Розділ 3

Інноваційний менеджмент

MANAGING THE DEVELOPMENT OF INNOVATION BUSINESS PROCESSES
WITH AUTOMATED INFORMATION SYSTEMS

The article analyzes management science development, examines the management process essence through
the business processes allocation as a sequence of actions aimed at achieving the ultimate, measurable and
concrete result. The definition of innovative business processes was provided. Their target direction and
informational interconnection were distinguished. The scientific-methodical approach to assessing the effectiveness
of the information technology implementation in the innovative business process, which involves the all costs and
risks gradual account, is proposed. Constructed the enterprise innovative business processes management
algorithm and it is substantiated that the use of IT provides shaping of an information management system for
innovative business processes, construction of an effective mechanism for their implementation.

Keywords: information systems, automation, enterprise management, efficiency, business processes,
innovation.

DOI: 10.21272/mmi.2017.4-12

Relevance of topic. The need to search for new approaches and methods for managing socio-economic objects becomes relevant as a result of increased competition, rapid pace of introduction of scientific and technological innovations, integration and globalization phenomena in the economy.

That is why the functioning of domestic enterprises is aimed at the production of high-quality products, profit making, the introduction of innovations, as well as the feasibility of applying a process approach to building a management system that will improve competitiveness and ensure the economic growth and development of the enterprise in the long term.
Analysis of recent research and publications. The theoretical basis of the research are scientific works of foreign and domestic scientists, which outlines fundamental provisions of processes management, the organization of business processes and the information systems introduction in the activities of industrial enterprises. Thus the sequence of goods production processes and the formation of their consumer value, with the highlighting of business processes, are covered in the works of M. Porter [15], M. Hammer [21], and others. The evolution of the concepts in the formation of strategies for innovation development, the goals and factors of business processes during forming of strategies for enterprise innovation development, assessing the financial aspect of the effectiveness of existing strategies, the impact of IT (information technologies) on improving of the management system were considered in the works of such scholars as O.F. Androsov [2], B.M. Andrushkov [1], M.P Voynarenko [26], O.M. Polinkevich [13], L.M Shulgina, V.V. Ekumenenko [23] et al. The advantages of orienting the enterprise management system to business processes were studied in the writings of such scholars as O.A. Belovodskaya [10], V.V Lavrenenko [11], V.S Ponomarenko [14], O.S. Fedonin, H.O. Shvydanenko [11], L.G. Shemaev [22] and others. However, some questions of the essence of innovative business processes and the widespread use of a process-oriented approach to enterprise management in the context of market transformations require the search for new mechanisms for implementation and further research.

Therefore, in order to solve the set issues, it is necessary to comprehensively consider the methods of implementation of innovative business processes, as well as to determine their essence and peculiarities in the conditions of application of IT.

Selection of previously unsettled parts of the general problem. Adaptation to the dynamic changes in the market and the choice of optimal development strategy nowadays are the central problems of domestic enterprises. In this regard problems of finding of efficient tools and management methods aimed at introducing results of scientific and technological progress into all areas of enterprise activities, which will reduce its costs and increase profitability, as well as increase of social standards of functioning remain.

Therefore, the organization of the enterprise requires the introduction of innovative business processes and building of an effective management system to reduce their inherent innovation and investment risks. Exactly the management of innovative business processes using IT in the context of innovation strategy will promote the company’s entering to foreign markets on a partnership basis and will provide efficient profitable activities.

Formulating the goals of the article (statement of the task). The purpose of the study is to determine the peculiarities in management of innovative business processes of the enterprise, studying and grouping the methods of their improvement, as well as disclosing the essence and prove the need for a process approach to enterprise management, identifying the essence of the innovation business process and its place and role in enterprise management, under the conditions of use of IT technologies.

Main material. Dynamic technology change, increased competition, the struggle for the consumer and product quality are driving companies to actively seek for new approaches in building of an enterprise management system. In such a situation, modern methods of information processing and information provision formation play a key role in improving the efficiency of management of industrial and business activities of the enterprise.

Science and practice of management uses a number of approaches and methods that acquire characteristic informational features as a combination of different properties at the stage of development of the information society.

