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The role of the intellectual services sector in the development of innovative processes of the modern «Knowledge economy»

El papel del sector de servicios intelectuales en el desarrollo de procesos innovadores de «La economía del conocimiento» moderna

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Contents

ABSTRACT:
The paper gives coverage to a considerable growth of organizations, typical for the conditions of "knowledge economy", which deals with production of intellectual services. It is noted that not only an increasing share of the gross domestic product (GDP) is produced in the intellectual services sector, but also a groundwork for the development of innovative processes within the entire economic system is laid. Technological platforms and service clusters are considered as institutional mechanisms for organizing the scientific and production cooperation between producers of intellectual services and large business structures.
Keywords: knowledge economy, intellectual services, quaternization, innovative process, technological platform, service cluster.

RESUMEN:
El artículo destaca el crecimiento significativo de las organizaciones que es característico para las condiciones de la "economía del conocimiento", que a su vez se dedica a la producción de servicios intelectuales. Se observa que en el sector de servicios intelectuales no sólo se hace un aumento del producto interno bruto (PIB), sino que también se sientan las bases para el desarrollo de procesos de innovación en todo el sistema económico. Las plataformas tecnológicas y los grupos de servicios se consideran como mecanismos institucionales para organizar la cooperación de producción científica entre productores de servicios intelectuales y grandes estructuras empresariales.
Palabras clave: "economía del conocimiento", servicios intelectuales, cuaternización, proceso innovador, plataforma tecnológica, grupo de servicios

Introduction

Significant structural changes are taking place within the modern service sector, manifested in strengthening the contribution to the development of the sectors which produce the so-called "knowledge-intensive" (or intellectual) services.

In this regard, experts began to talk about the development of not just tertiarization processes, but "quaternization" of the economy, implying the separation of the quaternary sector, which unites industries of the services aimed at production of intellectual services. At the beginning of the 2000s an Austrian researcher M. Peneder was one of the first to use this concept in his works. (Peneder M, 2003).

The formation of the fundamental factors of economic growth, which is the new scientific knowledge, intellectual capital, information technologies, financial sector services, consulting etc., takes place in the intellectual services sector, which is also called "Quaternary sector" (Katotkov, 2014).

However, it should be pointed out that there is currently no definiteness in defining of the boundaries of this sector due to the lack of conventional interpretation of the definition "intellectual services" and due to the lack of the list of types of service activities forming the given sector.

Also, according to most experts, one of the key roles belongs to the so-called high-tech (or technological) services, the production process of which is increasingly becoming a driver of innovative development within the modern "knowledge economy".

1.Methodology

1.1.The basic postulates of the concept of the "knowledge economy" as a paradigm of modern stage of social and economic development

The availability of knowledge-intensive components in each service produced is a distinctive feature of a service activity within the quaternary sector.

At the same time, the intellectualization of activities targeted at service rendering, the use of special knowledge and brand new communication technologies in its process are becoming the key factors for creating added value cost.

These features characterize the most important and fundamental features of the modern "knowledge economy".

The concept of "knowledge economy" became widespread at the end of the 20th century; however, the term itself was used among scientists since the 1960s. The term was coined by the American researcher F. Mahlup, who, for the first time, engaged in the problems of research of knowledge as a key element of modern economic development and wrote the work "Production and distribution of knowledge in the USA" in 1962. In that work, he used the term "knowledge economy" and laid the foundation for modern concepts of its key characteristics.

According to F. Mahlup, such factors as fundamental and applied science, higher education, innovation system, patent system, research and development form the sphere of creating new knowledge in the knowledge economy (Machlup F., 1962).

Various concepts of "knowledge economy" and approaches to its methodological understanding have been formulated by Machlup.

In particular, in 1966 R. Nelson and E. Phelps put forward one of the first models of economic growth based on the distribution of knowledge (Nelson R. R., Phelps E.S, 1966). In the late 1980s, G. Eliasson defined the knowledge-based economy as a system that inherently possesses the state of constant experimentation in the coordination (management) of economic activity, implementation of technological and organizational innovations, their selection and distribution through training.

