted that they were less tired of studying, but 49% said that there was less free time, and less than 33% said that they liked the distance online format more than full-time classroom studies (Ministry of Science and Higher Education of the Russian Federation, 2020). Nevertheless, researchers note an increase in demand for flexible forms of individual educational trajectories, and here we can see potentially very good opportunities for universities in the future. Universities will be able to better understand which technologies are most effective for the development of various forms of blended learning, and which, on the contrary, need methodological and even technological improvement, including the use of AI technologies.

INTERNATIONAL EXPERIENCE OF SCIENTIFIC AND EDUCATIONAL ORGANIZATIONS DURING THE PANDEMIC

Skyeng analysts Akulova (2021) also note that the share of online education in the Russian educational market has traditionally been quite small – up to 10% compared to offline. And the incredible growth of the last year is largely due to the "low base" effect. In addition, the explosive growth may slow down by 2022, as there will be those disappointed in the online format, and those who will reduce the amount of money spent on education. But in general, the sector of further professional education might grow twice as fast as the rest, as it has shown such dynamics starting from 2019.

The original approach was demonstrated by China, where several of the country's largest corporations – Huawei, Alibaba and Baidu – participated in the creation of a distance learning system. The unified national online educational platform was developed in just a few weeks. This system with 169 video lessons in 12 subjects based on the curriculum, electronic textbooks and tests combined more than seven thousand servers, and more than 50 million schoolchildren were able to study in it at the same time (Akulova, 2021).

The Chinese online educational platform Yuanfudao, which existed before the pandemic, has also grown significantly. In October, it announced that it would raise \$ 1 billion of investments. As a result, its capitalization reached \$ 7.8 billion, thus becoming the most

expensive EdTech startup in the world. In total, according to forecasts, in 2023, the volume of the online education market in China may reach \$ 99.3 billion (Akulova, 2021).

In France and Finland, the switching to "remote control" has become almost unimpeded. In these countries, even before the pandemic, powerful remote education systems were successfully functioning. Thus, in France, after the closure of schools, the platform *Ma classe à la maison* ("My class at home") appeared on the basis of the existing CNED system.

In Finland, the teachers used a variety of applications and tools for online learning, including Finnish Qridi, Classroom, Meet and Duo Google, Microsoft Teams, Zoom, and WhatsApp.

Children without personal computers issued laptops at home, and for official communication between parents, teachers and students platform Wilma was organized (Akulova, 2021).

CONCLUSION

A significant role in the effective use of the above considered methods of replenishing the budget of scientific and educational organizations belongs to such components of the marketing strategy as the formation of a positive brand of the organization, the establishment of various communications with potential recipients of scientific and educational developments and the results of the organization, as well as the use of methods of analysis and compensation for the risk of failure to achieve the goals of the developed and applied marketing strategy. Let us take a closer look at these tools.

A. The brand of the organization. From the point of view of marketing implementation, the organization's brand capabilities are determined at least by the presence among the organization's employees of scientists known for their theoretical and applied results, created and widely known software complexes, developed mathematical models and algorithms, etc. In addition, what is especially important – the existing high assessment of the scientific level and social significance of the achievements and topics of ongoing research, as well as the accompanying ingrained positive emotional opinion of the scientific community about the organization.

B. The development of marketing communications of a scientific and educational organization (with the environment or ecosystem) is a set of signals coming from the organization to various segments of the target audience to attract attention to their scientific results in order to find consumers. It is necessary to pay attention to the fact that in the field of marketing of an organization, communication is not only means of communicating to the target audience – and to a wider audience – information about the results achieved, the research topics of a scientific organization and its employees (Kachalov & Sleptsova, 2019).

Here it is necessary to pay attention to another essential detail, which relates to the formulation of the scientific results of the organization in a language that is understandable to potential recipients of the scientific achievements of the organization. In other words, it is necessary to adapt and simplify advertising and information materials about the scientific and educational results of the organization and bring them to a form that is accessible to understanding or perception and generally "non-rejection" of potential consumers.

And finally, it is a joint development with users of the organization's scientific and educational products put on the market, which includes such a necessary element as establishing

cooperation to bring the results (products) to practical use by other organizations, teams, etc. Thus, the new role of communication is also that it is not just the transfer of information, but also the establishment of positive relationships (interactions) between the transmitting and receiving subjects of economic and scientific activity. In a broad sense, the communication policy of a scientific organization is a set of rules describing the reaction of a scientific organization to events in the information and communication space, developed within the framework of a marketing strategy, taking into account the existing diversity of forms within a scientific organization.

