

Neural networks in the intellectual support of management decisions

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Abstract. The article analyzes artificial neural networks as an advanced direction in the field of creating artificial intelligence, as well as an effective technology in the intelligent provision of management decisions in organizations. The process of evolution of intracorporate management systems is considered on the example of a knowledge management system. Scientific forecasts for the further development of intellectual support for management decisions are presented.

Keywords: information systems, intellectual information technologies, neural networks, management decisions.

In the conditions of modern digital transformation of the economy, intelligent information technologies used to select optimal solutions to the problems are particularly relevant. The activities of the management of commercial companies are related to the need to make decisions of various complexity daily. Today, an important factor in improving the efficiency and normal functioning of the company is the rational organization of management and planning processes. This allows you to improve management and improve the quality of the managerial decisions, and also provides an information base for a promising analysis of situations.

One of the main problems when creating an information environment is the choice of a knowledge representation model. It is the model of knowledge presentation that defines the architecture, the capabilities and properties of the system, as well as the methods of acquiring knowledge of the intellectual system.

Currently, a number of basic models of knowledge presentation and their modifications are known - this is a presentation using the facts and rules, calculus of predicates, as well as neural, semantic networks, frames [6, p. 183].

Machine support algorithms for managerial solutions can be used in many areas, as a rule, where the automation of solving challenges is necessary for which the knowledge and experience of a person is customary. To date, neural networks are widely used. Neural networks are one of the directions of research in the field of artificial intelligence, based on trying to reproduce the human nervous system. Namely: the ability of the nervous system to learn and correct errors, which should allow to simulate, although it is sufficiently rude, the work of the human brain.

Historically, there are three main directions in modeling artificial intelligence systems [5, p. 39]:

As part of the first approach, the object of research is the structure and mechanisms of human brain, and the ultimate goal is to disclose the secrets of thinking. The necessary stages of research in this direction are the construction of models based on psychophysiological data, conducting experiments with them, nomination of new hypotheses regarding intellectual activity mechanisms, improving models.

The second approach as an artificial intelligence considers the second approach. Here we are talking about modeling intellectual activity with the help of computing machines. The purpose of the work in this direction is to create algorithmic and software for computing machines, which makes it possible to solve intellectual tasks not worse than a person.

Finally, the third approach is focused on the creation of mixed man-machine, or, as they say interactive intelligent systems, at the symbiosis of the possibilities of natural and artificial intelligence. The most important problems in these studies are the optimal distribution of functions between natural and artificial intelligence and the organization of the dialogue between man and the machine.

Solving specific tasks is preceded by the preparation of data for the neural network. In practice, it is a preprocessing of data that is the most time-consuming

element of neural network analysis. Moreover, the use and design of the basic principles and methods of predicting data is even more important than the development of actually neural network algorithms. The process of solving applied tasks, including the presentation of knowledge for the neural network, the preparation of the data is fully laid on the developer's shoulders.

The knowledge is understood as stored information or models used by man or machine for interpretation, prediction or reaction to external events [11].

Questions of knowledge include, in particular, the following: what information should be stored and how to present this information physically for its subsequent use. Thus, based on the nature of the knowledge, the method of their representation is determined by the goal. Regarding real applications "Intellectual" systems can be argued that the success of the solution depends on the good idea of knowledge. This also applies to neural networks as a separate class of intelligent systems. The form of representation of the input signals may be different. This leads to the fact that the development of acceptable neural network solutions becomes a creative process [3; 7; 14; 16].

In today's information flow, it is very difficult to take the right decision to consider a certain question. Neural technologies are used in solving such tasks in which there is no clear algorithm, accurate actions or formal rules that allow you to obtain the desired result without any difficulty. Decision making is a task that does not have certain rules. In solving this issue, it is important to make the right choice that it is often very difficult. The managerial solution is a choice that the manager must do in the process of implementing the management functions and solving specific organizational tasks. This decision is designed to ensure the promotion of landmarks, goals. Therefore, the most effective is the choice that will be implemented and will make the greatest contribution to the achievement of the ultimate goal [2].

