

O. Ye. Kuzmin

Doctor of Economic Science, Professor,

O. G. Melnyk

Doctor of Economic Science, Professor,

M. Ye. Adamiv

Educational-Scientific Institute of Economics and Management,

Lviv Polytechnic National University

THEORETICAL AND APPLIED PRINCIPLES OF ANTICIPATORY MANAGEMENT OF ENTERPRISES ON THE BASIS OF WEAK SIGNALS

© Kuzmin O. Ye., Melnyk O. G., Adamiv M. Ye., 2014

Abstract. In the article the actuality of anticipatory management of enterprises on the basis of weak signals in modern highly dynamic, uncertain and unpredictable operating conditions is grounded. The concept of anticipatory management of enterprises on the basis of weak signals by the process-structured approach is formulated. The methodology of evaluation of anticipatory management effectiveness implementation at the enterprises is characterized and the most popular results of anticipatory management fulfillment at investigated enterprises are shown.

Key words: anticipatory management, weak signals, system, effectiveness, coefficient, enterprises.

Introduction.. In modern business environment, which is characterized by such features as critical dynamism, unpredictability and uncertainty, management of any enterprise should be aimed at anticipating the future changes of external and internal operating conditions to ensure its goal-oriented, progressive and effective development. It concerns critical growing deficit of time and information resources for a decision-making process that strengthens a threat of the retarded or inadequate response to the changes of enterprises' operation conditions. The forced development of the modern globalized business environment requires from managers of all levels to make decisions in maximally short time period due to its intense changes and transformations. In addition, in the current functioning conditions managers and professionals are increasingly faced with not clear, understandable or incomplete by content data that require its accurate analyzing and interpretation. In management science, scholars interpret these informational messages as weak signals of the potential events in the business environment [1, p. 65].

The situation described above causes a peculiar management dissonance because the necessary condition to ensure the maximum effectiveness of management activity is the implementation of a completed management technology that is based on the adequate information support and requires the appropriate time costs for its fulfillment. One of the perspective directions to solve this problem is to use the anticipatory management as the actual addition to the enterprise's management system from the position of improving its interaction with the internal and external environment on the basis of increasing the level of enterprise's preparation to any potential changes in the operating conditions [1, p. 65].

Existing complicated business conditions require the displacement of monitoring management tasks to take into consideration the weak signals as early primary signs of possible emergence of opportunities and threats in the operating environment in order to improve the enterprise's preparation to future changes. In the context of ensuring the early diagnostics of potential events and developing the adequate preventive measures the anticipatory management of enterprises takes relevance because it is aimed at the polyvectorial investigation of weak signals about future changes in business environment and making rational management decisions with anticipatory direction at opportunities and threats of operating conditions. It forms enough time reserve for a well-grounded preventive decision-making process of exploiting opportunities or eliminating threats of enterprise's operating conditions. Everything mentioned above causes a need to characterize the key theoretical and applied bases of anticipatory management at the enterprises.

Analysis of recent researches and publications. Although the anticipatory management is a relatively new type of management in the scientific sphere, but the theoretical and applied principles of its implementation are reflected in researches of such Ukrainian and foreign scientists, as: I. Ansoff, I. Baklan, N. Bohonikolos, L. Huryanova, W. Ashley, L. Yegorova, T. Klebanova, P. Kuokkanen, Yu. Lysenko, L. Lihonenko, O. Moroz, J. Morrison, Zh. Poplavska, V. Potokan, A. Rohovych, R. Rudensky, O. Smetanyuk, E. Hiltunen [2–12] and others. Scientific developments of these authors reveal different peculiarities of anticipatory management of the whole enterprise or its certain kinds of activity, in particular, theoretical and methodological principles of anticipatory management, characteristics of its information support, methods of identifying and analyzing the weak signals in operating environment, the process of anticipatory decision-making.

However, the fragmented nature and the existing gaps in scientific investigations on the problem greatly hinder organic development of anticipatory management in the business environment and lead to a number of important scientific problems, which should be solved. In particular, there is a need to form the unified, completed and well-grounded theoretical base of anticipatory management implementation at the enterprises. As the experience with anticipatory management has not been accumulated yet at Ukrainian and foreign enterprises there is also a necessity to analyze the effectiveness of anticipatory management implementation at the enterprises. It will give an opportunity for managers of all management levels to understand the essence of anticipatory management and its impact on the effectiveness of enterprise's activity.

The purpose of the research. The main purpose of the article is to ground the theoretical and applied principles of anticipatory management of enterprises on the basis of weak signals.

