

The classification matrix of sources of new knowledge as a tool for planning a company's innovation activity

La matriz de clasificación de las fuentes del nuevo conocimiento como herramienta para planificar la actividad de innovación de una empresa

Natalya Sergeevna KHOROSHAVINA [1](#); Antonina Vasilevna SHARKOVA [2](#); Oksana Nikolaevna VASILYEVA [3](#); Olga Viktorovna BORISOVA [4](#); Konstantin Olegovich SOKOLOV [5](#)

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ABSTRACT:

In the present-day conditions of the nation's economic development, one is witnessing an amplification of the role played by innovation-focused companies, with new knowledge serving as the basis for the formation of these companies' resource potential. New knowledge can be regarded as the element from which innovative products are derived. The right choice of source of new knowledge largely governs a company's future development and the process of bolstering its position in the market. This paper draws upon some of the best practices in the innovation sphere to establish a set of principles and criteria for classifying sources of new knowledge – as a tool for planning a company's innovation activity. This type of classification, represented as a matrix, implies breaking the entire set of sources of new knowledge (NKSs) up into four major segments. Each segment within the classification matrix is assigned a separate quadrant: 1) Quadrant 1 – external and collective NKSs; 2) Quadrant 2 – internal and collective NKSs; 3) Quadrant 3 – external and individual NKSs; 4) Quadrant 4 – internal and individual NKSs. The classification reflects the company's potential within the innovation sphere and helps employ certain

RESUMEN:

En las condiciones actuales del desarrollo económico de la nación, uno es testigo de una ampliación del papel desempeñado por las empresas centradas en la innovación, con nuevos conocimientos que sirven de base para la formación del potencial de recursos de estas empresas. Los nuevos conocimientos pueden considerarse como el elemento del que se derivan productos innovadores. La elección correcta de la fuente de conocimiento nuevo rige en gran medida el desarrollo futuro de una empresa y el proceso de reforzar su posición en el mercado. Este documento se basa en algunas de las mejores prácticas en el ámbito de la innovación para establecer un conjunto de principios y criterios para clasificar las fuentes de nuevos conocimientos, como una herramienta para planificar la actividad de innovación de una empresa. Este tipo de clasificación, representada como una matriz, implica dividir todo el conjunto de fuentes de conocimiento nuevo (NKS) en cuatro segmentos principales. A cada segmento dentro de la matriz de clasificación se le asigna un cuadrante por separado: 1) Cuadrante 1: NKS externos y colectivos; 2) Cuadrante 2 - NKS internos y colectivos; 3) Cuadrante 3 - NKS externos e individuales; 4)

groups of NKSs in a well-argued manner in keeping with the company's resource potential. The authors explore the role of knowledge as an economic resource that is crucial to a company's innovation activity. The paper underlines the significance of such components of a knowledge-based economy as client, human, and structural capital, and provides a description of these elements.

Keywords: knowledge-based economy, new knowledge, sources of new knowledge, intellectual activity, results of intellectual activity, classification matrix.

Cuadrante 4 - NKS internos e individuales. La clasificación refleja el potencial de la compañía dentro del ámbito de la innovación y ayuda a emplear ciertos grupos de NKS de una manera bien argumentada, de acuerdo con el potencial de recursos de la empresa. Los autores exploran el papel del conocimiento como un recurso económico que es crucial para la actividad de innovación de una empresa. El documento subraya la importancia de tales componentes de una economía basada en el conocimiento como capital humano, humano y estructural, y proporciona una descripción de estos elementos.

Palabras clave: economía basada en el conocimiento, nuevos conocimientos, fuentes de nuevos conocimientos, actividad intelectual, resultados de la actividad intelectual, matriz de clasificación.

1. Introduction

The primary resource in the economy of any nation today is knowledge. It is knowledge, not the factors of production (land, labor, and capital), that ensures the nation's innovation-driven development and serves as the driver of its economic growth. Knowledge helps drive upturns in companies' innovation activity and boosts in their capitalization levels and bolster their position in the market. In today's realities, knowledge has become a crucial resource in innovation-driven companies. Notice that the use of knowledge as a key resource in an organization may differ significantly from the use of other – material – resources. At the same time, boosts in the pace of economic development in any company are grounded today in the innovation component of the company's line of work, which is based on new knowledge, not in the mere reproduction and buildup of the physical volume of its products.

