

The management system of cognitive economics

Irina Nikulina^{1,a}, Igor Khomenko¹, Stanislav Zaharov¹, and Evgeniy Nehoda²

¹Tomsk Polytechnic University, 634050 Lenin Avenue, 30, Tomsk, Russia

²Tomsk State University, 634050 Lenin Avenue, 36, Tomsk, Russia

Abstract. The article contains various definitions of cognitive economy. An economy based on knowledge, should be provided by a modernized management system, which allows solving the problems of modern organizations in their functioning and development. The modern control system can effectively influence the cognitive economy through the highlighted items at the levels of the organization, thereby forming a complex of facilities management. The knowledge economy relies on the laws of the globalization, different directions of development of science and practice of management, prediction of the future, as well as the changes taking place in today's business environment. In such an environment of modern society business is seen as an experiment. Various theories and management concepts are developed and supplemented with the changes in the life of people, organizations, industries and countries. Knowledge management concepts and theories are needed for technology of managerial work. In the era of cognitive economy, a manager must have the ability to use existing knowledge of management innovations applied to a particular situation, as well as to select areas of knowledge application for the development of the organization.

1 Introduction

Society development requires new conceptual approaches to the management of different areas of the economy and institutions of our country. The innovative development of the Russian economy is no longer disputed by scientists and practitioners, understanding that without using all the components of cognitive economy (knowledge economy), the dynamics of social and economic development cannot take place, or the pace of that development will not satisfy Russians.

Definition of an economy based on knowledge is viewed by scientists differently. It may be defined as a search for new paradigms and concepts of the development of society, economy and quality [1] and complex structural and logical relationships among intangible assets: human capital, various forms of knowledge and information as a potential knowledge [2] and the scope of the new economy, based on priority of reproduction of knowledge and innovation activities of enterprises [3] and other similar definitions. Our society seems to understand and accept the existence of an economy based on knowledge, yet introduction of the knowledge economy in the industry and clusters of the Russian economy is going with many complications and only with points of success stories. One of the reasons why knowledge economy does not successfully interpenetrate industrial economy is the absence of the management system for this process.

^a Corresponding author: nie@tpu.ru

Relying on a combination of research methods of systems it is possible to assert with confidence that the best management system is the one that most effectively solves the problems facing the economy of knowledge. The Russian society has not proven market traditions, values landmarks, and criteria for "market civilization." The society has yet to develop the concept of a management system that could be considered adequate to conditions of our country, especially in relation to knowledge economy. That is why each top manager organizes management in her/his organization, relying mainly not on commonly accepted values and views, but on her/his individual perception of reality.

Due to these reasons the national top managers still consciously or unconsciously are guided in their management by two sources - past experiences of organization managing and foreign experience. The first source helped them inherit a number of management practices that suited different historical conditions yet have become outdated and applicable only in a modified form. A second source does not help either, because foreign experience at best, needs a very difficult adaptation to domestic conditions (and often the method of management itself is not known), and at worst, which happens more often, it is simply not suitable for Russia.

In the years of perestroika, the success of a Russian economic entity was defined as a rule, not by the high quality of its management, but by completely different

factors. In these circumstances, it seems that managers can not particularly think about the concept of management and the quality of the relevant set of tools. However, the situation began to change dramatically. Therefore, managers need to address management problems in full, relying on wide knowledge about various industries. Today innovative approaches in the management of certain resources and private organizations are not always used. This is caused not only by the fact that managers do not have to be scientists, but also by the fact that science can and should be able to abstract away, yet practice should never do that. It follows that between the theory of innovative management and applied management there is some discrepancy, which is natural. However, decisions, taken in the practical management implicitly, are based on fundamental scientific positions that have become common sense and proven practices [4].

2 Modern conceptual models of development of cognitive economy

2.1 Modernization of modern cognitive economy

Modernization of modern cognitive economy [5] means updating and improvement of the productive forces and industrial relations with the introduction of new information technologies. It has several models:

Enclave Modernization – selection and modernization of one leading driver-industry, while all other industries are trying to either catch up or leave the market.