The presentation of the main research material. In today's complicated functioning conditions anticipatory management is an integral part of the enterprise's management process that provides its development in the direction of

improving its interaction with the internal and external business environment. The rapid spread of current trends of increasing the uncertainty and unpredictability of operating conditions complicates the problem of timely and adequate response to any change in the business environment. It is caused by the growing deficit of resource support (especially time and information) of management processes at the enterprises, especially the decision making. In response to everything above mentioned anticipatory management provides a mechanism of anticipation the future events in the business environment that is based on the recognition of weak signals and interpretation of their further development to specific opportunities or threats of enterprise's operating conditions for timely respond to those changes in the business environment [1, p. 66].

The results of literature study in the management sphere and practice of enterprise's functioning indicate that at present time the term "anticipatory management" is little known and not widely used in theoretical and applied level. At the same time it is found that immanent for anticipatory management operations of identifying and processing of weak signals in the operating environment, prediction of their future development to particular events, preventive decision-making process, etc. have been the object of research of cohort of Ukrainian and foreign scientists, as well as they have found practical application in the activity of some enterprises. It confirms the importance of the implementation of these operations within the management process of the enterprise. In order to ensure the organic functioning of all processes associated with weak signals about future changes in operating conditions as a holistic management mechanism of the enterprise their combination, consideration and implementation in the context of the specific management function – anticipatory management is proposed.

Having studied the literature on the problem and the practice of functioning of the domestic and foreign enterprises it has been suggested to interpret the term "anticipatory management of enterprise" as a goal-oriented activity that provides early identification of potential events in the internal and external environment on the basis of

polyvectorial investigation of weak signals and development on this basis the anticipatory scenario in order to make rational management decisions with anticipatory direction at opportunities and threats of enterprise's operating conditions. The anticipatory scenario shows a set of probabilistic and alternative trajectories of weak signals development to possible events and a complex of adequate measures of enterprise's reaction.

It is worth mentioning that in the management theory the term "anticipatory management" is often equal to the term "crisis management", which is not correct because of the established significant differences between these types of management by such parameters as their information support, targeted and polar direction, scale of realization, tool support, sphere of its use, etc.

In the process of performed research it has been found that in today's complex conditions of functioning anticipatory management is an objectively necessary element of enterprise's management system, which improves its interaction with the operating environment by increasing the level of enterprise's preparation to different potential internal and external events. In particular, in the conditions of dynamic changes of the business environment anticipatory management provides early identification of potential events on the basis of recognition and predictive interpretation of weak signals, which are reported about their appearance. It forms a considerable time allowance for reasonable development of measures and timely decision-making in order to use the identified opportunities or eliminate the threats of enterprise's operating conditions.

Anticipatory management on the basis of weak signals gives also an opportunity to reduce the level of uncertainty of business environment because it is directed at differently-vectorial processing of not clear and incomplete by content information messages about the future changes of operating conditions, as well as predictive supplementing of their essence in order to create a well-grounded base of the potential occurrence of particular positive or negative events in the future activity of the enterprise.

Anticipatory management of enterprises is based on weak signals as key elements in implementation of its specific assignment. The fundamental idea of anticipatory management is

based on the fact that any potential event is characterized by a period of its development from weak signals to strong signals. Having studied the literature on the problem [2; 5; 8] it has been proposed to interpret the weak signals as early signs of future changes in operating conditions which are reporting about the appearance of potential events and their sources in internal and external environment. To ensure the complex anticipatory monitoring of operating environment signals of potential events have been systematized by kinds of enterprise's activity: production, activity of scientific and technological preparation of production, financial and economic activity, marketing, logistics, social and human resources activity, foreign economic activity.

The results of performed research give an opportunity to formulate the concept of anticipatory management of enterprises on the basis of weak signals, which is based on anticipatory management system as an ordered set of technology, methods, management decisions, leadership, communications, controlling and controlled subsystems (Fig. 1). These elements interact with each other in the direction of effective anticipation of potential events in the internal and external environment in order to increase the level of enterprise's preparation to future changes of operating conditions.

Anticipatory management of enterprises is based on the classic sequence of process-structured management, but each stage is characterized by its specific meaningfulness to achieve the anticipatory goals. Therefore, anticipatory management of enterprises on the basis of weak signals is fulfilled by such sequence:

1. Consistent implementation of anticipatory management technology through the fulfillment of particular functions (anticipatory planning, anticipatory organizing, motivating the employees who are implementing the anticipatory management, anticipatory controlling and anticipatory regulation).

2. Adequate forming of anticipatory management methods for developing and theoretical grounding of the management mechanisms of influence on the controlled system to achieve the anticipatory goals.

3. Transforming the developed methods of anticipatory management into appropriate management decisions in order to implement effective management influence and achieve the anticipatory goals.

