The System of Factors for Intellectual Capital Evaluation of State Research Centers of the Russian Federation[1]

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Abstract: *The paper presents the results of a study aimed at identifying growth reserves of applied science's organizations which has a strategic importance for the country. State research centers of the Russian Federation are such organizations. The author shows the role of the intellectual capital factors in the development of state research centers, their classification and intrinsic characteristics.*

Keywords: *state research center, intellectual capital, factor, estimation*

1. Introduction

State research centers are enterprises, institutions and organizations of various forms of property located on the territory of the Russian Federation which has a unique experimental equipment and highly qualified personnel. The results of their researches has received international recognition. They are an important element of applied science sector of the Russian Federation.

The activity of state research centers should be directed to the preservation of leading world-class scientific schools in the Russian Federation; development of the scientific country's potential in the area of basic and applied researches; training of highly qualified scientific personnel.

The status of the state research center:

- does not entail a change of the legal form;
- assigned by the governmental decree and must be confirmed one time in every two years;
- requires of annual report about activities of the state research center to the Interagency Coordinating Commission for Science and Technology Policy.

Currently Russia has 48[2] state research centers located in 7 regions of the Russian Federation providing the solution of economic and social problems, including issues of national security, and specializing in the field of nuclear physics, nuclear science and engineering, chemistry and new materials, aviation, aerospace, shipbuilding, transportation, information technology and instrumentation, biotechnology, optoelectronics and photonics, robotics and engineering, acoustics navigation, water supply and hydrogeology, energy and electrical engineering, metallurgy, construction, meteorology, virology, biomedical problems, plant breeding.

In most cases an intangible nature of research institutions activity, as well as the high role of intellectual components in potential indicators is the feature of such organizations functioning. This thesis gives rise to the hypothesis about the creation of a clear identification and management system of state research centers intellectual capital as the essential tool for improving their functioning.

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[1] The article was written on the public task given to Tver State University by the Ministry of Education and Science of Russian Federation to research the topic "Methodology of management of intellectual capital of technology park structures and scientific structures with fixed state status".

[2] According to the Russian Federation government decree from 15.05.2013, № 797-r published after the work of the Interdepartmental Commission for Technological Development, the status of state research center has been saved for 48 scientific organizations of different forms of ownership and organizational and legal forms, but at the moment the state research center "Kurchatov Institute" changed the status to research-and-development center "Kurchatov Institute". Therefore, it is not among the state research centers involved in the annual Russian Ministry of Education monitoring, and information about its activities in generalized terms is not available.

2. Materials and Methods

Considering the functioning of the state research centers from an economic point of view the results of their activities are:

- scientific-technical products;
- innovative products;
- scientific and technical services;
- expert services;
- educational services;
- other services.

Analysis of amount of products and services of state research centers in 2013 indicates the prevalence in their structure of research and development, which corresponds to the main activity of the state research centers. In particular, scientific-technical products are the main result and it is necessary to search for growth reserves of its quantitative and qualitative characteristics for the purposes of improving the state research centers management.

The main economic resource which is the basis of scientific-technical products is knowledge.

At the present stage the codified knowledge contained in a system or in a process has a higher market value than the knowledge belonging to particular individuals as information [1]; human capital, personnel training becomes a main component of scientific-technical products cost [2].

In particular, structuring and effective organization of the new knowledge generating process using the main resource which is human capital are the basis for improving the effectiveness of state research centers as subjects of microeconomics.

In the works of the Organization for Economic Co-operation and Development (OECD) [3] there are four main types of knowledge:

- know what is a knowledge as a set of facts, this is the closest concept to the term of "facts";
- Know why refers to scientific knowledge of the principles and laws of nature. This kind of knowledge underlies technological development and product and process advances in most industries;
- know how refers to skills or the capability to do something;
- Know who involves information about who knows what and who knows how to do what. It involves the formation of special social relationships which make it possible to get access to experts and use their knowledge efficiently.

As the part of the classification for the main activities of state research centers the second and third types are the most significant, for their management and development system the fourth type is main.