In this era of the innovation-driven development of the world economy, a nation's well-being is determined by the availability of high technology, as well as by the level of its intellectual/information development. It is this that should constitute the basis of creating a modern society. The ability to achieve major boosts in the efficiency and quality of products and services provided largely depends on the ability to exchange new knowledge.

Today, special significance is being attached to the following conceptual approaches: the one to exploring the essence and nature of new knowledge as an economic resource and its role and place in social production; the one to developing a mechanism for integrating all subjects of a knowledge-based economy; the one to stimulating these processes to ensure the shift to new tools and methods in managing innovation activity. The above determines today's scholarly interest in issues related to creating, bringing in, accumulating, and making effective use of new knowledge.

2. Methods

Issues related to creating an effective mechanism for generating, bringing in, and making effective use of new knowledge in economic systems have been the object of research by Russian and foreign economists for many years. The latest fundamental and applied research into the issue is focused on the following topics: putting together a typology and hierarchy of knowledge, developing a knowledge-based economy, cultivating new knowledge as an economic resource, and managing knowledge.

Issues related to the development of knowledge management theory, as well as those related to exploring intellectual capital, have been investigated by P.F. Drucker (1993), M. Polanyi (1958), D. Bell, T.A. Stewart (1997), L. Edvinsson (Edvinsson and Malone 1997), and others.

Issues related to the development of a knowledge-based economy have been explored by I. Nonaka and H. Takeuchi (1995), J.S. Brown and P. Duguid (2002), B. Kuipers (1978), A. Galton (2009), T. Ishikawa and K.A. Kastens (2005), P. Romer (1995), L. Lindkvist (2005), and others.

The role of knowledge as an economic resource has been researched by H. Scarbrough (1998), G. Von Krogh, K. Ichijo, and I. Nonaka (2000), P. Quintas (2002), T.R. Gruber (1993), and others.

Research by scholars K.L. Lyons (2000), Y. Carlisle (2002), V. Allee (1997), F.A.J. Van den Bosch and R. Van Wijk (2001), D. Neef (1999), and others has focused on practical tools for employing knowledge management technology.

The research reported in this paper was conducted using the systemic approach and methods of induction and deduction. In writing this paper, the authors also drew upon methods of comparison, analogy, analysis, and synthesis.

3. Results

3.1. The knowledge-based economy as the basis for the development of a modern-day company

Many modern-day companies are predicating their economic development on innovation, which is associated with the emergence of a new form of social production – the knowledge-based economy. A key factor for the development of a knowledge-based economy is the availability of new knowledge. A knowledge-based economy is capable of responding to systemic restrictions curbing economic growth through the creation and effective utilization of the fruits of intellectual activity (Veselovsky et al. 2016).

A knowledge-based economy is characterized by the priority of the fruits of intellectual activity as a source of productivity and boosts in well-being. New knowledge can be a product and have consumer value, as society's need for it is growing continually. Currently, there is taking place a redistribution of investment flows in favor of acquiring non-material assets (patents, licenses, etc.), possessing which can help ensure a company economic growth, reduced costs, and greater competitiveness.

The essence of a knowledge-based economy lies in the ability of business entities to engage their human resources to create, bring in, and make effective use of new knowledge with a view to turning it into a resource facilitative of innovation-driven development. The process of cultivating a knowledge-based economy is predicated on enhancing the quality of human resources who are capable of generating new knowledge within the sphere of high technology.

Knowledge is information in context to produce an actionable understanding (Rumizen 2001). Given that the word 'knowledge' determines the essence of the term 'knowledge-based economy', this type of economy is, above all, associated with the creation and effective use of new knowledge. The knowledge-based economy is regarded as the highest stage in the development of an innovation-driven economy. Nonetheless, the term 'knowledge-based economy' is often used as a synonym for 'innovation-driven economy'.

A key trend in a knowledge-based economy is cooperation. This does not necessarily mean that organizations do not compete with each other – competition is inevitable. It means that their orientation shifts toward the joint use of each other's non-material assets to ensure mutual success (Amidon 1997).