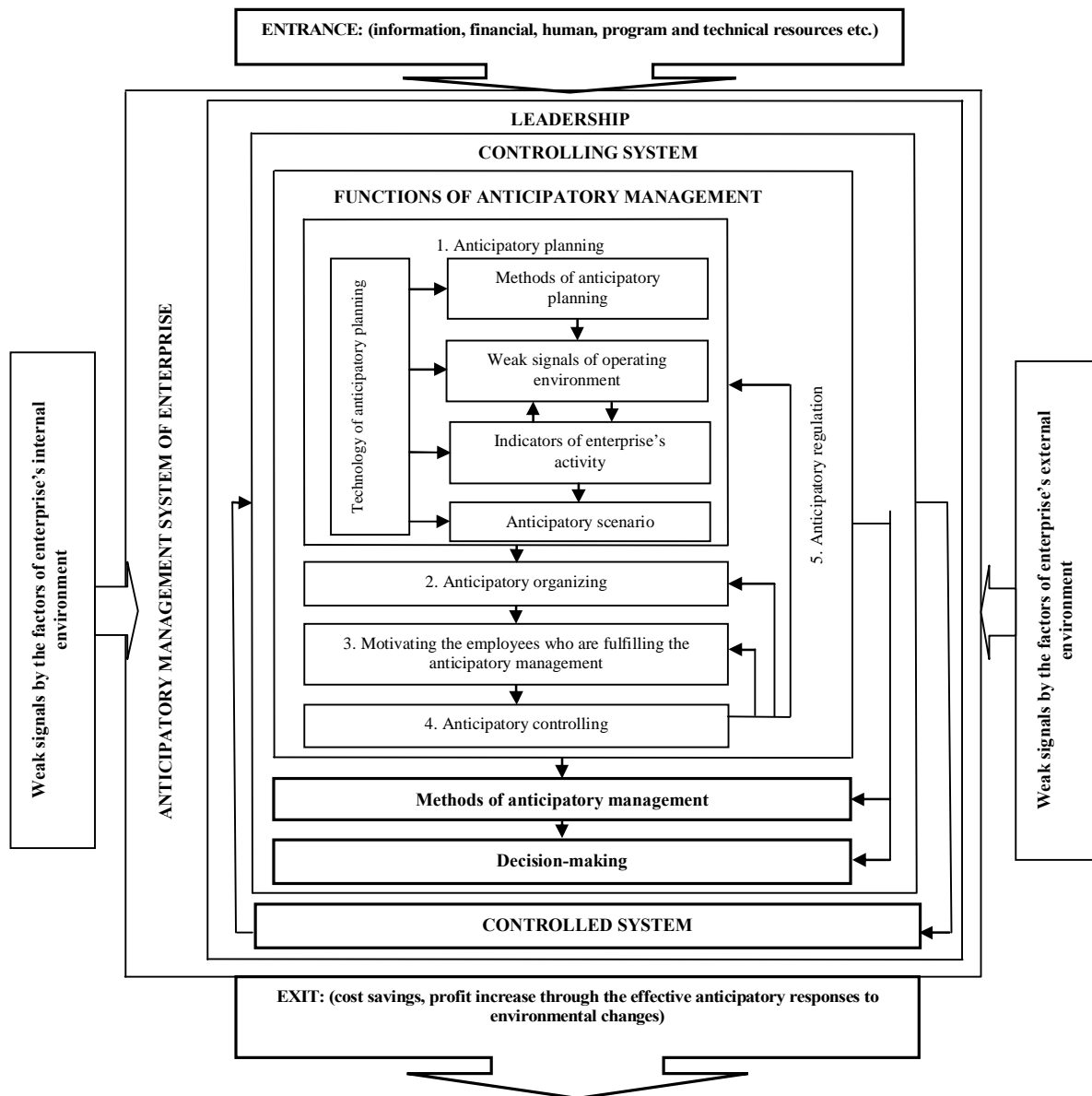


Fig. 1. Typical structure of anticipatory management system of enterprises on the basis of weak signals

4. Implementation of the unifying management function that includes all anticipatory management processes in order to ensure their effective fulfillment. Effective implementation and use of anticipatory management on the basis of weak signals at the enterprises should provide the increasing of economic effectiveness of their activity. Anticipatory management is aimed at early identification of potential events in the operating environment and developing the adequate preventive measures. That is why the claim about the possibility of cost savings achieving at the enterprises, increasing profits, improving some indicators is logically grounded. Effectiveness evaluation of anticipatory management implemen-

tation at the enterprise is recommended to be executed in the context of Balanced Scorecard System because of its complex character for diagnostics of key areas of an enterprise's activity. On the basis of materials study of the most universal compositions of indicators within each projection ("Clients", "Internal Business Processes", "Learning and Growth", "Finances") of Balanced Scorecard System the system of effectiveness evaluation indicators of anticipatory management implementation is formed at the enterprise.

