Innovative management neural network modelling based on logistic theory

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Abstract. Logistical approach assumes the scheme of the variety of flows, including financial resources, material values and information with all of them being united in a specific flow of logistical resources. The paper covers the concept that the stages of the study are likely to form the research area being described as the net of the characteristics of the social and economic system subject to researcher consideration. The neural network considers attitudes of modern scientific thought on obtaining objectively true knowledge about the surrounding reality on the basis of the theory of logistic studies of unique innovative management developing systems. The different principles of training neural networks enable to independently determine the degree of influence of certain factors on the result of operations. Continuous innovative development of production processes, ongoing automation processes in all areas of industrial enterprises and other related changes in the knowledge economy increase the role of information and its processing in providing competitive advantages.

1 Building neural networks of innovation management

Innovative labor employees effectiveness is considered by professor Igor Ilin from the point of view of IT solution concept [1] whose researcher idea could be developed in the mainstream of logistic thought. In general, it could be proved that the result of converting knowledge, effort and money into new ideas is an invention, and the result of converting an idea into cash is innovation. One of the conditions for effective innovation, together with the mechanism of fair competition and the existence of a communication environment that provides a free exchange of ideas, can be considered the development and promotion of the ability and aspiration of the worker to creativity, to the generation of new knowledge. The tendencies of globalization and informatization of education presuppose the principle of openness of information networks, but the thesis of protecting the personality of the learner from the negative effects of the openness of educational technologies presupposes the creation of a system of filters aimed at strengthening the closeness of the education system [2-3]. Neural network (hereinafter referred to as a neural network) is a mathematical model,

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as well as its software or hardware, built on the principle of organization and functioning of biological neural networks likely nerve cell networks of a living organism. In general, a neural network is a mathematical model that has a structure similar to the human brain, whose purpose is to identify specific patterns in the available data. The main importance is the self-learning of the network for the verification of incoming stimuli. Learning based on information received from the external environment is adjusted over time (self-organized) in accordance with unique algorithms that are dictated by the specifics of the situation, reflecting the circumstances, events in the field of activity in a certain period of time, in a certain territory. With the accumulation of "experience" (processing and ordering of information), it becomes a serious "analyst" and acquires a developed recognition structure useful in forecasting time series, financial forecasting and forecasting market prices. Synaptic weights and ways of communication of the trained neural network with the outside world are unique in their kind. Thus, the financial reserve can be optimized using the neural network methodology. At the same time, the methodology has the value of accounting for the information diversity of a single stream of the company's material and financial resources. Artificial intelligence is engaged in the development of paradigms as well as algorithms of computer solutions for cognitive tasks including the processes of perception, transmission, analysis and recording of information in memory. The results of these or other operations depend on various factors and interrelated variables. The identification of a two-way correlation of events and results is the actual "applied aspect of the methodology", and one can say "experience", which is available to the network operator, to the logistics manager.

Industrial enterprises have already encountered using such solution packages or with single tools of neural network management and forecasting and understand how effective neural networks are for problems with a good statistical base, for example, if there are sufficiently long time series, including multidimensional ones. At the same time, as a consumer of such information, decision makers know the potential of neural networks and solve such problems by traditional methods and are forced to look for other, more effective ways to solve problems. The principle of operation of neural networks is presented (Fig. 1)

Fig. 1. The scheme of neural network functioning.

The ability to model nonlinear processes, work with large volumes of data and adaptive neural networks allows us to consider a wide range of problems of industrial enterprises.

2 Logical and methodological analysis of system-structural studies of the logistics approach to innovative management

Innovative management considers the new principles of management rather than the management of innovation process which should be examined in the different way. The process of organizing the exchange of knowledge in innovative companies during currently

technological innovations is considered by professor David Tees and the director of the Haas Business School at the University of California (Berkeley), Henry Chesbrough, as mostly systemic, meaning only in combination with the innovative development or related systems or products, which implies centralized management in a large corporation. The system approach aims to solve the task of introducing innovations in a diverse and large-scale management object and asset but investing in their own innovative potential [4-7]. In the knowledge economy, the difficulty in organizing a management structure is that, unlike codified knowledge (specifications fixed in industry standards and development standards) transferred from one organization to another within the group of companies without significant loss of information quality, the hidden knowledge accumulated in the type of skills and personal development of masters, corporate traditions of technical culture, would not be examined separately from individuals who carry this knowledge (employees of a particular company). In such conditions, a virtual approach based on market ties creates strategic risks. One can agree with the opinion mentioned above that the open exchange of knowledge inherent in systemic innovation is more effectively carried out within the framework of a single organization that can resolve conflicts and problems with the help of well-established management procedures within the integrated social economical system.

The methodology of logistical approach to innovative management includes three main principles:

1. The principle of investigating the interaction of flows of material, financial and information resources in the micro-logistics system, taking into account their interrelation and mutual influence.
2. Principle of similarity of analytical description of material, financial and information flows.
3. The principle of finding a compromise between the costs of attracting material and financial resources and the costs of their maintenance.

Despite the fact that various works are currently being published to assess the flow of material and financial resources, the problem of integrating the material and related financial flow has not been fully explored. Application of the principles of financial logistics allows us to proceed to the construction of qualitatively new models for managing material and financial flows. Financial management includes the study of activities related to the acquisition, merger, financing, asset management, but does not pay enough attention to the study of the formation of an optimal stock of cash. One of the directions of the study of cash flows is to study the possibilities of managing cash reserves in a similar way to the management of inventories of material resources. In this case, it is necessary to consider in detail the application of models and methods of the theory of logistics in the process of managing cash reserves. Logistical models of financial flows allow combining methods of financial management (discounting and increasing cash flows) and methods and models of logistics theory.