In essence, the management decision is a creative, volitional action of a management entity, which is based on the knowledge of objective laws in the field of operation of a managed system and analysis of information on its operation. This

action consists in choosing a goal, program and methods of the team's activities to resolve the problem or change in the goal [9, p. 45].

In the conditions of occurring changes in production and technologies, people, their intellectual capital, knowledge and professional competence become the main resource for organizational development. In the modern information economy, such assets of the company as knowledge are of particular value. According to the Japanese organization theorist Ikudziro Nonaki, for the economy, where we can only say about uncertainty, knowledge is the only correct source of reliable competitive advantage [13].

As knowledge is the main asset of the company, they must be used as much as possible to improve the welfare of the company. Analysis of the evolution of internal corporate management systems shows that data processing preceded information systems, and the successor of the latter was the Knowledge Management system. Knowledge management as a system involves an integrated approach to finding, collecting, evaluating, restoring and disseminating all company information assets. These can be databases, documents, policies, procedures, as well as knowledge and experience of individual employees. For timely adoption of optimal solutions in a rapidly changing market, it is vital not only to have, but also reasonably use all the knowledge gained in the company.

According to the professor of e-business and knowledge management in the Syracuse of the University of Yogish Malhotra, knowledge management contributes to the setting and solving the right tasks, instead of the right solutions of the tasks themselves [4].

Knowledge management intersects with strategic management where it is about long-term conservation of competitive advantages. The task of knowledge management is to expand the powers of the organization and the creation of prerequisites for the company's successful activity. In this interconnection, knowledge management is understood as a certain business concept, according to which the organization is considered as a set of knowledge, where knowledge is resources that need to be managed.

But knowledge management system is not the last link in this chain. In modern conditions, the company's management must predict the coming processes, to warn all possible troubles and be aggressive. The management approach must be bold and creative, so as not to limit the intracorporate management processes by the framework of knowledge management systems.

The future of knowledge management systems are legitimately associated with super-sufficient solutions [8]. When classifying the processes occurring in the Company, allocate the corresponding types of managerial solutions [15]:

- the processes of using the existing potential for the production of products, performing work and services and, accordingly, tactical decisions regarding the use of the available potential of the production base;

- processes of creating, building and upgrading the potential of the company and, accordingly, the strategic most important decisions regarding the processes of formation (creation, replenishment, changes) of the potential;

- processes that ensure the creation and development of the company's reproduction base itself and, accordingly, super-strategic solutions that determine the potential for the development of the reproductive base.

For the life of the company as a whole, the system and decision-making mechanisms are important. It is from these components that the company depends on which funds will be allocated for development.

The basic principle of economic reforms of successful Western countries is the validity of the decisions made. This principle is implemented through scenario calculations of the effects of decisions made, including using economic and mathematical models working on the principle of "what will happen if ...".

One of the promising instruments for a quantitative assessment of the actions of the government currently actively used abroad is a new class of economic and mathematical models - computable models of general equilibrium, known in foreign literature as Computable General Equilibrium Models (CGE Models). This is a new direction in the applied economy, which allows you to find approaches to solving a wide range of human behavior modeling problems in a socio-economic environment

[1]. Sophisticated economic and mathematical models are offered (agent-oriented models) of economic entities of the macro level and micro-level agents with a large set of certain properties whose behavior is limited rational. The ultimate goal of the process to create such models is to track the influence of fluctuations of agents acting on the micro level, on the macro level indicators.

The state of modern control is not a prolongation of what was once or was already used in solving certain problems, but a completely new intellectual, informational and moral phenomenon [10]. The following key management trends are distinguished (fig. 1.) [12].