There are four major types of knowledge in a knowledge-based economy, and these are described below.

1. "Know what", which implies knowledge of facts. This type of knowledge is close to what is normally referred to as information. In certain complex areas, experts need to have lots of knowledge of this kind in order to be able to do their job (e.g., lawyers and medical personnel).

2. "Know why", which is a component part of scientific knowledge about the principles and laws of nature. This type of knowledge forms the basis of technological development. The production and reproduction of this kind of knowledge is normally undertaken by specialized organizations, like research institutes or universities. To get access to this type of knowledge, companies need to interact with these organizations either through hiring

scientifically qualified personnel or directly through organizing joint activity.

3. "Know how", which deals with various skills or abilities. This type of knowledge is normally developed by and kept within the pale of a particular firm.

4. "Know who", which implies information on who knows what and who knows how to do it. This includes the formation of a special social relationship that will enable experts to use their knowledge most effectively. This type of knowledge is internal to the organization and is valued more than any other type of knowledge.

Knowledge can be acquired via various channels. "Know what" and "know why" can be obtained through reading books, attending lectures, and accessing databases, while the other two types of knowledge are, primarily, acquired through practical experience. One of the reasons firms take part in fundamental research is their willingness to gain access to a network of academic experts whose competence is crucial to the development of their innovation potential. "Know who" is socially built-in knowledge that cannot be passed along through official information channels.

Today, the more crucial assets in a company are not its equipment, material goods, financial capital, or share of the market but its non-material assets, like patents, the knowledge of its staff, as well as information about its clients and channels stored in its institutional memory (Stewart, 1997).

In building a knowledge-based economy, a key role is played by client capital, human capital, and organizational (structural) capital. The term 'client capital' was first introduced by H. Saint-Onge in 1993. Broadly speaking, client capital is a form of mutually beneficial cooperation between the company and its highly-paying clients that is predicated on principles of being sustainable, reliable, long-term, and trusting (Saint-Onge, 1996). Client capital characterizes the consumer value of having well-established relations with key clients.

A condition for the formation of client capital in a company is having in place an effective system that would form the basis of mutually beneficial interaction between the company's personnel and its customers. It is effective communication between the company's staff and its clients and constructive dialog between them that will always facilitate boosts in client capital, which is testimony to the significant role played today by new knowledge and the importance of focusing on the company's personnel, who are the primary carriers of that knowledge.