Intangible component of each enterprise's capital is the intellectual capital, the individual structural components of which includes various types of knowledge or results of their application.

In accordance with systematization of theoretical sources with regard to the specifics of state research centers was proposed the following definition.

Intellectual capital of state research centers is the main intangible resource that allows to implement the main activities and increases customer value and added value of their results, it is capable to self-expansion on condition of effective management.

Amount of knowledge underlying scientific-technical products of state research centers ultimately defines its cost as the final product, herewith the knowledge obtained during research and development become the organization's and working in the production process staff's attribute and that's the reason to increase the total intellectual capital. In the following this creates preconditions for the expanded reproduction of knowledge, entails additional value-added growth and determines the development of state research centers as an economic entity.

In the works of a group of authors [4] were identified structural components of intellectual capital which are included in the intellectual capital of state research centers:

1. Human Capital

1.1 Knowledge Capital is staff's knowledge and knowledge system of organization ("know why") which are the basis of new knowledge generation during the production of scientific-technical products.

1.2 Creative Capital is an ability to apply the knowledge in practice ("know how" for "know why") by non-standard way including to find the "point" of their application to a problem solution.

1.3 Capital of competencies is an practical knowledge and skills ("know how") which are used in the professional staff's work.

1.4 Capital of professional experience is accumulated knowledge about tactical and strategic tasks in professional activities ("know how", "know why", "know what").

1.5 Capital of professional and personal reputation is sustainable opinion of the environment subjects about knowledge capital, competence, professional experience of individual employees of state research centers. In contrast to the types of human capital listed above this type is not a source of generation of new knowledge but creates opportunities for it successful extension and implementation of scientific-technical products and to obtain new orders for it ("know who").

1.6 Health Capital is the overall level of physical and mental health of employees of state research center which has a direct impact on the human performance and productivity. It is an indirect indicator of the efficiency of the production process of scientific-technical products, it has an impact on the process of creation and use of the human capital's types which listed above.

2. Goodwill (relationship capital)

2.1 Image capital is purposefully generated image of state research center in an environment that promotes a positive perception of products and services and the organization itself. It is not a source of new knowledge while it contributes to growth of customer value and, in some cases, the cost of scientific-technical products and services of state research centers.

2.2 Customer capital is long-established contacts of state research center with main stakeholders: customers, consumers, suppliers, service companies, government bodies, research organizations, universities and others. It provides effective implementation of scientific and production cycle of state research centers and regular timely order getting (implementation of the final product, services).

2.3 Brand capital is consumers and customers' established opinion about products of state research centers which contribute to their increase. Brand capital provides growth of customer value and cost of the product (service).

3. Infrastructure Capital

3.1 Corporate culture is corporate identity, historically and consistently generated norms and values, ideology, as well as communication system, the ethics of relationships in the team, and others. It is an element of intellectual capital promoting the generation of new knowledge in the operation process and determining the internal and external organization attraction for employees and stakeholders.

3.2 Business Model is an optimum combination for the current conditions of internal and external organization environment of the economy subject following characteristics: consumer segments, value propositions, sales channels, relationships with customers, revenue streams, main resources, activity cost lines, main partners, cost structure [3]. It is ensures the effectiveness of management system, state research centers' strategy, thus contributing to the growth of other types of intellectual capital.

4. Capital of intellectual property is intangible assets, copyright, patent rights, production secrets rights that belong to the state research centers ("know how", in some cases "know what"). It is a formal representation of the new knowledge generated during the operation of state research center and it has a variety of commercial value.

The system of intellectual capital management in the organization have to built in accordance with existing requirements and is aimed at improving the efficiency at the micro level, and to ensure effectiveness in fulfilling its mission.

The evaluation and management of scientific organizations still are in the centre of the debate due to the lack of unified approaches that satisfy all groups of stakeholders.

Feature of state research centers as branch research institutes is the ambiguity of the interpretation of their mission and goals. As the micro-level agents in the economy they have to ensure the maximization of financial results and future value as a business and as branch research institutes they have to efficiently meet the needs of state agencies and the real economy in applied knowledge, to promote their commercialization and bringing obtained on their basis innovative products to final consumers.