The processes associated with creation, processing, distribution and acquisition of information run through the entire economic system of society within its framework (Eliasson G., 1990). According to T. A. Stewart, the year of 1991 can be regarded as the starting point for the formation of the "knowledge economy", when the **volume of investment** in information technology exceeded the amount of investment in production technologies for the first time (Stuart, TA, 2007).

It is obvious that human society has approached the stage of development, the fundamental basis of which is the **increased attention** to knowledge, which appears as intellectual capital and becomes the immediate productive force and the most important economic resource.

The most important resource and factor in the formation of the "knowledge economy" are the processes of production, accumulation and application of new knowledge. They are present

absolutely in all sectors of economy, but they form an essential basis for functioning of economic subjects belonging to these sectors within some of them. These sectors are involved in the production of the so-called "intellectual services" which can be defined as specific professional actions of experts who exploit general and specialized knowledge as the main resource for their implementation, and the result of the implementation is the accumulation and development of human potential.

1.2. Key features of intellectual services as the most important tools for the formation of the "knowledge economy"

The processes of production, accumulation and application of new knowledge are implemented in all branches of modern economy, however, there is a number of sectors within it and its essential basis of activities of economic subjects operating within these sectors is constituted by production of knowledge and providing them to consumers. This applies entirely to the process of production of intellectual services.The process of creation of intellectual services is related to the use of intellectual and creative work based on consumption of new knowledge and skills. These services have a set of specific features:

• intellectual services are a kind of activity within a non-productive sphere;

• the process of rendering intellectual services is conditioned by the use of knowledge and intelligence as productive resource;

• structural features and nonuniformity of such services result from specific features of production and functional content of intellectual services, qualification of their producers and a number of other features;

• Knowledge-intensity and a high degree of personification and the difficulty of assessing the quality of such services are referred to specific properties of intellectual services.

The essential content of the process of creating of intellectual services is determined by the ability of a person to do intellectual work as a form of intellectual and creative labor.

Apart from the knowledge-intensive nature of production, a number of other features that help identify the intellectual services can be marked out: productive nature; high level of individualization; high share of added value; adaptive nature.

Thus, the specificity of the use of human capital in the process of rendering intellectual services lies in an individual who renders services and has skills and abilities related to efficient transferring of necessary information to a consumer of services on the one hand, and the ability of the latter to assimilate the acquired knowledge and its transformation into proprietary intellectual capital on the other hand.

At present, there is a large number of different approaches to the definition of the complex of services defined by the term "intellectual". F. Mahlup was one of the first who tried to distinguish them, having defined this form of services as "professional" and he attributed such groups as legal, audit, consulting, engineering, and health services to it (Machlup F., 1962).

P.Windram and M. Tomlinson, in turn, attribute a wider range of services to the intellectual ones, which cover such segments of economic and social activity: architecture, geodesy, construction, software, banking and financial activities, design, protection of the environment, asset management, insurance; staff recruitment, marketing, mass media, research and development, telecommunications, engineering, technical education (Windrum P., Tomlinson, 1999).

Despite the availability of various approaches to distinguishing of various types of intellectual services, according to most specialists who deal with this subject, they can be divided into two large groups - technological (high-tech) and professional (business) services. While analyzing the economic nature of the category under study, it should be borne in mind that the process of production of various types of services includes the use of labor resources which have a different skill level.

For that reason, it is customary to single out the sector of intellectual services, which possesses a complex of specific properties, defined as a quaternary sector, in the structure of the tertiary sector.

A number of specific features which acts as key criteria on the basis of which the intellectual services sector is singled out as a separate segment of the service sector, includes:

1) capital formation that implies implementation of functions of institutional source of accumulation of human capital by intellectual services;

2) resource supply which is manifested in directivity of the process of rendering intellectual services for supplying the consumers of these services with certain knowledge;

3) retransmission based on the implementation of the function of the channel for transferring professional knowledge to their consumers by intelligent services.

