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MANAGEMENT SOLUTIONS FOR THE INNOVATIVE DEVELOPMENT OF ENTERPRISES USING A CONTROLLING SYSTEM WITH INFORMATION AND ANALYTICAL SUPPORT

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Abstract. The *subject* of the study is the controlling system in an organisation, which is necessary for information support of the management decision-making process. *Methodology*. The research applied the methods of economic research: monographic method (when processing scientific sources and reviewing thematic literature); scientific abstraction and generalisation (when studying various methodological approaches to support processes of management decision-making); abstract-logical method (when substantiating key factors that have an impact on processes of management decision-making in the organisation, formulating conclusions of the research conducted); methods of analysis and synthesis (when justifying the phasing of the process of making and implementing management decisions based on innovative development). The *purpose* of the publication is to substantiate directions for improving the process of making managerial decisions by improving the controlling support. *Conclusion*. The controlling process is an important function and stage of the management process in general and of the organisation's management decision-making in particular. The information support of the controlling system is of great importance for the formation of analytical support for the decision-making process. The strategic vector of the organisation's development in the current and future conditions is the innovation component, which must be taken into account when making, implementing and monitoring the implementation of management decisions. In addition to the innovative component, the management decision-making process must take into account external and internal factors of the company's activity, which must be subject to constant monitoring and control. In order to increase the validity of management decisions, it is necessary to have a controlling system in the management of innovative processes based on an innovative anticipatory element. The paper offers a model of managerial decision-making with the use of controlling support, which is aimed at increasing the competitiveness of an organisation on the basis of innovative development.

Key words: management, control, information support, innovation, competitiveness, organisation.

JEL Classification: M10

1. Introduction

Modern management is a complex mix of planning, organising, motivating and controlling processes necessary to formulate and achieve the objectives of an industrial enterprise. The previous sections of the study confirmed that the controlling system is designed to facilitate this process. The substantiation of the feasibility of applying the concept of controlling the management of innovation processes in an industrial enterprise indicates that the current stage of development of the domestic industry is characterised by low efficiency in the implementation of innovative activities. This has a negative impact on the competitiveness of the companies themselves. One of the reasons for this is the use of outdated management methods. In such a situation, controlling is fully justified, since its main purpose is to obtain and analyse information characterising the innovative development of the company and, on this basis, to coordinate the activities of the management system in order to achieve the set goals.

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The existing trends of complication of the management process are due, first of all, to the growing dynamics and aggressiveness of the external environment of industrial enterprises, which leads to an increase in the density of the flow of management information and the speed of its updating. In such conditions, the discreteness of the management cycle, the limited resources of the manager's time and the impossibility of simultaneous performance of various functions by the subject of management become factors of instability of the results of the enterprises. On the other hand, the growing demand for flexibility and adaptability of management requires constant control, analysis and diagnosis of the internal and external environment, which leads to extensive development of management systems. As a result, there is an increase in the number of management personnel, which is associated with the complication of coordination processes, mutual agreements and information exchange between management units. In such conditions, there is a need to move from extensive to intensive development of management systems, which involves revising management functions and mechanisms for coordinating activities.

The research is focused on substantiating the directions of improving the process of making managerial decisions of an organisation on the basis of improving its controlling support.

2. Theoretical Approaches to Management Decisions on Innovative Development of Enterprises Using the Controlling System with Information and Analytical Support

As a tool to support management decisions, controlling becomes an essential management function in all types of management systems. Controlling is one of the functions of the management process, which is implemented at its final stage. Along with this, the effectiveness of the controlling system determines the effectiveness of the management process as a whole (Negulescu & Doval, 2014). According to Lueg et al. (2016), corporate performance management controls management decisions. The most widespread form of controlling management decisions is administrative control – about 70% of all cases.

Avino Z. B. (2013) proves that quality management decisions, supported by an effective control system, have a significant impact on the efficiency of business processes and improve the company's performance indicators.

In order to achieve the maximum efficiency and effectiveness, the controlling system in management must take into account several factors: personal characteristics of controllers, information provision of conditions for the development of management decisions, several organisational factors, a system of control methods, technical and time factors (Murotjonova, 2023).

Samad T. et al. (2022) associate the effectiveness of controlling in the management decision-making system primarily with the human factor and with common business practices and management principles.