We believe that the approach to highlighting these theoretical aspects should be understood as the theoretical direction (position) of consideration of management process, which includes the presence of a certain set of purpose-oriented content principles and management methods. Therefore, the urgent
Problem of modern management science is the need to create and develop a theoretical concept that combines acquired experience and would enable the integration of "classical" approaches to form a universal management model capable of reflecting contemporary trends in the development of society and business. Science of management evolution is characterized by a large number of schools, trends, concepts, approaches, currents that can be dividing into two stages: the formation of individual management schools and modern integrated approaches (Table 1).

### Table 1 – Stages of scientific schools formation and directions of their research
(developed by authors using [3; 7; 10; 11; 15; 26])

<table>
<thead>
<tr>
<th>Period</th>
<th>Management theory approaches</th>
<th>Schools scientists and representatives</th>
<th>Research essence and directions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stage 1 - Systematization period</strong> (generalization of accumulated management experience, scientific schools formation)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1855-1960</td>
<td>Formation of scientific approaches and construction principles of management system, formation of management as a science</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1855-1920</td>
<td>School of scientific management</td>
<td>Frederik U. Taylor, Frank and Lilija Gilbert, Henry Gantt</td>
<td>Investigated the study of production management, processes, determination of ways to increase productivity workers, their capabilities assessment on the basis of motivation.</td>
</tr>
<tr>
<td>1899-1945</td>
<td>School of &quot;Fordism&quot;</td>
<td>Henry Ford</td>
<td>Investigated the management based on idea of low-mass production (&quot;terror of machines&quot;), mechanisms of precise control and planning, effective motivation, conveyor assembly, continuous technological processes, innovative development, active administration were formed.</td>
</tr>
<tr>
<td>1899-1945</td>
<td>Classical (administrative) school of management</td>
<td>Henry Fayol, G.E. Emerson, C. Bernard, Max Weber</td>
<td>Conducted the research on management by type of activity, defined 14 administrative management principles, 12 performance principles, concept of rational bureaucracy developed.</td>
</tr>
<tr>
<td>1930-1950</td>
<td>School of human relations</td>
<td>Mary P. Follet, E. Meio, F. Rotlisberger, A. Maslow</td>
<td>Investigated the management formation based on the relationship assessment between employees, as attentive attitude to the subordinates increases productivity, improving the organization's activities by increasing the efficiency of using its labor resources through psychological impact and encouragement.</td>
</tr>
<tr>
<td>1950 to this day</td>
<td>School of behavioral science</td>
<td>Douglas McGregor, Chris Arjies, Rensis Lickert, Frederick Herzberg</td>
<td>Developed the methods of managing people's behavior, methods for establishing interpersonal relationships, increasing the efficiency of human resources, forming teams for psychological compatibility, etc.</td>
</tr>
<tr>
<td><strong>Stage 2 - Information Period - Integrated Methods Use in Management Practices</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1960 to this day</td>
<td>School of quantitative methods</td>
<td>R. Akkoff, S. Byr, D.Eckman, A. Enthoven, E. Kweed</td>
<td>Development of quantitative methods for justifying managerial decisions based on the use in the management of mathematics, cybernetics, probability theory, statistics and computer technology.</td>
</tr>
<tr>
<td>1960 to this day</td>
<td>System approach to management</td>
<td>C. Bernard, P. Drucker, N. Winner, K. Shannon</td>
<td>Consideration of the management processes in the relationship, their reflection in the system as a whole, the development of economic indicators regulation system for the enterprise.</td>
</tr>
<tr>
<td>1960 to this day</td>
<td>Situational approach to management</td>
<td>H. Denisson, M.H. Meskon, P. Drucker</td>
<td>The substantiation of theoretical approaches those different management methods suitability is determined by the situation.</td>
</tr>
<tr>
<td>1960 to this day</td>
<td>Process approach to management</td>
<td>Henry Fayol, Stoner</td>
<td>Consideration of management functions in the relationship, and each management function is a process that consists of interrelated actions</td>
</tr>
</tbody>
</table>
Traditional management schools, in contrast to modern ones, tried to determine their own unique way of improving the efficiency of management, perceived the process of management as separate influential actions to regulate the activities of the enterprise and did not consider the company as a complex economic system and the relationship between its elements, did not assess significant environmental effects.