Thus, the effectiveness coefficient of anticipatory management implementation by the projection "Clients" (E_c , %) is recommended to be calculated by the following formula:

$$E_c = w_{Vc} \times \left(\frac{V_c^0 - V_c^1}{V_c^0} \times 100 \% \right) + w_{Vm} \times \left(\frac{V_m^0 - V_m^1}{V_m^0} \times 100 \% \right), \quad (1)$$

where w_{Vc} , w_{Vm} – are the weighting coefficients of effectiveness components of anticipatory management implementation by the projection “Clients”; V_c^0 , V_c^1 – are the costs for meeting the complaints of clients before and after anticipatory management implementation, UAH; V_m^0 , V_m^1 – are the costs of market research and communication before and after anticipatory management implementation, UAH.

The effectiveness coefficient of anticipatory management implementation by the projection “Internal Business Processes” (E_b , %) is calculated by such formula:

$$E_b = w_{Kd} \times \left(\frac{K_d^1 - K_d^0}{K_d^0} \times 100 \% \right) + w_{Kr} \times \left(\frac{K_r^1 - K_r^0}{K_r^0} \times 100 \% \right), \quad (2)$$

where w_{Kd} , w_{Kr} – are the weighting coefficients of effectiveness components of anticipatory management implementation by the projection “Internal Business Processes”; K_d^0 , K_d^1 – are the coefficients of goods production defectlessness before and after anticipatory management implementation; K_r^0 , K_r^1 – are the coefficients of timely production before and after anticipatory management implementation.

The effectiveness coefficient of anticipatory management implementation by the projection “Learning and Growth” (E_d , %) is calculated by the following formula:

$$E_d = w_{Ve} \times \left(\frac{V_e^0 - V_e^1}{V_e^0} \times 100 \% \right) + w_{Vit} \times \left(\frac{V_{it}^0 - V_{it}^1}{V_{it}^0} \times 100 \% \right), \quad (3)$$

where w_{Ve} , w_{Vit} – are the weighting coefficients of effectiveness components of anticipatory management implementation by the projection “Learning and Growth”; V_e^0 , V_e^1 – are the costs of training and retraining of employees before and after anticipatory management implementation, UAH; V_{it}^0 , V_{it}^1 – are the costs of information, software and

technical support of employees before and after anticipatory management implementation, UAH.

The effectiveness coefficient of anticipatory management implementation by the projection “Finances” (E_f , %) is calculated by such formula:

$$E_f = w_p \times \left(\frac{P_1 - P_0}{P_0} \times 100 \% \right) + w_{Kz} \times \left(\frac{K_z^0 - K_z^1}{K_z^0} \times 100 \% \right) + w_{Dz} \times \left(\frac{D_z^0 - D_z^1}{D_z^0} \times 100 \% \right) + w_{Kk} \times \left(\frac{K_k^1 - K_k^0}{K_k^0} \times 100 \% \right), \quad (4)$$

where w_p , w_{Kz} , w_{Dz} , w_{Kk} – are the weighting coefficients of effectiveness components of anticipatory management implementation by the projection “Finances”; P_0 , P_1 – is the net profit before and after anticipatory management implementation, UAH; K_z^0 , K_z^1 – are the volumes of payables before and after anticipatory management implementation, UAH; D_z^0 , D_z^1 – are the volumes of receivables before and after anticipatory management implementation, UAH; K_k^0 , K_k^1 – are the coefficients of enterprise’s capitalization before and after anticipatory management implementation.

The integral effectiveness coefficient of anticipatory management implementation (E_i , %) is recommended to be calculated by the following formula:

$$E_i = w_c \times E_c + w_b \times E_b + w_d \times E_d + w_f \times E_f, \quad (5)$$

where w_c , w_b , w_d , w_f – are the weighting coefficients of integral effectiveness components of anticipatory management implementation at the enterprise.

It is worth to emphasize that all above represented formulas have a recommended character and may be changed according to the specific conditions of enterprise’s internal and external environments. These formulas should be used considering that all other factors are constant.