To study the problems of financial logistics, attention should be paid to the study of cause-effect relationships. Consider a practical algorithm for making decisions based on an understanding of the problem in the company "Xerox" from the six basic steps.

The algorithm is based on a system approach and covers six basic steps:

- 1) formulation of the problem within the competence of the group and develop a clear understanding of the problem;
- 2) analyze the problem by collecting data and using the appropriate statistical methods;
- 3) suggest ways to solve the problem;
- 4) choosing a solution from several proposed options by their evaluation;
- 5) implementation of solutions through work;
- 6) evaluation of the decision taken in terms of how far it exhausts the problem.

It can be shown that in general, we are talking about the formulation of concepts (the concept of the problem, the ways of solving and the connection between these concepts) and the further refinement of the properties of the elements included in the problem, to develop assumptions about the solution of the problem with a return to improving the conceptual apparatus used for a clearer understanding the problem. The process of solving financial problems is based on a system of concepts that forms the subject of a study of financial logistics. For a logistical approach, the design of an object as a system is characteristic by constructing a model not from objective, but from methodological considerations. The problem of determining the optimal money supply can be formulated as follows. Cash is a part of the current assets of the enterprise. Without this asset, the company's operational and investment activities are impossible. If an enterprise has a minimum reserve of cash, there are costs for replenishing this stock, the so-called "costs of attracting financial resources".

3 Decomposition of financial logistics at the enterprise level

The subject of the study of financial logistics includes the task to be solved in the research system (one of which is the study of models for optimizing the money supply at the level of the micrologistic system, which stands for a variety of objects including the enterprise, institution or group of companies), various scientific descriptions that make up the content of the reality (including description of the dynamics of the behavior of the monetary reserve), the scope of the study covers the material, information and financial flows of micrologistic systems. At the enterprise level, the approach applied is based on the expediency of making a decision in the field of inventory management, taking into account the limitations on the amount of capital allocated to the acquisition of inventory items, since the company's capital for the implementation of logistics processes in the relevant supply chain is limited.

Let's consider the decision-making process in the field of financial logistics with the help of the system representation of the problem being studied (the financial problem is investigated as a system of elements structured in a certain way, taking into account their properties and relations between them). We can distinguish the stages of understanding financial problems and making logistical decisions:

1. Conditional isolation of the elements of the problem under consideration.
2. Rearrangement of the elements under consideration.
3. Organization of a new structure of the elements of the task.
4. Replenishment of the task under investigation with new elements.
5. Combination of the elements considered earlier with the ones introduced into the task at the previous stage. The combination procedure complements the insulation.
6. Recollection of previously acquired knowledge about the formed combinations of elements.
7. Mobilization in the study of all relevant elements of the subject.
8. Recognition of previously undetected relationships between elements in the study of new configurations of the elements of the problem.

The decision-making procedures can be viewed according to the scheme of flows of financial resources, material values and information flows (information) drawn up in advance. When studying a complex whole, the researcher's attention is sequentially switched from one element of the considered flow scheme to another element.

After a number of details have been studied and their reassessment has been carried out, there may again arise a need to imagine the whole situation as a whole. In fact, after the reassessment of individual details, the "image of the whole" could change. The combined

effect of reassessing the role of certain details can lead to a new mental picture of the overall situation, a new, more harmonious combination of all the details.

Isolation of parts involves the decomposition of the whole into parts, and the subsequent combination of the base unites the parts into a whole that is different from the original one. The decomposition of the whole into its constituent parts, and then the reunion, the decomposition, and the reunion, leads to a reconstructing of the system under study into a more informative view.

The replenishment allows us to proceed with the study of the new material and proceed to the organization of a new structure of the elements under study. At the stage of the organization, taking into account the addition of new material to the structure of already existing elements, the relations between them in the new disposition are analyzed, by rearranging or rearranging the elements of the task. By regrouping the elements, we obtain a new structure of the system under study.

Considering the new configuration, it is possible to detect the previously observed relationships between the elements and repeat the entire process through isolation and a new grouping of a more promising whole. Regrouping allows you to shift the attention of the researcher to elements and relationships that are not taken into account before regrouping.

4 Conclusion

Both the development of new technologies and the increase in the influence of science on the enterprises' activities as well as the orientation toward social and economic business responsibility being considered in combination with a number of factors such as increased competition, the acceleration of the cycle of the output of new goods and services to the market which in conjunction with the other factors having a significant impact on the enterprise. In the changing environmental conditions, domestic enterprises face the urgent need to introduce development directions that will bring their activities to a qualitatively new level, best reveal their competitive advantages and level the shortcomings, and also open up a wider horizon of market opportunities and identify threats from the market, which must be avoided.

Then, the flow scheme could be investigated in relation to the searching for a familiar configuration of elements, pre-isolating problematic issues, and gradually moving to recognizing images based on familiar combinations. The recognition procedure can be combined with establishing a connection with the domain of previously acquired knowledge, using useful areas of available information about the subject under investigation. In this case, recognition leads to the mobilization of information relevant to the subject matter. Mobilized potentially useful elements introduced into the original concept of the problem can give a more complete look, eliminate shortcomings and replenish the system under investigation.

Neural networks could be formed as to allow to formulate scientific hypotheses and propose new alternative ways of solving problems including the innovative management approaches developed on the basis of the logistic theory.

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