In modern management theories approaches to the organization of management (Table 2) try to comprehensively take into account the peculiarities of the functioning of socio-economic objects as complex economic systems, their elements, and trends in the development of the environment in which they operate. Scientists R.S., Halekovic, V.I. Nabokova highlighted, in addition to the above mentioned (Table 2), such modern scientific approaches as administrative, reproductive, dynamic, integration, marketing, regulatory, behavioral [4, p. 25]. R.A Fatkhuddinov also provides logical, innovative, global, virtual, standardization, exclusive, structural, optimization, business, and others. [19, p. 71]. However, it is practically impossible to give a complete list of modern scientific approaches, directions, flows in a compressed systematized form because of their large number, so it is advisable to consider only the main ones. Thus, the orientation towards the needs of consumers, the implementation of flexible scientific and technical and industrial policy, and the desire for innovation are determined by new ideas of modern management, whose philosophy in the period of long-term development substantiates two basic approaches in the management of enterprises – functional and process [4, p. 35; 15, p. 27; 26]. Their combination and practical application form the integrated approaches, the choice of which allows implementing the optimal version of the functioning of the management system, taking into account the degree of complexity of production and economic objects. The essence of functional management is to ensure the performance of functions of production-economic system, with an orientation to certain ultimate goals. An alternative to a functional approach is a process approach, whose fundamental doctrine is proposed by P. Drucker “management of goals” [6]. The essence of process management is in the consideration of business process as a sequence of actions aimed at achieving the ultimate, measurable and concrete result.

Table 2 – Contribution to the modern science of managing the concepts of different approaches
(developed by authors using [1; 2, p. 9-13; 4, p. 25; 5, p. 40-45])

<table>
<thead>
<tr>
<th>Scientific approach</th>
<th>Contribution to the development of scientific management</th>
<th>Problematic aspects of the approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantitative</td>
<td>It is in the transition from qualitative evaluation to quantitative through mathematical, statistical methods, expert evaluations, system of points, etc. Implies compulsory use of computer technology.</td>
<td>Quantitative evaluation does not always provide relevant information; therefore, not all objects should be measured and quantified.</td>
</tr>
<tr>
<td>System</td>
<td>Investigation of the enterprise as an integral system, the relationship between its elements, the effectiveness and response of the system to changes.</td>
<td>Considerable attention is paid to the connections between the subsystems of the enterprise; the influence of the external environment on the state of the enterprise is practically not taken into account.</td>
</tr>
<tr>
<td>Situational</td>
<td>The study of the specific conditions of the enterprise, with the most important point is the identification of key situational factors that have the greatest impact on the ability of the organization to be competitive.</td>
<td>It is impossible to identify all variables that affect the enterprise depending on various factors, therefore, they choose the most important ones for obtaining the enterprise’s goal factors.</td>
</tr>
<tr>
<td>Process</td>
<td>Defines the management of a process in which activities aimed at achieving the goals of the organization are regarded as the sum of interrelated actions - management functions, and each of functions as a set of homogeneous actions, operations, procedures.</td>
<td>The application of a process approach to enterprise management involves a high degree of formalization, considerable amount and high cost of performed work.</td>
</tr>
</tbody>
</table>
Socio-ethical

Focused on the managerial process to reduce the likelihood of a decision that can damage the objects in its sphere of influence (business partners, personnel, owners, society, etc.). If a decision is to be taken, it is envisaged that significant compensatory measures will be implemented. The extended system of motivation that takes into account the variety of labor values of the employee, as well as human values in a whole is expected.

Synergistic

Approach in terms of the synergetic methodology of knowledge of economic and social phenomena, the source of creating additional and new value is the present or past (stated in innovations) intellectual work, in contrast to the mechanistic theory of the formation of additional value due to additional time spent. By the law of synergy, the sum of the properties of an organized whole must be greater than the sum of the properties of all the elements that it contains. At the same time the properties of the elements and the whole mean the change in various parametric characteristics, their interdependence.

Stabilization

Stabilization management has the purpose of keeping the object of management within the specified values of parameters, or preventing the transition of this object to the zone of uncontrolled state.

Complex

Complexity is aimed at deepening the interaction of the subjects of management, their association, the strengthening of interaction and the relationship between components of the system.

Functional

Provides management of the functions that are characteristic of the object being studied in accordance with its purpose.