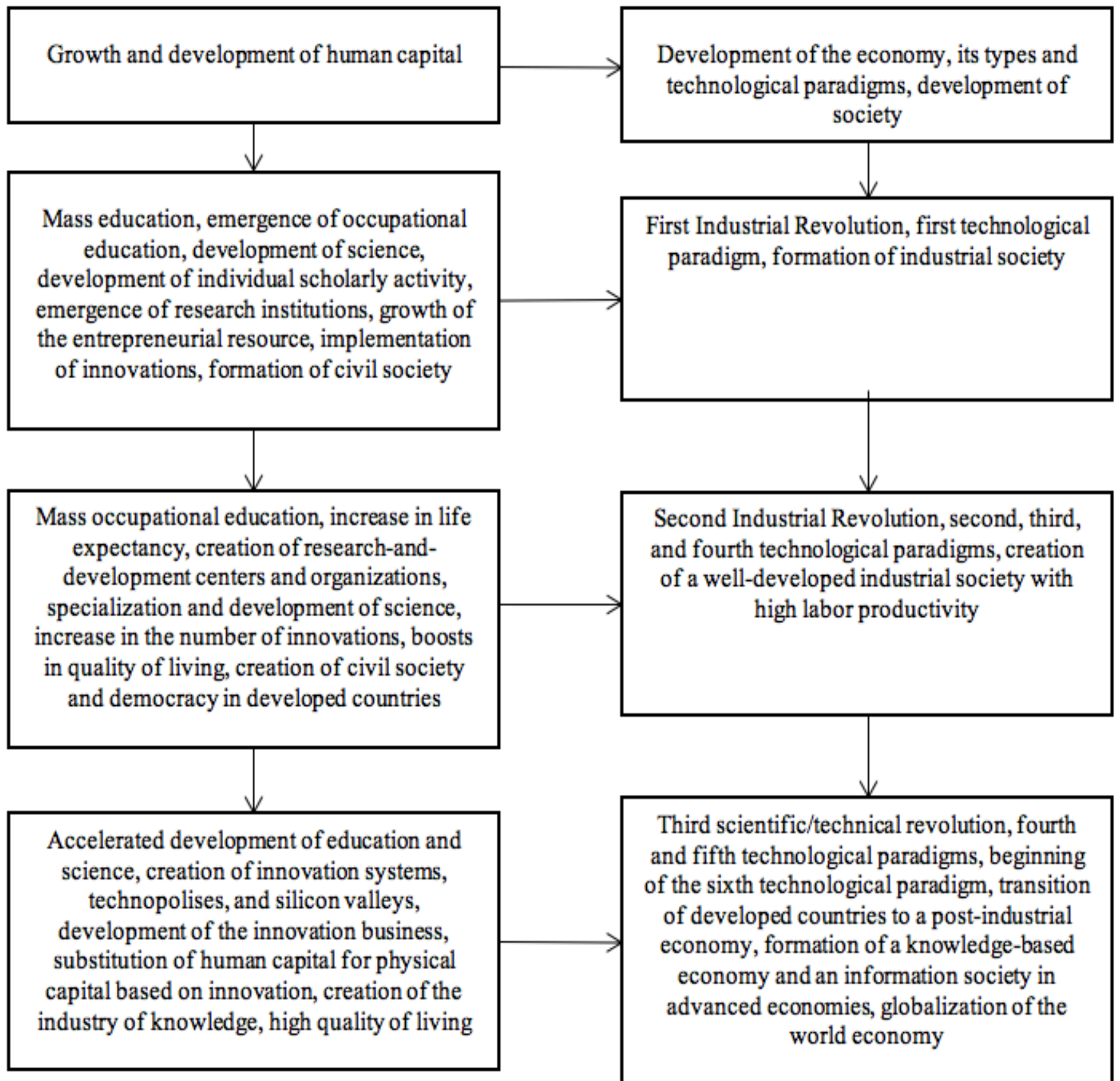
3.2. The role of human capital in a company's innovation-driven development

Human capital is a measure of the economic value of an employee's knowledge and skill set. The concept of human capital implies that not all types of activity are equally beneficial for the company and that investing in the development of human potential can significantly boost the quality of its personnel. Human capital is a reserve of knowledge, habits, talents, skills, abilities, experience, and intellect materialized in the capacity to do one's work in such a way as to produce a desired effect.

Figure 1 clearly evidences how significant human capital is to the development of an innovation-driven economy and vividly illustrates its interrelationship with various technological paradigms.

Figure 1

Human capital as an intensive factor for development and a key driver of scientific/technical development and of the change of technological paradigm (Izmailova et al 2016).



Without question, human capital is a key driver of economic development. Innovation provides the basis of economic growth and facilitates a shift to an innovation-driven economy. A production process predicated on innovation is about transforming knowledge into a new product. Thus, effective innovation activity implies an augmentation of the role played by people's creative abilities. In this regard, there arises a need to create the conditions for one's all-round development through investing in human capital.

Investment in human capital is normally thought of as expenditure associated with funding education, training, and healthcare services.

Preparing specialists for competing efficiently within a knowledge-based economy requires creating a new model of continuing education. In order to keep in the loop with all the new changes around them, specialists need to continually learn new things and keep learning throughout life, employing methods of both formal and non-formal learning. Formal learning incorporates structural training at educational institutions of a varying level. Non-formal learning, or non-structural training, can be undertaken anywhere, including at home or at work. One of the more progressive forms of non-formal education is mentoring.

Structural capital includes a company's trademarks, business processes, databases, business rules and procedures, special technical knowledge, corporate culture, styles of management, organizational history, and everything that forms the basis of future success, as well as

formal procedures for exchanging experience, etc. Structural capital, in contrast with human capital, is wholly owned by the company.