Revolutionary Modernization - restructuring of all industries with the introduction of the cluster approach, cross-industrial management, a change of all technical and technological equipment, intensification of labor productivity, revision of standards, specifications and regulations, etc.

Organic modernization follows the path of variable development, using the flexibility of the system of industries adjustment, building renovation of sectors based on their significance for the strategic development of the country and its economy. Here there is total coordination of efforts of the state and business in creating and implementing the strategy of technical and technological development of cognitive economy.

Catch-up modernization, where the key role in the process belongs to the state, competition of ideas and ways of its implementation, is downplayed, thereby increasing the probability of mistakes of poor selection from development alternatives. In such circumstances, there is a need of assistance from the state as a partner.

2.2 A cluster model of cognitive economy development

A cluster model of cognitive economy development [6] is based on the scenario of long-term development of the national economy. It implies the growth of its competitiveness in traditional and knowledge-intensive

sectors. The increase in the quality of human capital implies an increase of its competitiveness in both traditional and knowledge-intensive sectors, the growth dynamics in improving the quality of human capital, labor productivity, the development of high-tech production and innovative economy. Solving these problems is possible by using the cluster approach. We consider the **cluster approach as a new technology of modern management of the cognitive economy**. Michael Porter defined a cluster as a geographically concentrated group of interconnected companies, specialized suppliers, service providers, firms in the relevant industries, as well as organizations associated with their activities (e.g., universities, trade associations) and competing in certain sectors, but at the same time cooperating [7].

Clusters have greater innovative ability for the following reasons:

- They react to customer needs more adequately and quickly.
- They have facilitated access to the new technologies used in various areas of economic activity.
- They include suppliers, consumers and enterprises in other sectors in the innovative process.
- As a result of inter-firm co-operation, they reduce the costs of R & D.
- There is intense competitive pressure in clusters, which is exacerbated by the constant comparison by companies of their own economic activities with those of the similar company in the cluster.

2.3 An innovative model of cognitive economy

In an innovative model of cognitive economy [8] the dynamics of the growth of national economies of industrialized countries today is determined by a complex of scientific-technical and innovation factors, development of new industrial technologies and a large-scale use of R & D results.

According to the rating of innovations the United States takes the first place and can be rightly called a country with developed innovative economy. Japan as another country with innovative economy tries to become a “technological nation by maximizing the use of intellectual potential, which is the greatest resource in the development of innovative technologies” [9]. Innovative economy is not only new products, technologies and services, but also more advanced management methods, production organization, commercialization, retraining and advanced training of personnel in the companies.

The system of indicators characterizing competitiveness of national innovation systems includes [9]:

- 1) talents and ideas (25% - specific importance of individual factors), including the education system in the country; availability of talents and organization of their mobility in the labor market; public R & D resources; the volume and quality of R & D;
- 2) commercialization (10%), including financial resources for innovation, and their availability; mobility

of venture capital financing; a structure for commercialization;

3) demand conditions (15%), including access to the market and demand conditions, civil and military government procurements;

4) technological infrastructure and clusters (20%), including intellectual property; standards and regulation; technological infrastructure; the level of production equipment; availability of traditional and new innovative clusters;

5) innovative potential of companies (20%), the technological level of the company; ability to borrow and generate knowledge;

6) institutions and the efficiency of public administration (10%), protection of property rights; independence of the courts; freedom from corruption; the quality of governance.

2.4 A model of economic system restructuring

A model of economic system restructuring under which we understand not a set of technical procedures for the rescue of a particular group of enterprises, but a state-run process with a very clear coordination of all branches of power in the course of the structural changes in the economic system. It must be supported by corresponding changes in the manufacturing sector, tax, budget and information policy of the state and should focus on providing a reliable, dynamic economic system adequate to the needs of the economy. International experience shows that this process takes several years.

Therefore, there are many different models of development of cognitive economy and improvement on the basis of national economies. However, managers in Russia still need to rely on the experience of foreign countries.