Table 2 (Continued)

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socio-ethical</td>
<td>Focused on the managerial process to reduce the likelihood of a decision that can damage the objects in its sphere of influence (business partners, personnel, owners, society, etc.). If a decision is to be taken, it is envisaged that significant compensatory measures will be implemented. The extended system of motivation that takes into account the variety of labor values of the employee, as well as human values in a whole is expected.</td>
<td>Significant expenses for forecasting works, definition of timing, and correctness of definition of object of forecasting.</td>
<td></td>
</tr>
<tr>
<td>Synergistic</td>
<td>Approach in terms of the synergetic methodology of knowledge of economic and social phenomena, the source of creating additional and new value is the present or past (stated in innovations) intellectual work, in contrast to the mechanistic theory of the formation of additional value due to additional time spent. By the law of synergy, the sum of the properties of an organized whole must be greater than the sum of the properties of all the elements that it contains. At the same time the properties of the elements and the whole mean the change in various parametric characteristics, their interdependence.</td>
<td>Synergy could lead to very positive as well as to very negative consequences, many uncertainties, ambiguities and the lack of justification.</td>
<td></td>
</tr>
<tr>
<td>Stabilization</td>
<td>Stabilization management has the purpose of keeping the object of management within the specified values of parameters, or preventing the transition of this object to the zone of uncontrolled state.</td>
<td>Definition of approaches for substantiating parameters, limiting the functioning of objects by the given values of parameters.</td>
<td></td>
</tr>
<tr>
<td>Complex</td>
<td>Complexity is aimed at deepening the interaction of the subjects of management, their association, the strengthening of interaction and the relationship between components of the system.</td>
<td>Leveling out the results and potential capabilities of individual components of the control system.</td>
<td></td>
</tr>
<tr>
<td>Functional</td>
<td>Provides management of the functions that are characteristic of the object being studied in accordance with its purpose.</td>
<td>It focuses on subsystems of the investigated object to perform certain functions assigned to them and does not allow orientation to the final result of all activities.</td>
<td></td>
</tr>
</tbody>
</table>

According to the authors, the application of the process approach and the construction of a set of business processes are needed when using modern information technology management and the latest innovative approaches in all spheres of the functioning of social production systems. Application of situational, functional, complex and other integrated approaches indicated by the authors in Table. 1, allows to optimize current management decisions within the limits of the industrial enterprise and to form a single information space of its activity.

Thus, the innovative difference of the practical implementation of the process approach from the functional is that the focus of management is not on individual functions performed by different departments and officials, but on interfunctional processes that combine individual functions into common flows and ensure the achievement of enterprise goals [1; 2; 4, p. 25; 5, p. 40-45; 7, p. 97; 10, p. 119]. It is these process-oriented features that are capable of generating innovative ideas and creating a broad field for their implementation.

Consequently, the modern concept of process management involves the transformation of the business of the organization for closer coordination of its functional parts, increasing their flexibility and obtaining a synergistic effect, providing a successful environment for the implementation of production tasks and the introduction of various types of innovations.

In modern scientific thought there is no definite approach to the definition of the concept of “business process”. Some scientists define the business process as a set of different types of activities, within which the planned types and amounts of resources used as the “input” and a product, which is a valuable to the consumer, is created as a result of this activity at the “output” [17, p. 11].
According to some scholars, the business process is a set of logically interrelated actions performed to achieve a certain outcome of business activity [14, p. 5].

In our opinion, among the modern market positions, all processes that are carried out to obtain the final results of the enterprise's business and ensure that they receive profits, related to business processes. Actually, if the process refers to any activity that includes a certain set of functions, and which uses resources at the beginning of the process and transforms into the final product before its completion [1, p. 94], then under business processes, one should understand the step by step systematization of the complex of activities that create values for the industrial enterprise and its target audience and provide profit.

Accordingly, under the process management system of production and economic objects, we mean a set of socio-economic and technical functions and their implementation tools that implements management processes within the existing business processes in order to achieve their goals. Thus, the process model of an enterprise consists of a well-defined set of business processes, which are represented by responsible executives, which provide management of business processes, as well as employees of structural subdivisions performing the production tasks according to the functional purpose of the business process. Therefore, an industrial enterprise can be considered as a business system in which all business processes are directed to implementation of the strategy of development and introduction of innovations in order to ensure its long-term competitiveness, profitability and ability to integrate into world economic processes. Such a business system must be in line with the innovative business model that the enterprise chooses for all its business activities in order to ensure their competitiveness and profitability based on innovation, with the distinction of the components of the formation of value added both separately for each product and aggregate business [10; 16].