Scientific-technical product is a unique single product, commercial value and social significance of which cannot be determined using standardized calculation methods.

Scientific organization create a unique product that cannot be evaluated by standard indicators. A. S. Kulagin in the work "Assessment and self-assessment scientific organization" [6] raises the question about the need to distinguish between "effectiveness" and "efficiency" for scientific organizations. The author gives specific examples due to the need of improving of efficiency of scientific organization the quality of the research and experiments was reduced that eventually led to their low efficiency and the formation of pseudoscience.

The author proposes to form a system for the assessment and management of research organizations, based on the mission, which may be different from the point of view of the founders, customers (consumers), the organization (team), business partners. However, it should be aimed at meeting the listed stakeholder groups, as well as the scientific community and to ensure that the scientific results that meet global standards.

Transforming the look at the problem of the relation between "effectiveness" and "efficiency" of scientific organization A. S. Kulagin made the conclusion that the optimal combination with dominance of the first.

For industrial research organization this conclusion is obvious: good-quality research which resulted by implementation with specified commercial efficiency guarantees further collaboration with the customer with high probability and as a consequence the increase of profitability and financial stability of the organization.

Thus, for scientific organization specializing in the development, successful execution of work guarantees stable orders and jobs for employees with appropriate remuneration. This is the impetus for acceleration and high-quality execution of applied research and development.

Because of state research centers differentiation it is quite difficult to give a single unambiguous formulation of their mission. As scientific organizations they are urged to carry out research and development in clear defined sphere corresponding to the priorities of the Russian Federation that will allow taking leading scientific positions in Russia and becoming the leading research organization in this field. In general the formulation meets the above provisions, but all list of state research centers stakeholders which is related to the particular state status is somewhat broader than other similar organizations should be taken into account.

We should also highlight the scientific community, which may indirectly affect the activities of scientific research centers of Russian Federation allowing the evaluation of scientific results which contribute to the awards, prizes, or inversely decrease the image and credibility of the structure.

The analysis showed that the majority of scientific research centers are federal state unitary enterprises or public institutions. The share of open joint stock companies in 2013 amounted about 30% of the total but most of them are partially or fully owned by the Russian Federation or state corporations.

Thus, in the case of state research centers the state represented by the founders which are coordinating and supervising authorities is a main stakeholder and plays a crucial role in the formulation and implementation of their mission, and, therefore, in assessing of their impact and effectiveness. The structures, which are private property, for the purposes of compliance with the features of state research centers are to be incorporated into "mainstream" and to operate and manage in accordance with it.

It is no coincidence that state research centers in the framework of standard methods for performance measuring of research organizations in the public sector are now included in the reference group.

Undoubtedly, the theoretical and methodological foundations of intellectual capital management of state research centers cannot become universal for all such structures; however, their formation should take into account general trends and match them.

Thus, the control system of intellectual capital of state research centers must be ultimately aimed at meeting the needs of the state represented by federal executive authorities (state corporations), i.e. on the effectiveness of

state research centers (completeness, quality and timeliness of scientific results), which provides current and long-term effectiveness (commercially effective technical and scientific products).

The theoretical analysis demonstrates different importance of intellectual capital types as part of state research centers main activities. They can be divided into direct and indirect factors affect on the operating results (Figure. 1).