Parshukov A. et al. (2021) suggest building a controlling system based on a matrix model to support business management decisions. Matrix zonal segments of controlling are organised according to functional and linear relations of the organisation and provide opportunities for decision control in the development of new projects. The proposed matrix model of controlling also takes into account several internal and external influencing factors, which are analysed on the basis of PESTEL analysis.

The information environment and technologies of the organisation, the level of corporate management culture and the level of development of the country's economy are of exceptional importance for the effectiveness of the organisation's control system. Based on the research results of Bieńkowska A. et al. (2020), it was proved that in organisations and companies operating in the conditions of developed mature economies, the reliability and completeness of information have a more significant impact on the effectiveness of the controlling system and the validity of management decisions of managers.

Papamichail K., Robertson I. (2005) proposed a model of controlling an organisation based on an integrated approach, the main principle of which is to minimise disagreements and views on the results of management decisions by their executors and managers. This approach makes it possible to fully involve direct executors in the achievement of the company's goals and to increase their motivation and awareness of how to perform the assigned tasks.

The role of controlling in achieving the goals of sustainable development is exceptional in modern conditions. Scientists have systematised data on the impact of controlling on the state of the company's performance of tasks related to sustainable development. The obtained results showed that companies most often prefer to control management decisions related to the environmental component of management. The highest level of complexity characterises management decisions related to the social component of sustainable development. Accordingly, the system of control over their implementation becomes the most problematic (Lueg et al., 2016).

The complexity and dynamism of the modern development stage determine the need to improve the

existing support systems for management decisions and management. As Ball A. & Milne M. (2005) note, many types of control in organisations could ensure full achievement of set goals and compliance with existing regulations. Control measures should be complementary and aimed at achieving a single objective. At the same time, the forms and methods of control, which are based only on accounting and management accounting data, can no longer cover all aspects of the company's sustainable development and need improvement and additions. Other researchers follow the same point of view (Pylypenko et al., 2023; Poltinina, 2011).

Birch C. et al. (2015) complement this approach, noting that it is inappropriate for the control system to seek compromises between social, environmental and economic objectives. The organisation needs to make management decisions that ensure their synergy. Research along these lines is continued by Guarini et al. (2022), who point out that the weak link of administrative control in supporting management decisions is their strategic orientation. Therefore, it is necessary to restructure the existing control systems in order to increase their orientation towards the achievement of long-term goals and objectives of the organisation's development.

To solve this problem, Mykytenko V., Sheludko N. (2021) proposed homeostatic mechanisms for control of stability of organisations. The basis of such mechanisms should be regulators of adaptation of management systems to external and internal factors, stable forms and methods of management, organisational resources and mutually complementary complexes of the management system.

General and specific economic research methods were used to write the article. The literature review and the clarification of the nature and specifics of the problem were carried out on the basis of a monographic method, which included familiarity with the data presented in scientometric databases, in particular Scopus and Web of Science. The methods of scientific abstraction and generalisation are used in the study of different methodological approaches and scientific schools involved in the study of management decision-making processes. The methods of induction and deduction were used to justify the choice of the research topic and to formulate its purpose. The abstract-logical method was used in the process of substantiating the key factors that have an impact on the processes of management decision-making in the organisation. The methods of analysis and synthesis were used to substantiate the stages of making and implementing managerial decisions on the basis of innovative development. The conclusions of the study are substantiated on the basis of the abstract and logical method.

3. Management Decision-Making System for Innovative Development of Enterprises Using a Controlling System with Information and Analytical Support

The increase in the workload of staff complicates not only the problem of delegation and specialisation of management activities, but also their reorganisation up to the complete separation of the control function with its transfer to headquarters staff. In this sense, the organisational aspect of controlling consists in the creation of a central unit that performs the control and analysis function, separated from the general scope of management functions. In the functional aspect, in the context of the study, controlling is a process of constant monitoring of innovative development, the internal and external environment of the company, and analysis of the results in order to increase manageability and efficiency. If the ultimate goal is to increase the efficiency of innovative activity in conditions of increasing instability, then the demand for continuity in the management process is raised, which implies the need for its reorganisation, which, however, implies significant changes in the distributed decision-making system. The problem of optimising the amount of managerial workload automatically comes to the fore, since the effectiveness of any system of information and analytical support for management decision-making depends on the management entity, which has a significantly limited individual time resource. Workload management means regulating the activities of managers, which is still a particular problem.