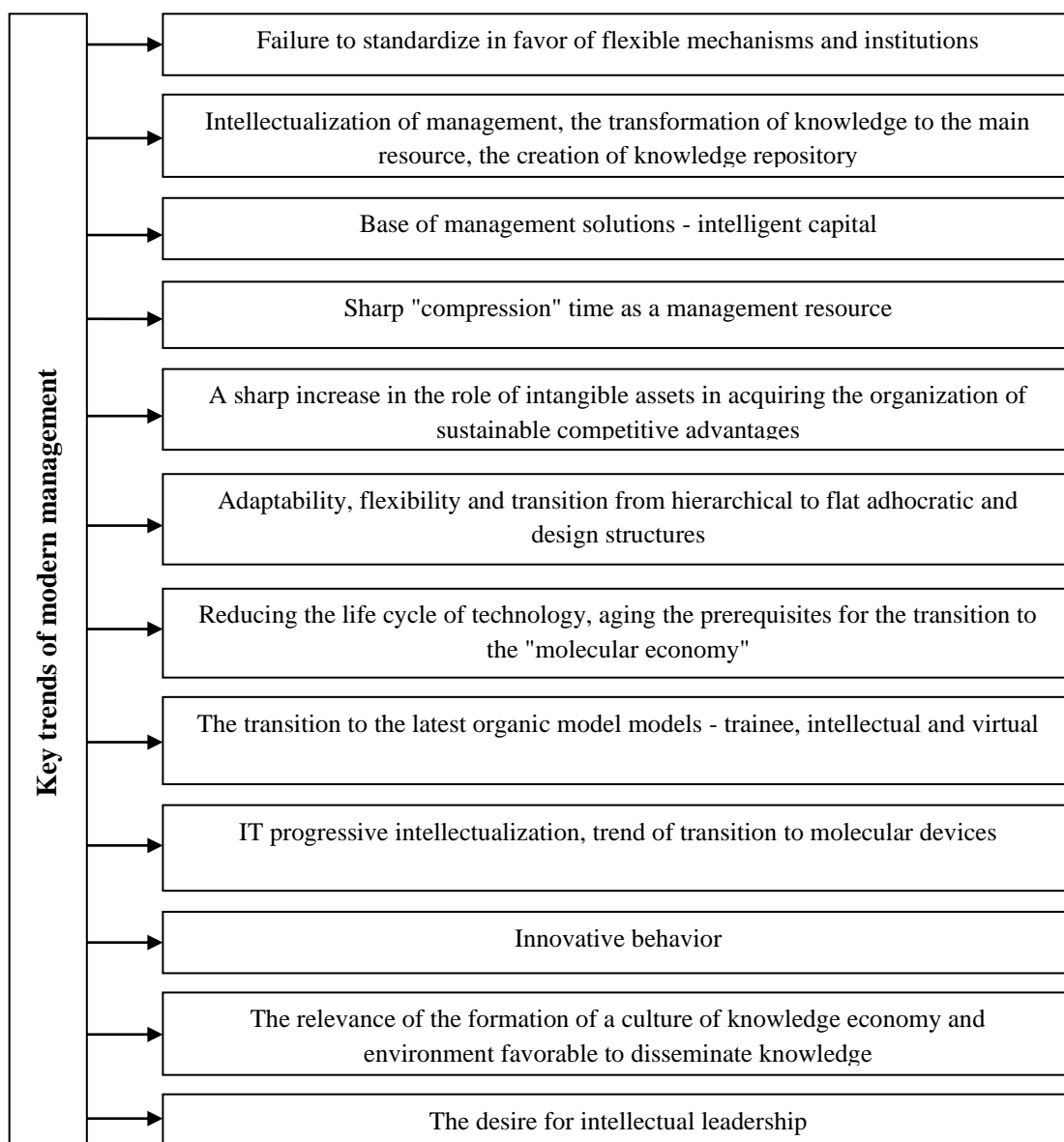


Fig. 1. Key trends of modern management

Researchers, breaking up a business into four areas: processes and technologies, product, organization and strategy, believe that it is in this order that most companies will begin to use the capabilities of adaptive technologies [10, p. 291].

Thus, the introduction, application and development of neural network technologies to manage the work of a specific company can lead to improved productivity and reduce the timing of the self-sufficiency of funds spent on the development of information technologies for supporting management and planned solutions.

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