C. Analysis of the risk of unrealizability of the organization's marketing strategy. Another aspect of the problem of forming a marketing strategy for a scientific and educational organization is related to the analysis of the risk of failure to achieve the goals of the marketing direction of the organization. Here we refer to the methods of identifying risk factors (RF) of not achieving the goal of marketing activities, the RFs known for the current period, as well as recommendations for establishing such a direction of work of a scientific organization in order to avoid risks. Based on the above system structuring of the ecosystem, which includes the scientific organization we are considering, we can identify the following very real risk factors. For example, for an object subsystem, this may be the RF of the occurrence of facts of copyright infringement on the scientific achievements of the organization, the RF of the illegal use of intellectual property belonging to the organization.

The process subsystem is characterized by such factors as the RF violation of the deadlines for the availability of planned scientific results or the RF occurrence of interruptions in the provision of the organization with auxiliary resources. Within the framework of a project-type subsystem, it is possible: RF of an erroneous choice of the topic of a scientific project, or RF of the development of an inefficient – from the point of view of marketing – organization's website, etc. Similarly, in the environmental subsystem, there may be RF of the entry into force of new civil legal acts of a regulatory nature that complicate the routine work of the organization, or RF the revocation of the license of the servicing bank and other similar changes in the external economic environment.

Preventive and/or compensatory anti-risk management actions can be considered as measures to overcome the difficulties caused by the manifestation of certain RFs. Detailed information about possible anti-risk measures is given in the works of the authors (Kachalov & Sleptsova, 2019).

For Russian scientific organizations of a humanitarian profile, the marketing direction of activity is of interest not only as means of replenishing the budget, but also as an incentive for the development of relatively new topics of relevant and popular research. In this article, the strategic approach to research in the field of marketing of scientific organizations of socio-humanitarian profile is developed on the basis of the application of the system economic theory and the concept of ecosystems, which allowed us to pragmatically structure the space of financial opportunities, highlight the range of strategic marketing activities in terms of forming and improving the brand of a scientific organization, expanding communication tools. A systematic approach in general can contribute to a significant increase in the resource supply of a scientific organization, and also opens up prospects for the use of risk management methods in the tasks of forming a marketing strategy for a scientific organization.

It should be noted that the development of a strategy implementation plan requires a sufficiently detailed definition of the necessary measures and resources for their implementation.

At the same time, the presence of high risks of unreliability of obtaining the initial data used in the selection of such measures significantly complicates their determination for a long-term period equal to the period of the development strategy. This circumstance, therefore, makes it almost impossible to form an effective mechanism for implementing the strategy on the basis of this plan. In this regard, there is a clear need for a different approach, which on the one hand would ensure the relationship of current activities with the goals of long-term or strategic development, and on the other – would allow to identify such measures that would ensure the achievement of strategic goals in the most effective way. One of the ways that, in particular, can be used in this case is the project approach, based on the use of project activity tools. This approach generally ensures the initiation, preparation, implementation and completion of relevant programs (plans) on the basis of project management. Such management involves, in particular, the use of the network structure of the management organization (design and planning process) with the involvement of professional and competent specialists and the definition of specific measures in the management process that ensure the achievement of the established goals in stages consistently. In essence, this implies the need to divide the long-term period of achieving the goals (moving towards the goal) set by the development strategy into medium-term stages with the definition of all the necessary parameters of the initial stage in the priority development program of the corporation for the medium-term period. The distinctive features of such a program are complexity, focus on achieving practical results, resource availability, time certainty, and validity.

In order to prepare and implement the organization's development program for the medium term, it is necessary to develop project activities, which begin with the establishment of a special management body – the project office (committee), subordinate directly to the highest management body of the organization. The main goal of the project office (committee) is to form, ensure the implementation and timely update of the development program for the medium term. Taking into account the special (personalized) procedure for forming the composition of the project office (committee), it is obvious that the main advantage of such a management body is its professional and thematic orientation, which allows for the most effective interaction between specialists in various fields to select the most effective measures for implementing the organization's development strategy.

In addition, the subordination of the project office (committee) directly to the highest management body of the organization, allows this office to speed up the preparation and adoption of necessary management decisions by eliminating formal procedures governing the process of passing and approving measures and documents, especially necessary and important in the case of using a vertically integrated management organization scheme.

Thus, the project office (committee) becomes a kind of center responsible for the preparation and implementation of projects and activities aimed at achieving the strategic marketing goals of a scientific and educational organization. It is able to form an integrated strategy for the development of such organizations, which would be based on an understanding of the essence and significance of innovation and could include the principles of the development of both scientific and educational technologies. In addition, the article substantiates the thesis about the need to identify and analyze hypothetical obstacles to the successful formation of a positive image of a scientific and educational organization in the socio-economic environment.

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