Innovative model of business organization of enterprise is the basic condition for its functioning, since innovation activity is initiated by the development of scientific and technological progress and serves as one of the means of enterprises adaptation to changing environmental conditions [9, p. 57-61]. In this context, it should be noted that for modern enterprises to increase profitability of their business, in addition to investing large amounts of financial resources in research and development, it is also advisable to ensure their effective use in accordance with the most successful innovation strategy. This strategy will substantiate the main directions, level, and types of innovations in accordance with the potential of the enterprise and its main business processes [9, p.22-47; 20; 24]. According to the criteria of their efficiency and further development, they should be determined by the level of production growth, profit, market share, etc., taking into account the potential of the enterprise and the stages of its life cycle [25].

Innovative business processes have a significant impact on the conditions of the functioning of enterprises, causing dynamic changes in its internal and external environment. In the internal environment of the enterprise, preconditions are created for the application of modern tools for planning income and expenses of the enterprise, methods of conducting control procedures, modern methods of information support activities, software and hardware complexes of information security of innovative business processes, modernization of equipment and introduction of the latest technologies, etc.

In the interaction of the enterprise with the environment, prerequisites are created for long-term cooperation with suppliers and customers, entering of the enterprise to foreign markets, attraction of foreign investments, stimulation of innovation development.

Thus, taking into account the peculiarities of the essence and prerequisites of our innovative business organization model will allow us to form an effective system of management of innovative business processes that will ensure the interconnection of all elements of the innovation process during its progressive development from the initial stage of the formation of the innovative idea to the implementation of the original product, where Continuous interaction with all kinds of business processes of the enterprise is carried out.

Accordingly, we define the innovative business process as the newest system of consistent, targeted
and regulated activities that functions in conjunction with all business processes of the enterprise, in which, under the influence of management processes and resources, which are the inputs of the process are transformed into outputs - the results of the process that are capable of ensuring the implementation of innovations and income generation, the steady development of the enterprise and its ability to adapt to changing environmental conditions with a high level of competitiveness (Fig. 1).

![Diagram](image-url)

**Figure 1 – Relationship between types of innovative business processes and their purpose** (constructed by authors using [14, p. 8-12; 22])

We agree with the opinion of scientists [14, p. 8-12; 22] that business processes can be divided into core business processes, business processes of support, management and development. Core innovative business processes generate income of the company. These include processes focused on the production of innovative products or services, which are the target objects of enterprise creation and provide income generation. It is the core business processes that form the result and consumer qualities for which the company receives revenue. Business processes of support provide support for all other types of business processes, and may include innovative approaches that can support the implementation of the innovative goals of the core business processes.

Business processes of management are processes that cover the entire complex of management functions at the level of each business process and the enterprise as a whole. These are the processes of strategic, operational and ongoing planning, the formation and implementation of managerial influences, which may include managerial, technological, technical and other innovations as independent projects, or interconnected with the core ones.

Business processes of development are processes of improvement of products or services, processes of technologies development, processes of modernization of equipment, as well as innovative processes.

Consequently, we have chosen a process approach to the formation and development of an innovative management structure, based on the concentration of defining business processes as components of the whole, to determine their information and management relationships and optimize their structure. However, ensuring the efficiency of innovative business processes - is one of the main tasks of an industrial enterprise. In today’s economic conditions, the implementation of this task is complicated by the influence of external and internal factors, which lead to increased costs and reduced revenue [11, p. 32; 12]. Therefore, reliable methods and tools are needed to counteract these negative factors.

Given the importance of ensuring efficiency for enterprises, there is a need for clarification,
systematization and formulation of the basic principles and methods for managing the efficiency of their activities.

In the context of the national information technology program of Ukraine, information technologies (IT) become the fundamental basis of innovative business processes of modern enterprises, promote the globalization of activities and entering of enterprises to external markets, provide a comprehensive reorganization of management work, turn into a source of added value of business entities. The modern society’s informatization level and economy knowledge formation determines the use of the economic object’s latest technical, technological and software tools in various information systems. Therefore, it becomes necessary to determine the automated information system as a set of information resources, economic and mathematical methods and models, technical, software, technological tools and specialists, designed to process information and make managerial decisions to achieve the goal. Consequently, the above factors cause the growth of the rate of using IT of Ukrainian enterprises [20, p. 336-340; 26].