3 Features of modern management and the current system of management of the organization

Solution of problems of organizational management with the applications of the knowledge economy can be assisted by modern management, which sometimes is referred to as innovative management (not to be confused with the management of innovation!). First, we need to define the notion of the main category - "modern management" - and then understand its terminological apparatus. Modern Management determines the targets in the organization and creates a mechanism for their achievement; it characterizes the quality of management, i.e. the effectiveness of the organization and management of the company in a constantly changing environment. Such an interpretation of the term with certain unprincipled differences is present in definitions of many of the authors. In our view, this definition blends two concepts: management of organization and management of its resources, which are not the same thing, although in general terms they can be, and it is rightly so, as one without the other is impossible. In other words, it is impossible to manage

the firm without managing its resources. In addition, this definition leaves out levels of management, combining vertical (people management) and horizontal (resource management) connections.

As a result, we understand *modern management* as a process where management is carried out by the goal-oriented impact of some participants of the management system (organization's employees) on other participants. Management is also carried out through information interaction between participants to achieve the optimal way to obtain new, much-needed economic benefits. Here, the object and the subject of management are people (employees of an organization). This process involves innovative forms of division and cooperation of labor in the organization and bringing them in line with the requirements of effective work in a real competitive environment and knowledge economy.

In turn, people in the organization can manage the resources (material and financial resources, personnel, information, energy). In this process, managers and employees of certain areas and parts of the organization realize a direct impact on these resources through the implementation of the relevant manufacturing operations or other similar activities that result in the transformation of these resources. Thus, the same objective as in the organizational management is achieved. When considering modern management as a system of management of the organization, it will be the management of inputs and outputs of the system.

In this case, we can talk about two levels of modern management, i.e. the level of *organizational management* and the *resource management* level. Also in accordance with that, all theoretical approaches to management problems can also be attributed to the above levels. The essential point is that each level of management has a variety of parameters with different properties to control different processes and relationships, operations and transactions. In addition to that, these parameters are not static – they change constantly under influences of modern endogenous and exogenous environment.

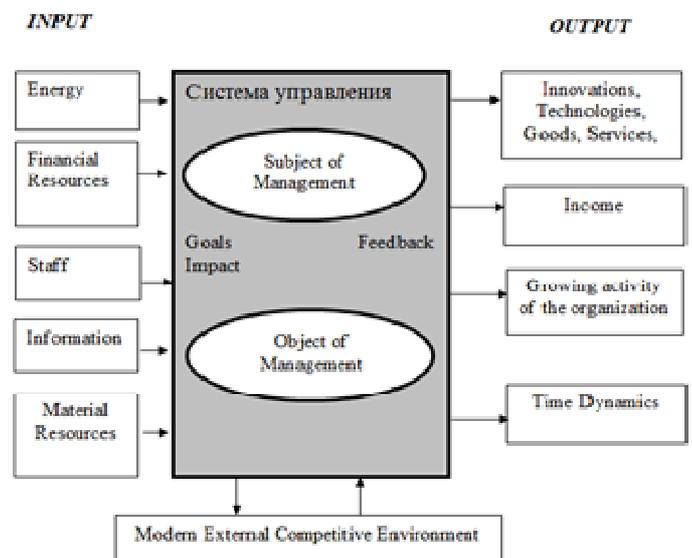


Fig. 1. The scheme of the modern management system

By combining the two levels of management (organizational and resource), modern management can be interpreted from the point of view of the theory of the system approach as a complex system of management of all processes and relationships that characterize the innovative activities of the organization (figure 1).

Modern management as a system performs the transformation of resources from environment, modifies them on the basis of new technologies of the management process and has internal subsystems: *managing and managed subsystems*.

A *managed subsystem* as an object of management, adequately perceives management actions coming from the subject of management, responds to it and notifies the managing subsystem of its new state and the state of the environment (feedback). The object of management can be all processes, resources and relationships that occur in an organization, which applies principles of knowledge economy in its activities. All objects of management form subsystems of management in the overall system of modern management.

Modern management of the organization has all the system-wide properties: *integrity; divisibility; openness; controllability and observability; identifiability; emergence*.