In the context of the above implementation, controlling requires the reorganisation of management processes in an industrial enterprise, and the controlling unit itself is a "compensating" analytical subsystem of the innovative process management system (Kniazevych et al., 2021). This reduces the burden on managers, on the one hand, and ensures the continuity of the control function, on the other. Its particular importance lies in the fact that control is a "routine" management function that requires significant time. The separation of this function ensures the intensification of management processes without a significant expansion of the distributed decision-making and implementation system. At the same time, the intensification of management systems means more efficient use of managers' limited time resources by improving the system of delegation of authority.

Scientists (Barabash, 2008, p. 121) refer to the delegation of authority as a factor that directly affects the effectiveness of management decision-making, namely:
– Hierarchy in decision-making – delegation of authority to make decisions closer to the level that

has more information and is directly involved in the implementation of the decision;
– use of targeted cross-functional groups with members drawn from different departments and levels of the organisation;
– application of direct (immediate) horizontal links in decision-making. In this case, especially at the initial stage of the decision-making process, information is collected and processed without recourse to senior management. This approach helps to make decisions in a shorter timeframe, increasing responsibility for the implementation of decisions.

Centralised decision-making means that the decision-making process should be in the hands of one manager. In this case, there is a hierarchy in decision-making, when each lower manager resolves his/her issues (makes decisions) with his/her immediate superiors, rather than with a higher manager, bypassing the immediate superior.

Another factor that ensures the effectiveness of management decision-making is compliance with the following principles (Matviychuk, 2010, p. 42):
– Systematicity (focuses on the comprehensive consideration of relevant factors);
– standardisation;
– optimal awareness;
– consideration of possible consequences;
– freedom of choice;
– responsibilities;
– creativity;
– timeliness;
– collegiality, etc.

At this stage in the development of market relations, the process of making managerial decisions is becoming increasingly complicated. Today, scientific opinion has already formed a sufficient number of methods to support managerial decision-making, the choice of which, as a rule, depends on a specific situation. Researchers distinguish four groups of methods (Barabash, 2008, pp. 121–122): traditional, economic, mathematical, systematic and systemic.

Traditional methods are used when decisions are made on the basis of the manager's experience and intuition or certain calculations, including economic ones. It is advisable to use these methods for solving tasks under conditions of certainty, i.e., in typical standard situations. Their advantages include simplicity and reliability, but they also have disadvantages: the scope of their application becomes more and more limited as production and economic relations become more complex.

Economic and mathematical methods are based on the simultaneous use of mathematical and economic methods in solving practical problems. These include economic and statistical methods, economic cybernetics, optimisation and econometrics methods.

Systematised methods include heuristic approaches based on experience and logic that allow a manager to make the right decisions, as well as expert evaluation methods and others. Systematic methods are effective in solving problems under conditions of risk and uncertainty. In this case, human intelligence is the main modelling tool, and statistical methods are used to process expert assessments.

System-targeted methods are necessary for solving relevant strategic tasks. These include system analysis methods and programme-targeted methods. The main methods of system analysis are decomposition, which involves dividing the system into parts, elements and subsystems to identify interconnections and their impact on achieving the goal, and diagnostics, which examines each of the elements and the system as a whole to identify the most sensitive points or bottlenecks.

Programme-targeted methods are based on the dominant role of the goal and offer means to achieve it. For example, after defining a global goal, a programme for achieving it is developed in the form of a "goal tree", and measures are identified to achieve lower-order goals.

Making management decisions with the support of controlling can be assigned to different groups of methods depending on the specific situation, since almost all of the specified methods can be used within the limits of controlling. In this case, however, it is precisely this that gives flexibility and efficiency to the process of managing the innovative development of an industrial company.

The process of managerial decision-making is characterised by a precise sequence of steps and procedures. In business literature, there are several schools of management, each with its own decision-making techniques. The peculiarity of the American school of management, for example, is that, when making a decision, the head of the company is concerned not only with the decision itself, but also with everything that is connected with it and arises from it. Solving the problem does not require a single decision, but a series of decisions. Thus, although representatives of the American School of Management, such as M. Mescon, M. Albert and F. Hedouri, describe the decision-making process as having five stages, including implementation and feedback, they believe that the actual number of stages depends on the problem.