High-tech services gain a particular importance within intellectual services which include services provided by high-tech enterprises, which spend at least half of the profit for R&D, and use special knowledge and attract highly qualified specialists to this activity. A.V. Schraer believes that the characteristics of the services belonging to this category are (Shraer A.V. 2010):

1. Use of advanced technical equipment while production or consumption .

2. Application of information and telecommunication technologies in rendering services.

3. Organization of services production based on economic and mathematical models of interaction between producers and consumers.

4. Implementation of the process of service maintenance of technically complex products.

5. Use of the latest achievements of science and technology, innovative materials and components for the production of services.

6. Creation of services of technologically complex products during the production process.

Besides, the development of the market for high-tech services, to a large extent, depends on the state of the R&D sector, while management and organizational norms and practices are of key importance for the other largest segment of the intellectual services market.

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2. The results

Activity structures mediated by market mechanisms and informal exchange operations are filled within the transformation of the system of economic relations under quaternization.

This process takes place within the implementation of the postulates of the concept of "service-dominant logic", according to which the service is the result of applying the knowledge or competencies of individuals who produce this service and are able to benefit other individuals who need it, i.e. it is the end result of the mutual exchange of resources between consumers and producers.

At the same time, the process of rendering services within this approach is considered as a process of co-production in which the producer and consumer invest certain resources in order to obtain a mutually beneficial result.

There is also a gradual replacement of mass, standardized production with a new system of individualized production, based on the use of intellectual work, information and innovative technologies.

Due to the key role of smart use of intellectual capital of the market subjects of intellectual services in the process of organizing their relationships with customers, and also because of the principle of coincidence of time and place of production and consumption of services, the latter acquire the ability to satisfy customers’ requests more accurately rather than the elements of commodity offer.

Besides, the process of development of individualized services implies necessity for creating product (mostly organizational and marketing) innovations. That is why producers of intellectual services regard the innovative activity as the most important condition for ensuring their competitiveness.

"Service-dominant logic" has affected not only the market of intellectual services, but also the sphere of production, resulting in the development of such a joint form of selling goods and services as hybrid products in which the services applied to a specific product are no longer an addition to it, but rather are an element of the ready solution of a customer's problem, which is developed in accordance with his or her individual requests. Efforts are applied not to the implementation of a single transaction in the form of sales, but to establishing a long-term cooperation with the consumer, covering not only the service sphere, but also the process of manufacturing of ready products. Thus, the actual value of the hybrid product will be assessed instead of the potential value of the ready product, including the degree of its accordance to rational and emotional expectations of customers.

Thus, the processes of quaternization are defined not only by strengthening of the role of "knowledge-intensive" service sectors, but also by changing the key features of production

processes in the real sector from the perspective of acquiring a key value with new factors of production, involving a consumer in this process, and forming fundamentally different organizational management structures.

In addition, the producers of intellectual service generally become the generators of innovative processes within the economic system (Muller E., Doloreux D., 1998).

They often play the role of peculiar intermediaries in the search and processing of information which links the subjects of innovative activity (Consoli D., Elche-Hortelano D., 2010).

In this case, the subjects of the intellectual services market accelerate the diffusion of innovations, interacting with their developers.

However, having a broad access to huge arrays of accumulated knowledge, the companies of the intellectual services sector are mostly acting as innovators themselves, while maximally adapting innovative products and services to the individual needs of customers (Doloreux D., Shearmur R., 2010.)