The basis for its implementation should be an effective system for managing the implementation of information technology in the business processes of enterprises. The purpose of information technology implementation is to reduce the complexity of the processes of using information resources and increase their reliability and efficiency. The basis of qualitative assessment of information technology lies in the diversity of methods and methods of their design [11; 26]. The most important indicator is the degree of conformity of information technology to the scientific and technical level of its development. Before choosing one of the methods for assessing economic efficiency, it is necessary to determine the criteria by which the main result of the implementation and use of IT in the business process is expected to be achieved. The most common criteria for assessing the effectiveness of IT are the functional and resource criteria of saving social time and the criteria for the ratio of costs and output [17].

Functional criteria are those whose values characterize the degree of achievement with this technology of those desirable indicators of an information process that are necessary for the user, namely:

1) the value-time characteristics of the implemented information process (data transfer rate, memory capacity for storing information, etc.);
2) characteristics of the reliability of the implementation of the information process (the probability of a correct transfer or transformation of information, etc.);
3) parameters characterizing the degree of achievement of the main end result of the information process implemented with the help of this technology (correctness of the language or image, the quality of the formed graphic information, etc.).

The value of resource criteria characterizes the quantity and quality of different types of resources necessary for the implementation of this information technology. Resource efficiency criteria allow you to fundamentally compare different types of technologies. In addition, they provide an opportunity to quantify the effect of the use of these technologies in terms of their social usefulness in terms of saving the following types of resources:

1) material resources (technical and technological equipment necessary for the successful implementation of this technology);
2) energy resources (energy costs for the implementation of the information process or this technology);
3) human resources (number and level of personnel training required for the implementation of this technology);
4) time resources (amount of time required for the implementation of the information process with this technology of its organization);
5) information resources (the data and knowledge necessary for the successful implementation of the information process).

The criteria for saving social time are used as one of the most common indicators of the
development of society, including for a comparative quantitative assessment of the effectiveness of various types of information technologies. It is generally accepted that any savings, ultimately, can be reduced to time saving. This is the most common indicator of technology of any kind (production, social or informational).

Criteria of expenses/outcomes ratio are useful in analysis of data processing technology. The satisfaction of information needs of users or participants in business processes could be considered as an outcome then.

The effectiveness of IT implementation should be monitored on the basis of a single set of criteria throughout all stages of their life cycle. A general rule in determining the criteria for monitoring the effectiveness is a targeted approach, respectively, which is the level of achievement of the goal of managing business processes of the enterprise.

Proceeding from the fact that the purpose of implementation is the establishment of information technology to achieve certain goals, respectively, and effectiveness will be determined as the degree of their achievement [26, p.105-106].

An analysis of the practical experience of implementing IT for managing innovative business processes shows that the generally accepted approach to the interpretation of efficiency is the ratio of benefits (effects) and costs from the introduction of innovations [21; 26]. But focusing only on the evaluation of this indicator is a mistake, since measuring the effectiveness of the implementation of information technology in this approach is somewhat limited, as the impact of information technology on the profitability of the enterprise is mediated through improved management of innovative business processes of the enterprise, increasing the competence of employees, customer satisfaction. Measuring these effects in a financial dimension is complicated, and the value of the performance indicator will not provide accurate information on the effectiveness of the introduction of IT into the innovative business process.

Consequently, under these conditions, the effectiveness of the implementation of information technology means the adequacy of functional characteristics of technologies to specific goals and objectives of innovative business processes, which are determined when deciding to introduce or upgrade the enterprise information system. Therefore, the set of effects from the introduction of information technology and accordingly efficiency depends on goals of this introduction firstly.

The evaluation of the effectiveness of the implementation of information technology should be aimed at analyzing the potential benefits for the enterprise and, consequently, for such a project implementation, which will maximize this benefit [26].

Thus, on the basis of the above material, the authors came to the conclusion that it is expedient to apply the methodology for assessing the effectiveness of the introduction of information technology in the management of innovative business processes of the enterprise, which can be presented in stages.

At the first stage, the assessment of innovative business processes from the standpoint of determining their role for solving enterprise problems, which allows you to connect IT processes to solve the problem aspects of the enterprise. At this stage, the planning of the implementation of the innovation strategy of the company takes place, taking into account critical factors and indicators of success, identifying the most important elements of innovative business processes and developing a plan for their implementation.

At the second stage, the choice of IT solutions, which can improve the efficiency of innovative business processes, is made. At this stage, an analysis is carried out that identifies bottlenecks in each of the selected components of innovative business processes and justifies such a solution, which allows to eliminate the identified shortcomings and to obtain a qualitative result from the implementation of IT.

The third stage is prediction of risks. At this stage, the research determines and measures the risks inherent in IT solutions (taking into account the uncertainties that arise directly at the stage of evaluation).