The German school of management sees the decision-making process as an integral part of the planning and control processes. It includes stages such as problem formulation, information search, evaluation and decision-making. The Japanese school of management believes that the most critical stage is the correct formulation of the task, after which the decision comes quickly. They also emphasise the

stages of presenting different options for solutions and selecting the best one.

Representatives of Russian and Ukrainian schools of management have different approaches to the decision-making process. Depending on which aspects of the decision-making process are emphasised, this process can be structured into separate stages guided by different principles. The mechanism of management decision-making using controlling support can be reduced to an algorithm that takes into account the number of stages, sequence and interrelationships determined by the specific conditions of the tasks.

The authors of the publications note that in modern economic conditions management decision-making systems should be built on the basis of digital technologies, which will increase the speed of implementation and ensure the competitiveness of enterprises (Kramarenko, et al., 2022; Irtyshcheva, et al., 2022; Pryshchepa, Kardash, Yakymchuk, et al., 2020).

In this case, from an organisational point of view, the process of making and implementing management decisions for the innovative development of an industrial enterprise, based on controlling, is a sequence of stages, operations and procedures, between which there are direct and feedback links. This implementation is carried out in order to ensure the efficiency of the innovative activity of the industrial enterprise.

Once the task has been defined, the first stage involves collecting, processing and analysing information. The main goal of this stage is timely detection of signals of complications in the innovative activity of the enterprise, preliminary determination of the causes and notification of decision-makers. In this case, the system of controlling the innovative development of the industrial enterprise is the primary source of information, which accumulates in the bank of controlling information.

At the second stage, the identified problem is diagnosed, its problematic nature is determined, which appeared as a result of the influence of a certain set of factors not previously taken into account, and its causes are eliminated.

At this stage, all information comes from the previous bank of controlling information formed by the controlling system using the appropriate theoretical and methodological tools. The purpose of this stage is to provide the necessary information and analytical support for making management decisions at an industrial enterprise.

At the third stage, the management receives a detailed description of the identified problem situation for timely management decision-making. One of the main tasks of the innovation development management system is to be proactive.

The fourth stage involves searching for existing alternatives to solve the problem. There is always a danger that some of the best alternatives will be missed. Therefore, efforts are usually directed at thoroughly identifying and justifying all existing options using the controlling information and analytical base.

The fifth stage is the selection of the best alternative. After a detailed analysis of the alternatives, taking into account the achievement of the set goals, resource expenditures, and the forecast of possible consequences and risks, a conclusion is made about the superiority of one alternative over another.

At the sixth stage, decision makers take a final decision based on the information provided and taking into account the defined criteria or principles of optimal choice, which is then explained to the executors (usually at the operational level).

At the last, seventh stage, the decision is implemented. That is, measures are developed to specify the decision and pass it on to the executors; control over its implementation is exercised; necessary adjustments are made; and the result obtained as a result of the decision is evaluated.

As a result of the study, controlling information has been formed, which should become an information and analytical basis for making managerial decisions on the innovative development of industrial enterprises. At the same time, the controlling system combines the first and second stages of the mentioned mechanism (Figure 1).

At the same time, the strategic goal of using the concept of controlling is to increase the efficiency of implementing innovative processes in companies by improving the management system in order to ensure their competitiveness. The implementation of an anticipatory element in the management of innovative development and the increase in the validity of management decisions are the results of the implementation of the controlling system in the management of innovative processes. It should be noted that the use of advanced management methods in the management process, to which controlling in particular belongs, allows not only the use of standard methods of diagnosis and information gathering, which ignore essential indicators of threats and opportunities, but also the development of practical approaches, thanks to which it is possible to assess the situation properly, make effective management decisions and be several steps ahead of competitors.

The analysis of the state of innovative development of the leading industrial enterprises of the Kharkiv region confirmed the importance of innovative activity for ensuring the competitiveness of economic entities in modern conditions.