Resources included in the management system according to its group structure are divided into:

1. Tangible resources (buildings, equipment, office equipment, furniture and other equipment).
2. Financial resources (money) divided into outgoing flows and used flows, taking into account the permitted uses of financial flows.
3. Energy resources, which are understood as electricity and heat, gas and other energy;
4. Information Resources, whose role in the overall structure of the resource base in the framework of knowledge economy management increases dramatically;
5. Human resources, which under knowledge economy are represented by highly qualified specialists in the organization in a sufficient quantity.

All resource flows are interdependent and are focused on a certain system of management of the organization. All inputs of the organization management system influence the management system and its outputs influence the external environment.

In conclusion, we should emphasize once again that the modern management, which meets all the requirements of knowledge economy, has the properties of the system, has a complex set of management subsystems, its inputs and outputs in the form of resource support and feedback, which make up the basic elements of modern management (figure 2).

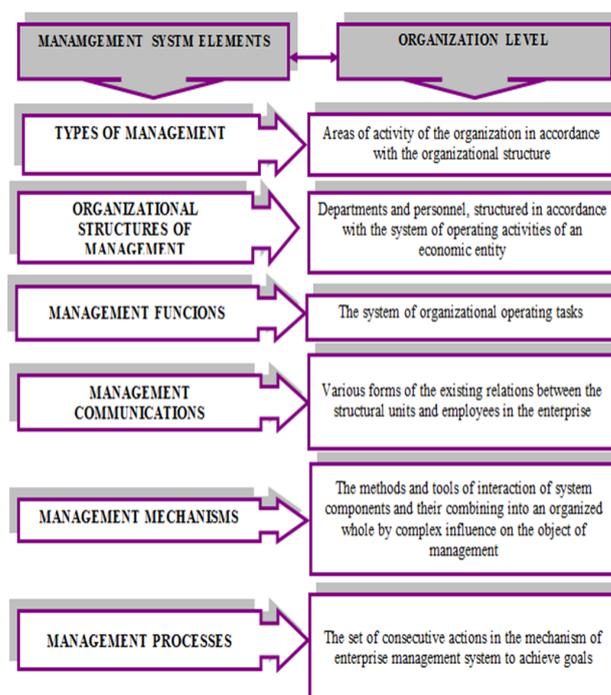


Fig. 2. Organization of intelligent energy system networks for improving the energy efficiency

4 Conclusions

As the conclusions we can state the following:

1. Prospects of development of an economy based on knowledge largely depend on updates of theory and practice of modern management, which, despite its shortcomings and imperfections, has entered the stage of postmodernism, using the different facets of innovation in different areas of application of the structural elements.

2. There is an urgent need for a theory of Russian modern management based on knowledge that would apply the research and developments in practice, arm managers with the knowledge, and would help them in their hard work.

3. Today the Russian Federation has no clear long-term strategy of the knowledge economy and concepts of its introduction to the sectoral economy. There are only basic principles of the economic strategy. Lack of theoretically processed experience of knowledge economy development strategies in different countries, non-identified strengths and weaknesses, as well as the analysis of the national specificity of such results lead to unpredictability of the Russian economy development in the near future.

4. In today's crisis, commercial organizations are not able to analyze theoretical developments in the field of management science, therefore scientists need to help practical managers in the use of achievements of modern management.

References

1. G.B. Kleyner, *Obsh. nauki i sov*, **3**, 56-69 (2005)
2. V.F. Potudanskaya, Ye.V. Yakovleva, *Kreat. Ekon.*, **3**, 11-18 (2009)
3. T.L. Luk"yanchikova, *Kreat. Ekon.*, **8**, 104-108 (2011)
4. I. Nikulina, I. Khomenko, *Social and Behavioral Sciences*, **166**, (2015)
5. I.E. Nikulina, *Probl. of Econ.*, **1 (10)**, (2013)
6. E.B. Lenchuk, G.A. Vlaskin, *Probl. of For.*, **5**, (2010)
7. M. Porter *Competition* (2003)
8. V.V. Kashirin, *Manag. & Bus. Ad.*, **3**, (2010)
9. S.A. Degnan, *Tech. Manag.*, **2**, 22 (1999)
10. E. Garipova, *Economics and Finance*, **27**, 194 (2015)
11. A. Faskhutdinov, *Social and Behavioral Sciences*, **210**, 188 (2015)