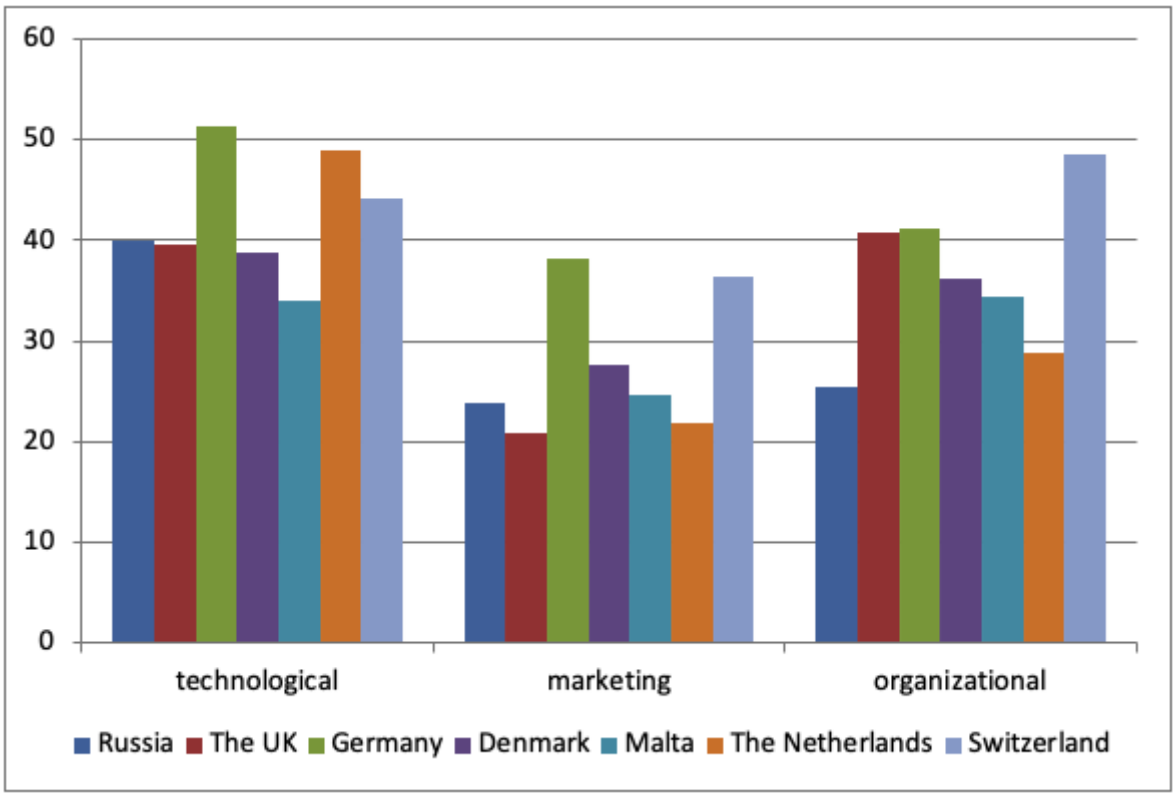
Based on the results of the comparative analysis performed by the experts of Higher School of Economics with the aim of revealing the role of the participants of intellectual service sector in the innovation activity on the example of the Russian Federation and a number of European countries, it can be concluded that the parameters characterizing this role are much closer that those which characterize innovative activity within the entire national economy.

This is, in particular, witnessed by the parameters of the share of companies performing innovations in total number of producers of intellectual services of the countries specified below (Figure 1).

As we can see from the figure below, the share of producers of intellectual services performing technological and marketing innovations can be compared to those of Denmark and the United Kingdom.

However, the degree of implementation of organizational innovations by the participants of the Russian intellectual services sector is much lower than in the European countries under study.

Figure 1
The share of innovation companies in total number
of producers of intellectual services. (%)