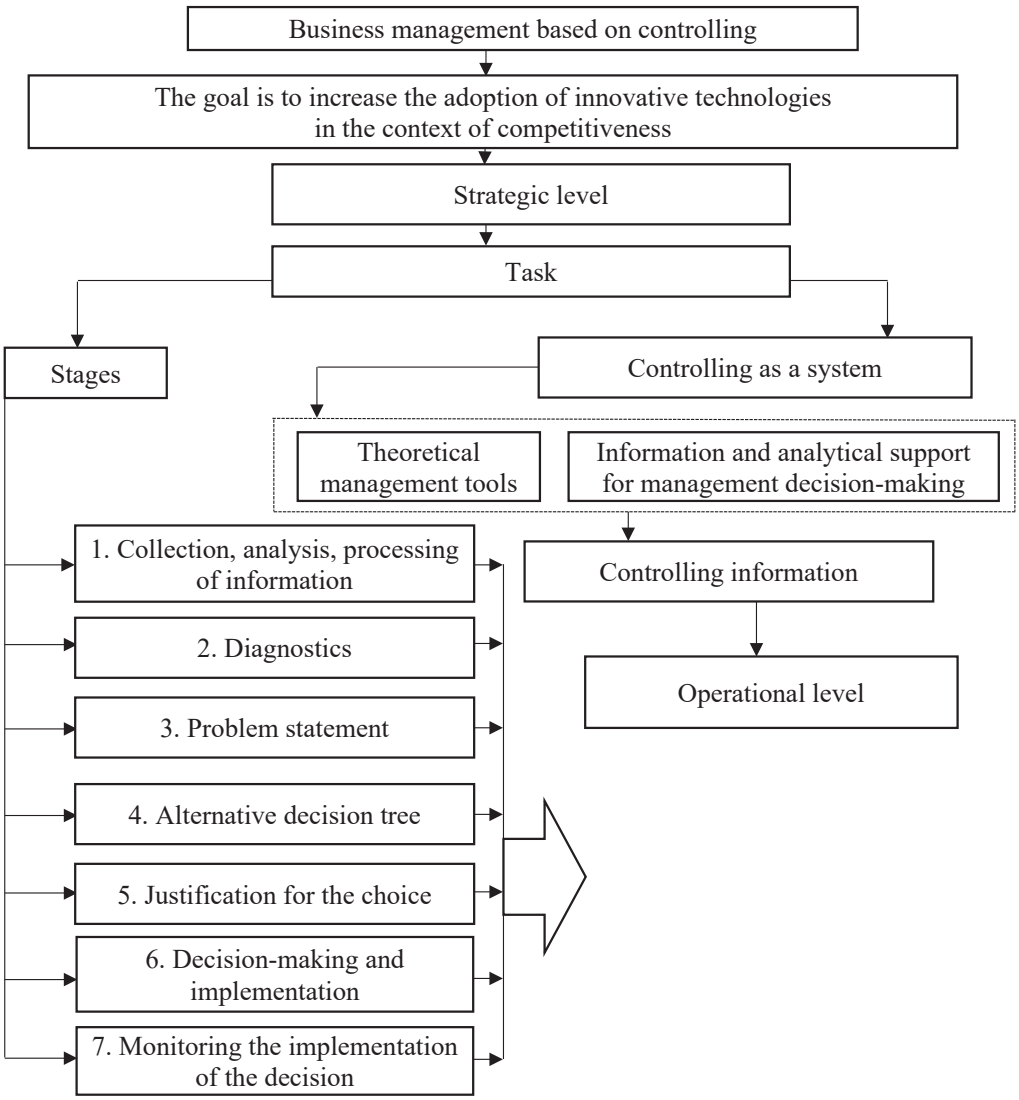

Figure 1. Improvement of management decision-making of the organisational component using controlling support

Source: authors' development

4. Conclusions

The conducted research has shown the exceptional importance of controlling systems for making and implementing management decisions of an organisation. The modern management decision-making process is a complex and dynamic process that should take into account a wide range of external and internal management factors and be focused on achieving sustainable development goals. Building an effective control process should be based on a system of principles: consistency, full and timely information support, responsibility, creativity, timeliness and collegiality. The specific nature of the organisation's management dictates the choice of methods for supporting management decision-making, among which the most promising are economic and mathematical, system-targeted and software-targeted. Controlling information, which should become the information and analytical basis for making management decisions, should take into account innovative principles of management and business development. To create such a basis for the organisation, it is advisable to propose an organisational component of management decision-making with controlling support. The main goal of improving the organisation and its controlling support should be to ensure its competitiveness on the basis of innovative development.

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