The fourth stage is estimating the cost of IT solutions. At this stage, the amount of IT funding
required to achieve the goals is determined. Cost estimation consists of:

1) cost estimates for IT solutions (involves the definition of all capital and current costs associated with the implementation and use of information technology, namely:

a) estimation of direct costs for implementation of IT solution (\(V_P\), UAH):

\[
V_P = V_{TZ} + V_{PLP} + V_{DP} + V_{VSZ} + V_{PSO} + V_U + V_i
\]

(1)

where \(V_{TZ}\) – purchase of equipment, UAH; \(n\) – number of types of purchased technical equipment, pcs; \(V_{TZ_i}\) – costs for purchase one technical equipment, UAH; \(V_{PLP}\) – purchase and maintenance of software, UAH; \(m\) – the number of types of purchased software, pcs; \(V_{PPZ}\) – expenses for the purchase of \(j\)-software, UAH; \(V_{PPZ_j}\) – expenses for support of \(j\)-software, UAH; \(V_{PPZc}\) – expenses on outsourced services, UAH; \(V_{PPZ}\) – expenses for IT management, UAH; \(V_{i}\) – other direct expenses for IT implementation, UAH.

b) estimation of indirect costs for IT implementation (UAH);

c) estimation of expenses for maintenance of IT during their life cycle, which predicts the annual cost of maintenance of information technologies during the period of their useful use. Annual expenses on IT maintenance (\(V_{UTR}\), UAH):

\[
V_{UTR} = V_{OP} + V_{PSO} + V_{PSO} + V_i
\]

(2)

where \(V_{OP}\) – payment for support and upgrade of IT, UAH; \(V_{PSO}\) – expenses for social events, UAH; \(V_{PSO}\) – payment for outsourced services, UAH; \(V_{i}\) – other expenses for maintenance of IT, UAH;

d) estimation of possible losses from the introduction of IT (\(P\), UAH), where it is planned to determine the losses from failures and downtime (planned or unplanned), losses from elimination of failures at work and others. Determining the value of potential losses is based on statistical data on the implementation of such IT, or based on data accumulated in the enterprise. Thus, the total cost of IT solutions (\(V_{IT}\), UAH) will be determined by the formula:

\[
V_{IT} = V_P + V_N + V_{UTR} + P
\]

(3)

2) assessing the validity of the determined cost of IT solutions, which is carried out by: comparing costs with the average indicators of enterprises in one industry; Determining the economic efficiency of IT solutions.

The fifth stage evaluates the effectiveness of the implementation of information technology in the innovative business process. For this purpose, one of the above-mentioned methods for assessing the effectiveness of IT implementation is determined and evaluated for expected implementation benefits.

In order to ensure the completeness and reliability of assessing the effects of the introduction of information technology, the mandatory condition is to take into account the influence of external factors that affect the innovative business processes of the enterprise and determine the current level of efficiency of innovative business processes. This approach will determine the level of efficiency of automation of innovative business processes of the enterprise. The peculiarities of the formation of IT support of the management system for innovative business processes in the context of the introduction of IT are presented in Fig. 2.

The main types of modern software products that can be used to model and develop innovative
business processes include: BPM-systems (Business Process Management) – this is the concept of organization process management (business process management), which complements enterprise class systems ERP, CRM; BPMS programs (Business Process Management System) that provide modeling, automation, monitoring, management and optimization of business processes. These systems also include software products based on the integration of CASE-technologies and simulation models: Arena – simulation of the production process, physical phenomena, etc.; ARIS – network technologies; Vensim, iThink, Powersim, AnyLogic - modeling the business process structure, rebuilding BPR (business process reengineering), etc. The main purpose of these systems is to provide software support for the concept of enterprise process management (both existing processes and innovative business processes).

Figure 2 – The main elements of the information support of the management system of innovative business processes of the enterprise (constructed by authors using [17, p. 95; 18, p. 18-40; 26])

Thus, at this stage of economic transformations in Ukraine the primary task of domestic industrial enterprises is the formation of a system for managing the strategy of innovative business processes and mechanisms for meeting the information needs of management personnel in an unstable environment and growing competition of foreign manufacturers, which should not only take into account changes in the environment but actively influence them as well.
Such an active innovation policy coupled with modern management technologies can provide an increase in the company’s profit without attracting investment from the outside. Consequently, the innovative approach to socio-economic development of an enterprise involves the formation of an innovative strategy, the implementation of which is provided by innovative business processes, using modern computer technologies, which require constant monitoring, systematization and control in order to achieve the goals of the enterprise, increase its profitability and competitiveness.