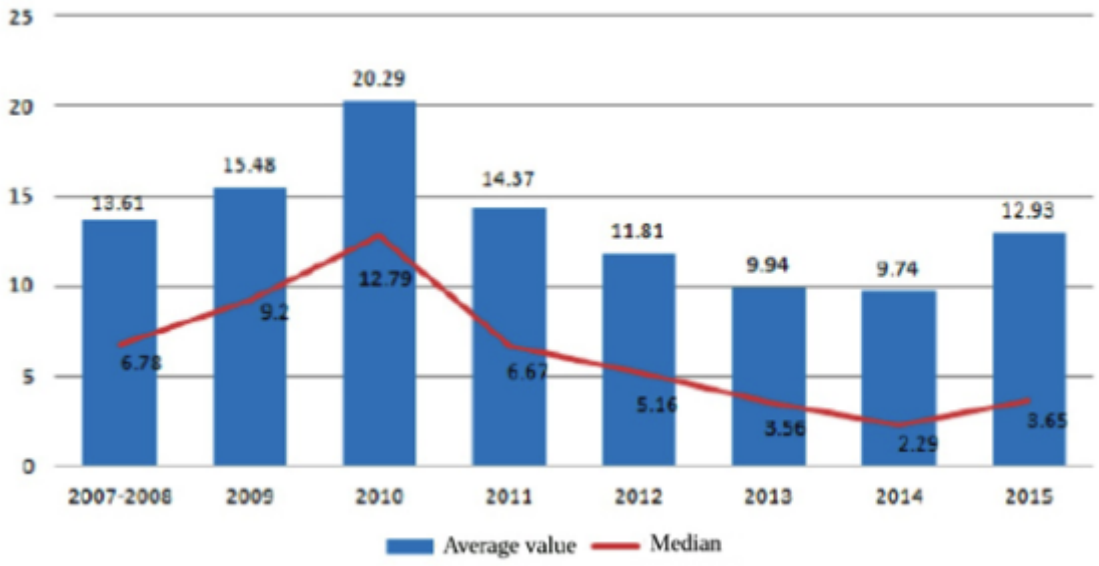


(https://issek.hse.ru/data/2017/06/21/1170246031/ NTI_N_56_21062017.pdf)

It should be pointed out that the share of innovative products in the structure of sales of domestic participants of the intellectual services market at the end of 2015 was about 13%, having

increased significantly in comparison to 2014, however, this indicator is far behind from the parameters of 2010, when the maximum value of this parameter was registered (Figure 2).

Figure 2
The dynamics of the change in the share of innovative products in the structure of sales of domestic producers of intellectual services (%)



(https://www.hse.ru/data/2016/11/16/1110239914/NTI_N_28_16112016.pdf)

It is worth noting that if, during the decline of innovative activity, the producers of intellectual services were increasing the share of technological and organizational innovations, the value of this parameter decreased in 2015 following the increase of share of organizations which were involved in the introduction of marketing innovations.

It should be noted that while indicating the reasons preventing the development of innovative processes within the intellectual services sector, their producers, along with the factors related to the lack of interest of consumers, denote a shortage of human resources capable of performing innovative activities (15.3% of the 526 surveyed participants of the intellectual services market), and the absence of necessary infrastructure (13.1%)

(https://issek.hse.ru/data/2017/06/21/1170246031/ NTI_N_56_21062017.pdf.).

While solving these problems, it is advisable to take into account foreign experience of stimulating the involvement of high-quality experts of the intellectual services sector into participating in innovation activities.

Thus, Dupont company, after once investing into fundamental researches, attracted highly qualified scientists not so much with financial terms rather with providing full autonomy while performing these studies.

At the meantime, such corporations as Bell and Intel were attracting talented specialists to participate in scientific developments under a strict centralized leadership.

Based on the analysis of the existing examples of attracting intellectual resources, A. Gambardell, K. Paniko and J. Valentini conclude that there is a broad autonomy for experts in the sphere of intellectual services wherein the success of a project is largely determined by specialists' contribution, and, to the lesser extent, by business assets available (Gambardella A., Panico C., Valentini G., 2015).

This conclusion is particularly significant in the context of the organization of research and production interaction, in which the motivation of representatives of the intellectual services sector is largely determined by the possibility of using financial and infrastructural capabilities of large businesses which is not possessed by the subjects of this sector, while the motivation of business structures determines the use of knowledge and competencies of specialists engaged in the provision of intellectual services.