Modern-day companies engaged in innovation activity are expected to especially focus on the following areas:

1. Creating a knowledge base incorporating information on staff's key competencies, knowledge, and skills.
2. Developing relevant occupational and supplemental staff training programs.
3. Studying the dynamics of change in labor productivity based on key performance indicators.
4. Developing effective methods for promoting continuity and mentoring.
5. Developing programs for fostering managerial and leadership skills in staff.

The knowledge base can be used to train new employees. Using the knowledge base one can easily locate a professional who is capable of resolving a particular issue. Information for the knowledge base can be obtained through the conduct of interviews, which can be developed for each business unit and functional sphere of activity within the company. It may help to reprocess the interview results so as to make the base easily accessible and easy to use.

A company's economy may be referred as a knowledge-based economy if:

- the company creates on its own or brings in new knowledge and creates an innovative product based on it;
- the company is active in ramping up its intellectual potential and managing information and knowledge flows to create new non-material assets which can ensure it a competitive edge in the market.

Today, new knowledge is becoming an independent factor for economic growth, and possesses the following crucial characteristics: changeableness, integrity, temporariness, disproportions between costs and end results, replicability, discreteness, and inexhaustibility. Further, new knowledge ought to be represented in an easily accessible form and kept in a state of maximum readiness for practical application.

3.3. Sources of new knowledge

New knowledge is the outcomes of intellectual activity that possess some novelty. New knowledge may be protected by the government as intellectual property. To stay competitive, present-day organizations ought to be instrumental in creating, locating, and obtaining new knowledge and exchanging it so as to be able to resolve various issues and put their potential to full use. Currently, increasingly more companies are incorporating knowledge management into their overall business strategy (Zack 1999).

New knowledge possesses the features of an innovative resource, as it is capable of materializing into an innovative product. Innovative resources are regarded as special means that are needed in order to produce innovative goods and services and that help drive economic growth in a region and, as a result, help derive an economic, social, environmental, etc., effect from their realization.

New knowledge can come into the organization from a variety of diverse sources. All sources of new knowledge can be divided into several groups. On the one hand, sources of knowledge can have an external (e.g., consultants, business coaches, and research establishments) element or an internal (e.g., a company's staff or its business units) one to them. On the other hand, knowledge can be obtained collectively (e.g., in company with educational institutions or competitors) or individually (e.g., by each specific employee of the company or through enlisting the services of a third-party professional). In this regard, the authors are proposing the following classification of sources of new knowledge in an organization, which is represented as a matrix (Figure 2). This classification model implies identifying a set of conditions that will ensure the creation, reproduction, and accumulation of innovation resources in a company. And that is what a source of new knowledge is all about.

Figure 2
Matrix of sources of new knowledge

Participation in the process of acquiring new knowledge

Entourage	External	Square III Consultants, business coaches, stockbrokers, and technology (innovation) brokers	Square I Educational institutions, research establishments, outsourcing, crowdsourcing, partners, competition
	Internal	Square IV Inventors, efficiency experts, intrapreneurs	Square II Innovation teams. Business units concerned with R&D
		Individual	Collective

The first segment brings together sources of innovation that are predicated on a synergetic effect resulting from the company's efficient interaction with its entourage on a collective basis. This kind of cooperation implies interaction with educational institutions, research establishments, outsourcing and crowdsourcing companies, partners, and even competitors in realizing innovative products, services, technology, etc. This is the most cost-intensive option for companies keen to obtain new knowledge as part of their innovation activity. These organizations often lack the resources to fund full-scale market research and R&D activities, as well as to provide proper training and retraining of the workforce.

The matrix's second segment incorporates sources of new knowledge under which new knowledge is created and brought in by business units within the company itself. Here emerges so-called 'corporate knowledge' – knowledge the right of ownership of which belongs not to a staff member who has developed a new product or a new idea but the company as a whole and stays with it even after that person is laid off. Notice that the company must possess sufficient financial, material, and labor resources to be able to organize R&D activities on its own. Yet, not all companies have that kind of financial capacity to be able to run an R&D unit of their own.

