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KNOWLEDGE MANAGEMENT AS A BASIS FOR COMPANY'S INNOVATIVE DEVELOPMENT *

The article presents a conceptual management framework for production, accumulation and commercialization of new knowledge as the basis for companies innovative development. Types of knowledge that allow choosing effective strategies for company's innovative growth are defined. Strategies of innovative development are classified by the degree of product innovation novelty for an industry, as well as type of business of the innovating enterprise. An approach to providing a harmonized interaction of different knowledge types is offered to follow in the process of enterprise's innovative development.

Keywords: knowledge management; knowledge production; commercialization of knowledge; innovative enterprise; innovation strategy.

Сергій М. Ілляшенко, Юлія С. Шипуліна, Наталія С. Ілляшенко УПРАВЛІННЯ ЗНАННЯМИ ЯК ОСНОВА ІННОВАЦІЙНОГО РОЗВИТКУ ПІДПРИЄМСТВА

У статті розроблено концептуальні засади системи управління продукуванням, накопиченням і комерціалізацією актуальних знань як основи інноваційного розвитку підприємства. Визначено і систематизовано види знань, які дозволяють обрати ефективні стратегії інноваційного зростання підприємства. Виконано систематизацію стратегій інноваційного розвитку залежно від ступеня новизни продуктових інновацій для галузі, а також типу інноваційного бізнесу підприємства-інноватора. Розроблено підхід до забезпечення узгодженої взаємодії знань різних видів у процесі управління інноваційним розвитком підприємства.

Ключові слова: управління знаннями; продукування знань; комерціалізація знань; інноваційне підприємство; інноваційна стратегія.

Табл. 2. Рис. 2. Літ. 20.

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В статье разработаны концептуальные основы системы управления продуцированием, накопления и коммерциализации актуальных знаний как основы инновационного развития предприятия. Определены и систематизированы виды знаний, которые позволяют выбрать эффективные стратегии инновационного роста предприятия. Проведена систематизация стратегий инновационного развития по степени новизны продуктовых инноваций для отрасли, а также типа инновационного бизнеса предприятия-инноватора. Разработан подход к обеспечению согласованного взаимодействия знаний различных видов в процессе управления инновационным развитием предприятия.

Ключевые слова: управление знаниями; продуцирование знаний; коммерциализация знаний; инновационное предприятие; инновационная стратегия.

Problem statement. Last decades of the twentieth century introduced a number of changes in the ratio of economic growth. Leading positions were taken by innova-

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tions based on information and knowledge. They are the driving force and the limiting factor for economic development. The knowledge economics began to form (post-industrial by A. Toffler (1970), in which competitiveness of national economies and individual businesses are increasingly determined by the ability to produce and use knowledge. Under these circumstances, there appeared an urgent problem of production and commercialization of knowledge management for both the state and individual businesses. Its solution determines the priority areas for knowledge production within global trends and available capacities and to select effective ways of commercialization: implementation of new products and technologies, their development and production, methods of production management and marketing.

Recent research and publications analysis. Knowledge production management and knowledge commercialization have been studied in the works of many foreign and domestic scholars. T.M. Koulopoulos and C. Frappaolo (2008) cover general approaches to knowledge management. K. Janetto and A. Willer (2005) study the issue of developing and implementing corporate strategies of knowledge management. A.L. Haponenko and T.M. Orlova (2008) investigates the methods of knowledge capitalization.

I. Golysheva et al. (2014), T.G. Myasoedova and R.O. Shevchenko (2007), D.S. Suslov (2012), B.Z. Mylner (2003) explore some aspects of the formation of knowledge management system at contemporary enterprise. I.P. Moysenko (2004) highlights the approaches to the construction of some elements of knowledge management systems, also noting the need to create organizational culture and a structure of knowledge management. Y. Vovk (2013) studies the role of staff in knowledge management at enterprises, showing the role of knowledge in enterprise development.

V. Tomakh (2014) proves that knowledge has a key role in providing enterprise adaptation to changes of environmental conditions, identifies the stages of knowledge management. I.V. Cherkasova (2010) explores the role of knowledge in forming the innovation potential of a company. O.V. Vostryakov and O.M. Grebeshkova (2009) show the central role of knowledge in strategic management, analyzing the practical aspects of knowledge management at enterprises.

Unresolved issues. The available literature analysis shows that these studies consider mainly the overall perspective of knowledge management at enterprises. They do not highlight the characteristics of their transition to innovative development. There is also a gap in the research on the role of knowledge in providing innovative growth of companies and specification and coordinated interaction of knowledge types. They are necessary for elaboration of innovative development strategies, knowledge management at innovation-oriented enterprises etc. Resolving these issues enables management of production and commercialization of new knowledge at enterprises, choosing effective directions of innovative development regarding both external and internal conditions.