One of the most successful tools of such interaction is the formation of the so-called "technological platforms" and "service clusters".

3. Suggestions

One of the key tasks in the process of development of the interaction of the participants involved in the sphere of intellectual services and the innovation-based business structures is the formation of flexible modern tools for their multifaceted cooperation.

Nowadays, fundamentally new forms of such interaction are forming, typical for the emerging "knowledge economy". In particular, there are so-called "technological platforms" which are defined as voluntary, self-governing, self-financed associations of universities, scientific organizations, production and service business structures that share the main goals and objectives of these associations contributing to their achievement in the process of forming innovative technologies, products or services on the basis of attracting special resources for research and development. These associations are platforms wherein strategic guidelines are specified for the development of certain scientific and technical areas that form the basis for the implementation of particular innovative projects.

The organization of efficient activity of technological platforms assumes the implementation of the following stages:

1) formation of a "strategic vision" of specific technologies based on which the necessity for uniting the efforts of the subjects of the platform is grounded;

2) transfer of the "strategic vision" to a research and development plan which specifies medium- and long-term priorities of R&D within the platform;

3) practical implementation of the research and development plan within a joint cooperation.

The productive use of external knowledge and competences as part of the functioning of technological platforms is interpreted as a process of "open innovation", acquiring one of three forms (Enkel E., Gassmann O., Chesbrough H., 2009):

• incoming process directed to the inside of an organization and aimed at enriching its knowledge by integrating it with external sources of this knowledge;

• outgoing process, when available knowledge and technologies are acquired by external partners capable of ensuring their commercialization;

• combined process within the integration and the formation of various alliances.

An academic firm, which is a specific kind of organization established as a firm and engaged in the production of knowledge through research and development and their practical use in the implementation of innovations, becomes an important participant of technological platforms which is also a fairly new form of organizational design of business.

This kind of a firm is aimed at constant interaction with other firms both academic and commercial with such intrinsic properties as cooperativeness and rivalry.

At the same time, within its organizational nature, an academic firm can be either an integral organization or a separate subdivision or a certain undefined structural element of a commercial firm.

In general, if we consider the structure of participants in technological platforms in the EU countries, we can conclude that a quarter of their total number accounts for large business structures, 23% - for research organizations, 17% - for educational institutions, 12% - for small and medium business structures, 9% - for government institutions, 8% - for industrial associations.

Besides, while comparing the mechanisms of technological platforms formation in the EU countries and in the Russian Federation, it should be pointed out that if, in the first case, it is mostly initiated by large industrial companies having experience in commercializing the results of R&D, then in the second case, state authorities act as the initiator, which, as a rule, determine the direction of activities of the created platforms.

In addition, in Russia, technological platforms are formed within the institutional design of the most promising areas of the scientific and technological sphere.

In particular, the National space technology platform and the platform "Aviation mobility and aviation technologies" were created in the aerospace industry, uniting the efforts of business, scientific community and state authorities.

The attraction of intellectual services to the activities of the platforms of the subjects of the market will allow, on the one hand, to direct their activities to comply with the requests of end consumers of innovative products, and on the other hand, in the framework of the above-mentioned concept of "service-dominant logic", to attract potential consumers to the co-production of this product.

Another promising form of integration of organizations in the sphere of intellectual services in the context of implementing their innovative potential is the formation of service clusters.

It should be noted that, nowadays, there are different approaches to determining the essence of service clusters. In particular, A.I. Noskov-Dukelsky understands such a cluster a system of interconnected enterprises which offer services of a different nature located on a certain territory and playing a significant role in its economic development (Noskov-Dukelsky AI, 2011).

The service cluster can be represented as a spatial complex integrated to increment competitive advantages of industries, enterprises, infrastructure organizations which operate in the service sector in a specific region.

Nowadays, under domestic realities, tourist, educational and scientific services are capable of forming service clusters.

Thus, we can conclude that there exists a potential for the development of clusters of intellectual services.