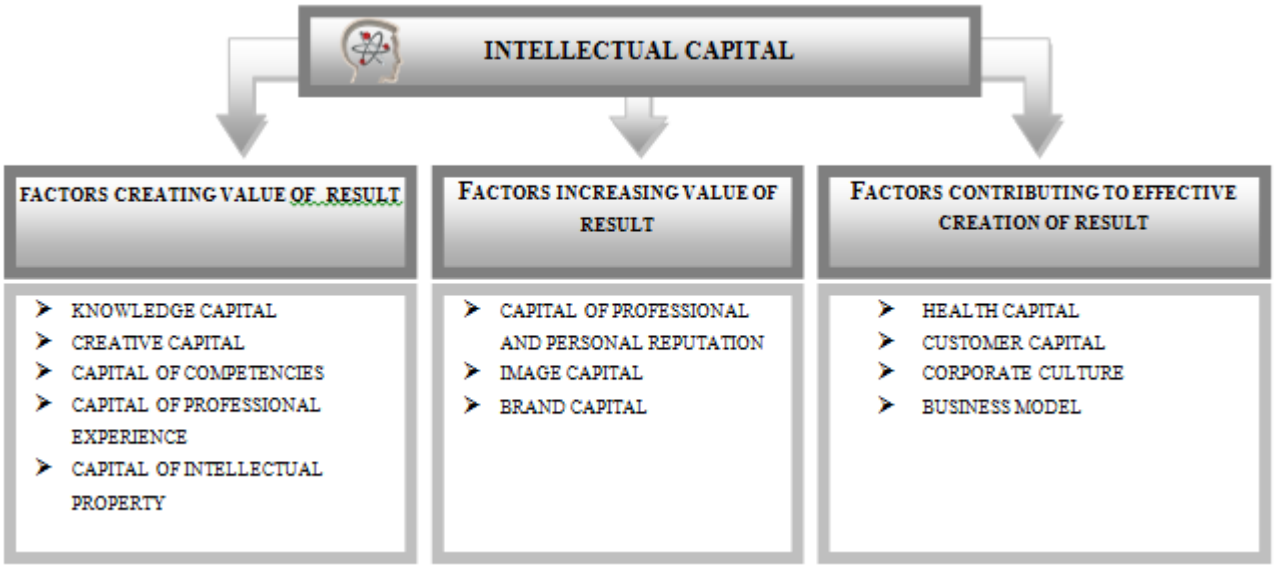

Fig. 1: Classification of intellectual capital types in terms of degree of impact on the performance results of state research centers

For purposes of intellectual capital management the most significant is the first group of factors that has a direct impact on new knowledge generation during creation of scientific-technical products. Knowledge capital and capital of competencies transforms codified scientific knowledge in a specific technological solution under the influence of creative capital and the capital of professional experience. Capital of intellectual property may be a basis and a result of the creation of new scientific knowledge.

Priorities of the state research center, as shown above, are applied researches, experimental which significantly increases the importance of capital of competencies and professional experience.

Due to the uniqueness of the primary product of state research centers which is scientific-technical products its cost is influenced by numerous factors and in some cases may be different from the direct expenses involved in its creation. Market of scientific-technical products is a seller's market under conditions of monopoly. Factors increasing value of result often play a decisive role in the pricing of state research centers products. Contract price fixed as part of the agreement (contract) has upper and lower limits due to cost efficiency of products for a seller and for a buyer.

Fixing of price close to the upper limit can be achieved if there is the high demand in scientific-technical products from a buyer (a customer) and a significant reliance to its content and quality characteristics. Image capital, brand capital, capital of professional and personal reputation of specific order executives is a significant source of increasing added value on products of state research centers.

Due to the limited number of benefits and preferences for state research center of Russian Federation at the present stage existence (assignment) of special state status in particular promotes the growth of image capital.

Additional factors that create the prerequisites for the successful functioning of state research centers are:

- health capital of employees, providing full and timely performance of their professional duties;
- customer capital characterizing possibilities of state research centers to attract and retain of client base, obtaining budgetary funding with the assistance of the executive authorities, timely and complete logistics, involving other companies (Russian Academy of Sciences, other research institutes, universities, innovative companies, industries) for solving of separate tasks as part of technological solutions;

- corporate culture forms a positive image of state research center as an employer and counterparty providing moral incentives of employees as an incentive to increase productivity;
- Business model providing efficient functioning of state research center as the subject of an economy, promoting rational management of the organization in response to changing environmental conditions.

3. Conclusion

Thus, description and systematization of the scientific bases of intellectual capital of state research centers of Russian Federation and its individual species were undertaken on the basis of theoretical and empirical analysis, their role in shaping the outcomes was demonstrated and areas for further development of research for creation of management methodology of intellectual capital of state research centers to improve the efficiency of their operation were identified.

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