The most accessible way to work out new knowledge for most is the one illustrated through the matrix's third square. This square implies interaction between the company's specific staff member with external partners during the process of working out innovative ideas. As a rule, these partners include brokers, consultants, and business coaches. In implementing this source of new knowledge, the staff member is to create an extensive network which is formed as a result of their business trips to other enterprises, participation in conferences, and visits to trade fairs.

The fourth segment of the matrix implies that the basis for obtaining new knowledge is the company's actual staff member, including their inner potential. Therefore, a special role here is played by the availability of inventors in the company who are capable of developing innovations and implementing them in the company's practical activity. This kind of internally innovative development in a company is referred to as intrapreneurship.

Intrapreneurs are individuals who are capable of taking on responsibility for the implementation and practical utilization of innovations in the company's activity and coordinating the actual process of transforming new knowledge into an innovative product. To be able to effectively realize a source of new knowledge within this segment, the company needs to have in place a well-thought-out system of motivating its staff members and stimulating their enthusiasm for innovating. Further, material remuneration alone is not enough. As is indicated by research, of the greater significance in terms of driving efficiency are non-material incentives – especially, if they are employed to galvanize innovation activity based on a long-term perspective. A major type of this kind of incentivizing is the possibility of a staff member advancing up the career ladder.

At a certain point in life, every person develops a need to be recognized as an integral member of the team and to occupy a certain position in society. In this regard, an essential incentive for innovation activity is competition or rivalry among a company's staff members.

Thus, the authors' matrix of sources of new knowledge could help a company to rationally plan out its innovative activity, engaging in the innovation process those of its elements that are most facilitative of the realization of that knowledge in practice.

4. Discussion

By definition, the successful development of a knowledge-based economy is dependent on how efficiently one employs relevant ideas, not how well one utilizes available material resources. It is innovative ideas that serve as a catalyst for the development of any company and economic growth in the nation as a whole. It is in a knowledge-based economy that knowledge is created, obtained, passed along, and utilized most effectively by companies and communities with a view to helping drive economic development. A knowledge-based economy is predicated on the following three major components:

- providing government support for the purpose of stimulating the effective use of existing and new knowledge;
- having in place teams of well-educated and well-qualified professionals focused on creating and utilizing knowledge;
- having in place a dynamically developing information infrastructure to enable the effective exchange, distribution, and processing of information.

New knowledge is a key factor for a company's development on an innovation basis. Notice that activity on creating and bringing in new knowledge is normally of a casual, rather than permanent, nature, which is due to the lack of an integrated, systematic approach to planning innovation activity. Classifying sources of new knowledge helps simplify the process of planning innovation activity, as well as minimize the level of uncertainty present in the dealings of business entities within the innovation sector.

5. Conclusion

A modern-day enterprise ought to have the capacity to both generate and bring in new knowledge and to translate new knowledge into innovative products. In this regard, of special significance is the level of practical use of new knowledge in companies' innovation activity, including in planning innovation activity.

The success of innovation activity largely depends on whether or not the company is able to make the right choice of sources of new knowledge matching its innovation potential and strategy for development.

In analyzing the strengths and weaknesses in the performance of the company's staff with regard to working out innovative ideas, as well as in planning its innovation activity overall, one is expected to rely on information on sources of new knowledge.

The authors' classification of sources of new knowledge may help companies to not just effectively implement the process of motivating their staff members and stimulating their enthusiasm for being efficient in their work, based on the more suitable forms of incentivizing innovation, but also help them to competently plan out their innovation activity

as a whole. This, in turn, may help drive the company's development and enable it to properly respond to actual and potential competition in the unstable economic conditions of today.

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1. University of Technology. 42 Gagarin St., Korolev, Moscow Oblast, 141070, Russia. E-mail: nataxoroshavina@mail.ru

2. Financial University under the Government of the Russian Federation. 49 Leningradsky Ave., Moscow, 125993, Russia.

3. Financial University under the Government of the Russian Federation. 49 Leningradsky Ave., Moscow, 125993, Russia

4. Financial University under the Government of the Russian Federation. 49 Leningradsky Ave., Moscow, 125993, Russia

5. South Ural Institute of Administration and Economics. 9A Komarovsky St., Chelyabinsk, Chelyabinsk Oblast, 454052, Russia

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