Within performed specialized investigation of anticipatory management at the most successful domestic machine-building enterprises the key results of implementation and fulfillment of anticipatory management or its elements at these enterprises were determined. The most priority results are: improving the quality of opportunities

use or eliminating threats in the operating environment; increasing the volume of time resources for decision-making process; increasing the level of enterprise's preparation for potential events in the operating environment; increasing the level of information support of managers activity and specialists; expanding the range of opportunities and threats of enterprise's operating conditions; achieving the cost savings of enterprise's activity, improving some indicators of enterprise's activity; providing the goal-oriented, progressive development of enterprise or its certain kinds of activity; improving the quality and efficiency of decision-making process in different spheres of enterprise functioning; improving the quality of strategies formation, different plans, forecasts of the enterprise, etc.

Conclusions. At the present stage enterprises operate in complicated conditions that are characterized by high level of dynamism, unpredictability, uncertainty, variability, increasing competition, the influence of different crisis at governmental and international levels, etc. Such challenges require from managers of any enterprise to search, implement and use the modern progressive mechanisms, technologies and instruments of management in order to improve the existing management system. In this context the anticipatory management is actual and effective type of management because it is aimed at improving the interaction between the management system and enterprise's operating environment in order to increase the level of enterprise's preparation to different future changes of functioning conditions. The concept of anticipatory management of enterprises on the basis of weak signals is based on its system as an ordered set of technology, methods, management decisions, leadership, communications, controlling and controlled subsystems. The effectiveness evaluation methodology of anticipatory management implementation at the enterprise in the context of Balanced Scorecard System is based on the calculating of key indicators before and after implementation of anticipatory management at the enterprise by each projection of its system.

References

1. Shpak N. *The role of innovative creative collectives in anticipatory management of enterprises* / N. Shpak, O. Goryachka, M. Adamiv // *Econtech-mod: an International Quarterly Journal on Economics in Technology, New Technologies and Modelling Processes*. – Lublin; Rzeszow, 2013. – Volume 2, number 3. – P. 65–70.
2. Baklan I. V., Poplavska Zh. V., Tsmots O. I. *Detecting and assessing weak signals within a machine-building enterprise* // *Actual Problems of Economics*. – 2011. – № 5(119). – P. 257–271.
3. Bohonikolos N. D. *Models of anticipatory management in factory financial activity: summary of dissertation for the scientific degree of candidate of economic sciences: specialty 08.03.02 – “Economic and mathematical modeling”*; Kharkiv National Economic University. – Kharkiv, 2005. – 18 p.
4. Guryanova L. S., Klebanova T. S. *Models of anticipatory management of enterprise's financial security* // *Thesis of Intern. scient.-pract. conference [“The theory of active systems”]*, (Moscow, 16–18 November, 2005). – Moscow: IPU RAN, 2005. – P. 186–188.
5. *The methods of anticrisis management by the weak signals: [monograph] / [Yu. G. Lysenko, R. A. Rudensky, L. I. Yehorova and oth.]*. – Donetsk: South-West, 2009. – 195 p. – (Ser.: Sustainable Systems in Economics).
6. Moroz O. V., Smetaniuk O. A. *The financial diagnostic in the anticrisis management system of the enterprises: [monograph]*. – Vinnytsa: UNIVERSUM. – Vinnytsa, 2006. – 167 p.
7. Rogovych A. T. *Models of threats' anticipation in financial activity of enterprises* [Electronic Source]. – Access regime: http://www.rusnauka.com/7_DN_2007/Economics/17600.doc.htm
8. Rudensky R. A. *Anticipatory management of complex economic systems: models, methods, tools: [monograph] / [scient. ed. prof. Yu. G. Lysenko]*. – Donetsk: South-West, 2009. – 257 p. – (Ser.: Sustainable Systems in Economics).
9. Hiltunen Elina. *Good sources of weak signals: a global study of where futurists look for weak signals* [Electronic Source] // *Journal of Future Studies*. – 2008, May. – №12 (4). – PP. 21–44. – Access regime: <http://www.jfs.tku.edu.tw/12-4/A03.pdf>.
10. Kuokkanen Pertti. *Communicative and Anticipatory Decision-Making Supported by Bayesian Networks: a dissertation* [Electronic Source]. – Finnish National Defence University. – Department of Leadership and Military Pedagogy. – Helsinki. – Publication Series 1: No 2/2009. – 131 p. – Access regime: <https://oa.doria.fi/handle/10024/43917>.
11. Potocan V. *Business systems: sustainable development and anticipatory system* [Electronic Source] // *Management*. – 2002. – Vol. 7, No. 1. – P. 67–79. – Access regime: www.efst.hr/management/Vol7No1-2002/5-potocan.doc
12. William C. Ashley, James L. Morrison. *Anticipatory Management: Tools for Better Decision Making* // *The Futurist*, September/October 1997. – № 31(5). – P. 47–50.