The article aims at developing the principles of management for production, accumulation and commercialization of new knowledge as the basis for company's innovative development. The main tasks are:

- to identify and classify kinds of knowledge that enable choosing effective strategies of company's innovative development;

- to classify innovative strategies by the degree of novelty for the branch of product innovations, as well as the type of innovative business of innovator enterprises;
- to develop an approach to harmonized interaction of different types of knowledge in management of innovative enterprise development;
- to develop the principles of knowledge management system formation at innovatively active enterprises.

Key research findings. Systemic analysis of literature and management practice has allowed identifying the main types of knowledge in order to choose further an effective strategy of innovative development. The article deals with knowledge as the ability to use a certain set of facts and rules to solve problems in a particular subject area, as an intelligent product and an object of market exchange.

Consideration of knowledge is advisable to conduct according to the stages of innovative development strategy:

- The essence of stage.
- Procedure of works at this stage.
- Types of knowledge (scientific: ideas, theories, hypotheses, scientific laws, regularities, concepts etc., including theoretical and empirical; technical: patents, inventions, know-how, algorithms, processes, technology, drawings etc., professional: know-how, skills, abilities, experience etc. (Illyashenko and Shypulina, 2013).
- The results of operational phase.

1. Forecasting promising development directions of industry (market) in which the enterprise operates. Forecast of this kind involves the following procedures: marketing forecast to identify the most likely trends in consumer demand for products of this industry; expert assessments of the state of science and technology to identify opportunities for implementation of existing and future groundwork in sector analyzed (or related) into new products, technologies of their production and promotion that meet customers' needs.

The implementation of these procedures requires knowledge of the following types:

- Knowledge of microenvironment: the current situation at the industry market and trends; enterprise's market positions; current and future market opportunities and threats etc.
- Knowledge of macroenvironment and its individual components: political and legal; socio-demographic; economic; ecological; technical and technological;
- Knowledge of the current phase of economic cycles (N.D. Kondratieff (2002) – 40–60 years; S.S. Kuznets (1930) – 25 years; C. Juglar (1862) – 7–11 years; J. Kitchin (1923) – 3–3.5 years and placing a particular manufacturing industry into them.

As a result, commercially promising areas of scientific and technological development of the analyzed area (market) can be singled out.

2. Identification of priority areas for innovative development and market opportunities for the enterprise. To do this one should analyze the correspondence between the internal capacity of the enterprise for innovations and external defined at the previous step. The analysis provides the evaluation of subsystems and components of innovative development potential and comparing them with critical values. Such an analy-

sis is performed for each perspective direction of innovative development, as a result, directions that meet external and internal conditions are identified.

The analysis requires knowledge of subsystems of innovative development potential (company's possibility):

- Market (marketing) as the availability of consumer demand for innovation sustained by purchasing power, or the possibility to form it.
- Innovative as possible implementation of science and technology in product, technological, other innovations that can satisfy consumer demands.
- Productive as the technical ability and economic feasibility to develop, produce and promote innovations at a market, including its components: financial, human resources, technology, marketing, organizational management.

As a result, the perspective directions of company's innovative development are determined.

3. *Elaboration of an innovative development strategy.* At this stage, the type of innovation development strategy is chosen (Freeman, 1982) supplemented by the authors):

- Offensive, which involves creation and active implementation of innovations (if the company has strong scientific, research and design departments);
- Defensive, which involves improving product, the technology of its production, promotion methods etc. (if the company has a strong marketing department).
- Simulation, which involves the acquisition of licenses and the subsequent deployment of production innovation, or acquisition of patents and technical preparation of innovation production, followed by the sale of licenses for its production (the company alone does not create innovation).
- Dependent strategy adhered by enterprises that manufacture components for innovative products to other businesses (a subtype of offensive or defensive).
- Traditional, involving only minor product improvements (company manufactures unique products or has unique technologies);
- Niche strategy (used by companies manufacturing innovative products that address specific needs of small groups of consumers).
- Licensing, which involves the search of partners for implementation or selling innovations (patents, licenses etc.), it is typical for small companies of innovative businesses which are limited in their capabilities.
- Mixed as a combination of different strategies for different target markets or their segments.

The strategy type choice is stipulated for awareness of the stages of innovative and life cycle of new products (at the scale of a particular industry). These products are supposed to be produced and commercialized within promising areas of innovative development selected at the previous step. Thereby products may be new for the analyzed company, but already common for the industry in general. The selection pattern is presented in Table 1.