The mechanism for managing the cluster of intellectual services should be formed on the basis of a system of key principles that reflect the most significant patterns and relationships emerging during interaction of organizations operating in this sphere.

In particular, the principal model of this mechanism, regardless of the specific directions of intellectual services rendered by its residents, can be represented as follows (Figure 2).

The basic principles underlying the formation of such a cluster include the following:

1. The principle of voluntariness. The cluster forms on the basis of common interests and awareness of the need for interaction under constantly increasing rivalry.

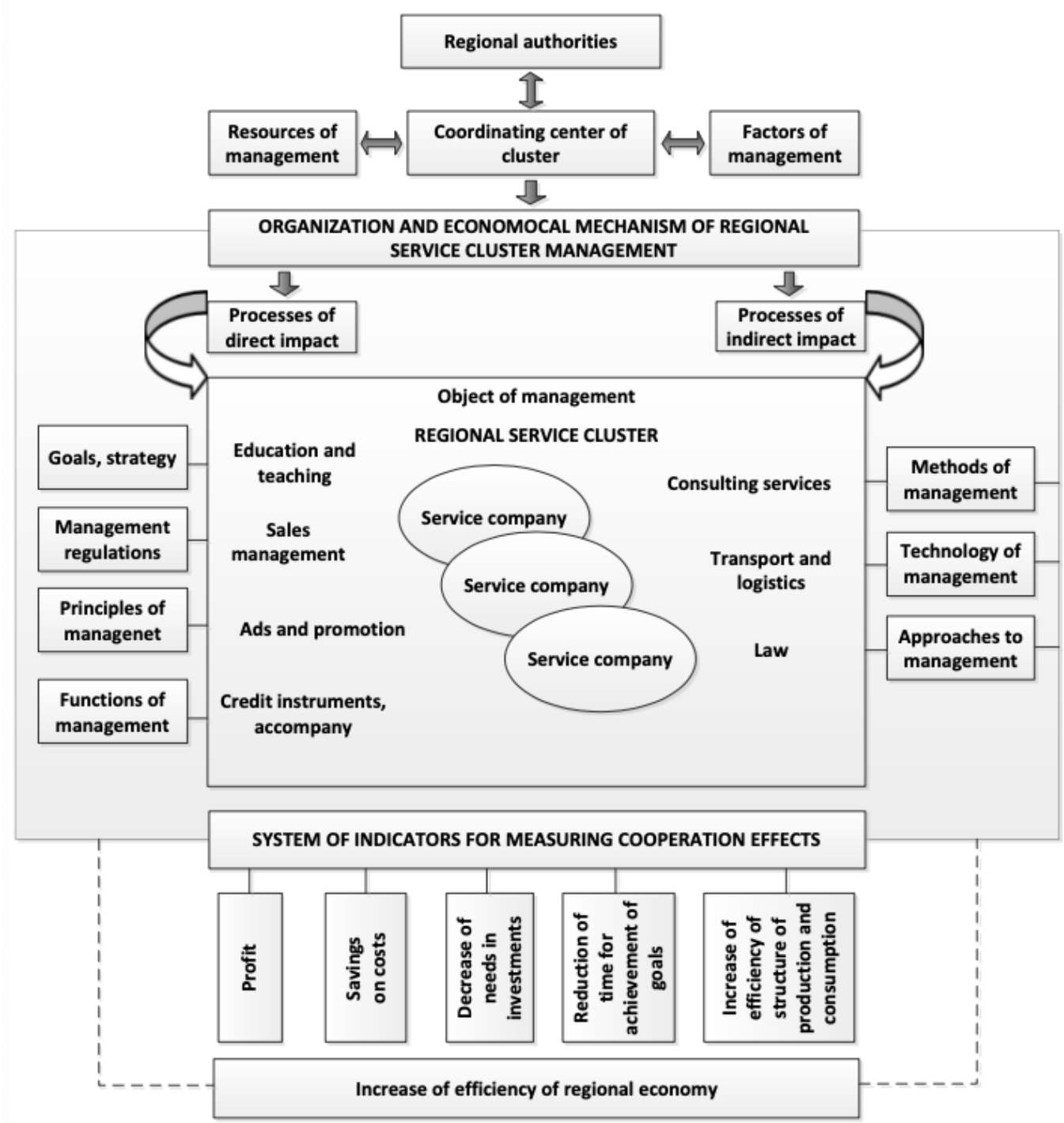
2. The principle of public-private partnership. The vast majority of intellectual services sectors are of a high social significance, which implies the obligatory participation of state and regional authorities in organizing and ensuring efficient functioning of these clusters.