Summarizing paragraphs 1–3, a bigger scheme of interaction of knowledge complexes in the process of forming the innovation strategy is developed (Figure 1). From Figure 1 it follows that during the work process of steps 1–3, an analysis of feasibility of new knowledge producing and direction of their commercialization is performed (selling of formalized knowledge in the form of a patent or a license; imple-

mentation of knowledge into new products, technology etc.). The feasibility of producing a certain type of knowledge (scientific, technical, technological, professional etc.) is determined by the assessment of sufficiency or inadequacy to implement promising areas of innovation development of market opportunities. In addition, new knowledge empowers enterprises (promote the growth of innovative development potential – IDP), so updating the existing knowledge and its production is a major prerequisite for innovative development of any enterprise.

Table 1. Variants of the innovation cycle and the corresponding types of innovative business and innovation strategies, authors'

Strategy type	Innovative business type	Stages of innovative cycle				Stages of life cycle			
		Generating ideas and developing new product concepts	Business analysis	Production	Market tests	Introducing to market	Increasing volumes	Maturity	Withdrawal from the market
Licensing	Venture								
Simulating									
Licensing									
Simulating	Explorant								
Niche	Patient								
Traditional defensive	Violent								
Niche	Commutant								
Simulating	Combined								
Offensive									
Defensive									

In this context, it is not so much about professional knowledge of personnel management which is sufficiently investigated, it is more about scientific and technical knowledge that will encourage selection and implementation the existing and future directions of innovative development of market opportunities. These include:

1. Scientific knowledge concerning: cyclical economic development and approaches to determining the phases of economic cycles; methods of forecasting the trends in the external macroenvironment; methods of forecasting of scientific and technological trends of the industry in which the analyzed company functions, related industries, and their impact on the sector (industry).

2. Scientific and technical knowledge concerning: discoveries; the latest scientific and technological advances in the industry which are recorded in the industrial property rights (patents, utility models, designs, know-how etc.), scientific books and articles, reports at conferences; employees innovations; sources, algorithms and procedures for search, analysis and selection of scientific and technical information; methods and procedures for diagnosis of the IDP condition at enterprises and so on.

Indicated knowledge combined with knowledge of enterprises' IDP allows choosing rational ways of implementing and strengthening the existing competitive advantages, which, as shown by N.S. Illiashenko (2014), make the basis for outstrip-

ping innovative development. This will keep from repeating the path others have gone and win a strong position at markets, but choose own way, realizing own potential benefits, occupying leading positions.

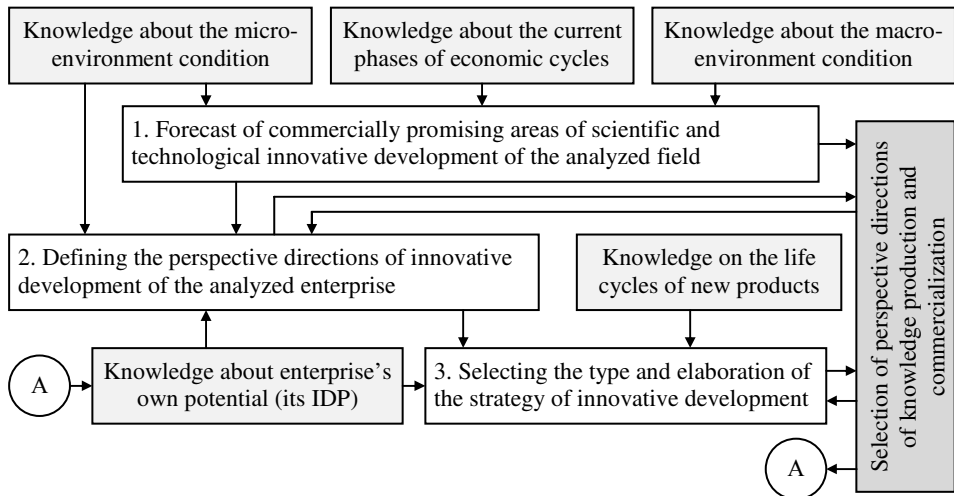


Figure 1. Scheme of knowledge complexes interaction in the development of company's innovative strategy, authors'

The necessity in acquiring or producing knowledge in a particular area can be identified by analyzing the problems that hinder its development. The choice of priority directions for production and commercialization of knowledge (at the enterprise level) can be made according to the forecasted trends in science and technology and variations of consumer demand due to changes in the external micro- and macroenvironment.

Hence, the success of enterprise's innovative development depends on the effectiveness of production and commercialization of its staff's knowledge. And the effectiveness is determined by the level of enterprise's innovative culture, which is a part of corporate culture. The last one characterizes the degree of availability and predisposition of individual employees, groups of employees (units) and the organization as a whole to innovations, their willingness to apply innovations in new products, technologies, management decisions etc. In fact, innovative culture is an essential component of innovation-friendly environment at the enterprise.

Subject to this, the scheme of knowledge management in innovatively developing company is proposed (Figure 2).