3. The principle of combination of interests. Since a cluster is an unofficial association which forms on the basis of participants' awareness of the need for a mutually agreed policy ensuring the achievement of the interests of all of its participants, each of them must take into account the interests of other participants of the cluster.

4. Spatial principle of a cluster formation. This principle is based on the idea that clustering, being an important instrument of regional policy, is to ensure an efficient use of the intellectual potential of the territory.

5. The principle of economic efficiency. This universal principle underlies the formation of cluster structures, determines the need for searching adaptive mechanisms that ensure stability and competitiveness of its residents under unstable circumstances.

Figure 3
A conceptual model for managing the functioning of a regional cluster of intellectual services (Shnyakina Y. R., 2011)



The formation of clusters of intellectual services on the basis of compliance with the above principles is an efficient tool, which allows, on the basis of ensuring a synergetic effect and a significant decrease of transaction costs, to increase the level of stability and competitiveness of both the quarteriary sector of the regional economy and the social and economic system of the territory as a whole.

At the same time, the assessment of economic efficiency of such integration is the most important factor determining the decision of the producer of intelligent services about the relevance of entering into a specific integrated structure (service cluster, technological platform).

Such an assessment is based on an analysis of potential costs and benefits, since participation in a cluster or platform is relevant only if there is a synergistic effect in case of merging a company's $\sum_{i=1}^{I} R_i^{A\_available}$ own resources with the resources of a potential partner $\sum_{i=1}^{I} R_i^{B\_available}$

The synergetic effect will be observed if companies A and B, having united their resources, achieve a greater economic effect than they would have in case of separate rendering of intellectual service process:

$$E^{A+B}\left(\sum_{i=1}^{I} R_i^{A\_available} + \sum_{i=1}^{I} R_i^{B\_available}\right) > E^{A}\left(\sum_{i=1}^{I} R_i^{A\_available}\right) + E^{B}\left(\sum_{i=1}^{I} R_i^{B\_available}\right) \quad (1)$$

This effect is achieved through the joint implementation of the intellectual potential of each of the structures allowing, with the help of necessary resources, to increase the profitability of a joint business and the practical implementation of a set of ideas, knowledge and competences in the form of innovative products.

4. Conclusion

The formation of the "knowledge economy", with the development of processes of quaternization as one of its most important manifestations, puts forward new requirements for the organization of interaction among the participants of innovation activity as a form of practical implementation of new knowledge.

The role of organizations operating within the intellectual services sector is becoming more significant. These organizations, having a broad access to huge arrays of accumulated knowledge, not only accelerate the diffusion of innovations, continually interacting with their developers, but also act mostly as innovators, maximally adapting innovative products and services to the individual needs of customers.

However, the limitedness of the resource potential of the participants of the market necessary for implementing innovative cycle on the one hand, and the interest and use of knowledge and competencies of their specialists provided by big business on the other hand, necessitate organizing scientific and production cooperation under the formation of such fairly new and promising forms of this interaction as technological platforms and service clusters.

Apart from the use of specific knowledge and competences of the subjects of intellectual services market, their involvement in the innovation process will allow, on the one hand, to guide its progress towards the satisfaction of the requests of end consumers of innovative products, and on the other hand, to attract potential consumers to the co-production of this product on the basis of constant exchange of necessary information with them.

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