According to Figure 2, knowledge management system includes 3 interrelated subsystems: education, knowledge production, knowledge application. Knowledge management is based on the organizational structure of a company, communication system, corporate culture and innovative culture as its component. In the process of knowledge management these subsystems are modified and adjusted.

Correlation of the role and importance of knowledge management subsystems depends on the type of innovative business of the enterprise (Table 1), the choice of which depends on the IDP of the enterprise and market conditions.

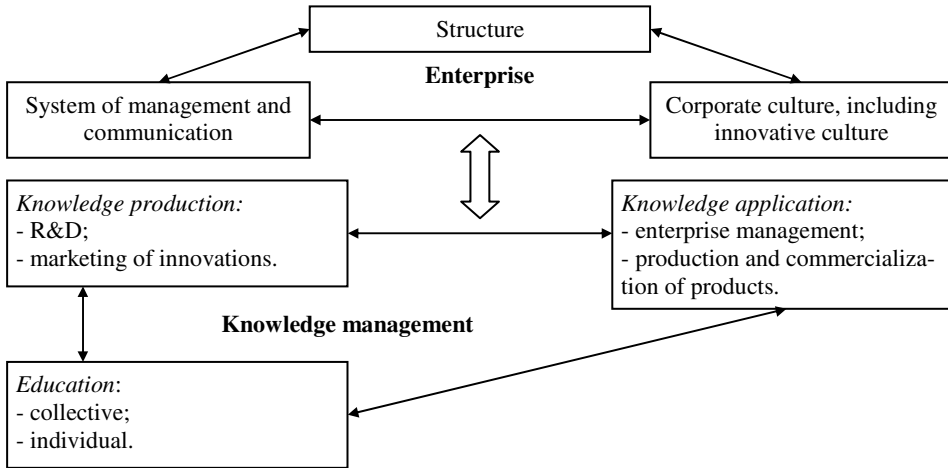


Figure 2. Structure of knowledge management at the enterprise-innovator, authors'

Table 2 presents the authors' vision of tasks for knowledge-producing subsystems on the stages of the innovation cycle. On the basis of Tables 1 and 2 one can prioritize knowledge management subsystems for different types of innovative businesses.

Table 2. Objectives of research and development and marketing of innovations on the stages of the innovation cycle, authors'

Innovation cycle stages	R&D	Marketing of innovations
Generating ideas and developing product concepts	Methods: generation and selection ideas, prototype analysis, brainstorming, synectics, eliminating "dead end" situations morphological maps and more. Forecasting technical and economic features of product innovation.	Analysis of current and future customers' and other market participants' demands. Conformity assessment of new products with market participants. Searching for the ways to enhance market appeal of product innovations.
Business analysis	Specification of technical and economic features of product innovation. Forming a business idea, the main aim and the tasks of the innovative project. Technical and economic grounding of the project.	Complex market research, strategy and marketing program development to promote a new product at a market. Evaluation of marketing potential of the company.
New product development	Design and technical documentation development, working off the technology, preliminary tests of a prototype, state tests (if necessary).	Specification of a target market, estimation of product innovation competitiveness, development of market testing program.
Market tests	Correcting the design of product innovation and its production technology on the results of market testing.	Testing marketing method.
Introducing innovation to market	Complex market research for improvement of new products and production technologies.	Implementation of the marketing innovation. The analysis of market adequacy of new products and market conditions.

Generalization of the above leads to the following **conclusions**:

1. The main knowledge types are systematized here and the pattern of their interaction in the development of company's innovative strategy is reproduced.

2. Innovative development strategies are systematized. According to this systematization one can choose an appropriate strategy to apply depending on innovation cycle of a particular product innovation, as well as the type of innovative business of the enterprise.

3. The authors' original approach is introduced to building a conceptual model of knowledge management in the innovatively developing company. The structure of knowledge management system is elaborated.

4. Tasks of knowledge production subsystem components by the stages of the innovation cycle are defined and systematized. An approach to the prioritization of knowledge management subsystems at the company is offered, depending on the type of innovative business.

The results show that enterprise transition to innovative development requires actual knowledge on the conditions and trends of external macro- and microenvironment and its innovative development potential. Coordinated interaction of these knowledge complexes in the process of adjusting internal and external factors for development is the basis for innovative strategies' effective implementation.

This significantly deepens the conceptual foundations of innovative management in part of the formation of effective mechanisms for knowledge management (production, accumulation, application) at innovative enterprises as the basis of their development. Their practical implementation will reasonably determine the priorities of knowledge production based on the world trends and available potential and also help choosing effective ways of their application through the creation of product, technology, management and others innovations.

Further research in this direction should focus on the creation and scientific grounding of formal methods and procedures of knowledge management in the process of effective strategies production for outstripping innovative development of the company.

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