As innovative business processes are characterized by a certain degree of uncertainty and risks that are also inherent in IT, there is a need for their continuous monitoring, state diagnostics, flow control and identification of ways to effectively implement and improve. The mechanism of innovative business processes management of the enterprise should be aimed at fulfilling the tasks, the sequence of implementation of which reflects the proposed algorithm (Fig. 3). Here, the first stage involves conducting system diagnostics of innovative business processes of the enterprise, which allows to establish qualitative and quantitative characteristics that determine the degree of efficiency of management of innovative business processes [9; 14, p. 69-82].

**Figure 3 – The algorithm of the enterprise innovative business processes management**

(constructed by authors using [8; 14, p. 69-82; 16, p. 20-24])
The proposed system of key performance indicators identifies business processes as well as IT implementation measures that are to be improved and developed to enhance competitive advantages.

In the second stage, using methods of qualitative analysis, one should highlight the most problematic components of business processes, and define their “bottlenecks”. The result of the diagnostics should be the formalization of the problem and the identification of the causes of inefficient management of innovative business processes, as well as factors that cause the emergence of these reasons [7; 14; 16].

The third stage involves conducting a qualitative and quantitative assessment of the resource capabilities of the enterprise to implement measures to manage innovative business processes. The results of the integrated assessment of innovative business processes and the identification of resource capabilities of the enterprise will be the basis for the fourth stage - definition of measures for their improvement.

The main purpose of the fifth stage is to determine the economic effect of introducing the proposed measures of innovative business processes in the IT environment, calculating the integral effect, as well as monitoring and implementing measures to improve the innovative business processes of the enterprise in the context of the introduction (use) of IT [3; 18; 26].

Conclusions

By the results of the study of socio-economic objects management concepts evolution, we came to the conclusion that the process approach to building a management system allows modern management to focus on interfunctional processes that combine individual functions into common flows and ensure achievement of enterprise goals.

It is these characteristic features of the process approach that ensure the implementation of the enterprise innovation strategy through the introduction of innovative business processes in all its areas of operation. This allowed to highlight the prerequisites and peculiarities of functioning of an effective innovative business processes management system and to substantiate their essence and their own definition.

IT is becoming increasingly important for the effectiveness of the introduction of innovative business processes, the feasibility of which can be justified based on an assessment of their implementation efficiency, which involves the gradual inclusion of all costs and risks. The use of IT provides the formation of an information management system for innovative business processes, the construction of an effective mechanism for their implementation.

Conclusions and perspectives for further researches. Consequently, the modern concept of process management involves the transformation of the enterprise business for closer coordination of its functional parts, increasing their flexibility and obtaining a synergistic effect, providing a successful environment for the implementation of production tasks and the introduction of various types of innovations. In order to increase the efficiency of activities and achieve strategic goals, domestic enterprises need to reorganize the management system based on a process approach and pay special attention to the development and improvement of innovative business processes in the context of the introduction of modern IT.


Marketing i менеджмент інновацій, 2017, № 4
http://mmi.fem.sumdu.edu.ua/

145


Розділ 3 Інноваційний менеджмент

[Вінницький індустріальний університет]


М.П. Войнarenko, д-р екон. наук, професор, Заслужений діяч науки і техніки України, член-кореспондент НАН України, проректор з науково-педагогічної та наукової роботи, Хмельницький національний університет (м. Хмельницький, Україна);

Л.В. Джулій, канд. екон. наук, доцент, доцент кафедри обліку і аудиту, Хмельницький національний університет (м. Хмельницький, Україна);

О.М. Куляменко, канд. техн. наук, доцент, доцент кафедри економічної кібернетики та інформаційних систем, Вінницький торговельно-економічний інститут Київського торговельно-економічного університету (м. Вінниця, Україна);

Т.В. Янчук, канд. екон. наук, доцент, доцент кафедри маркетингу, Донецький національний університет імені Василя Суша (м. Вінниця, Україна)

Управління розвитком інноваційних бізнес-процесів за умов використання автоматизованих інформаційних систем
У статті проведено аналіз розвитку науки про управління. Систематизовано етапи формування наукових школ та інтегрованих методів у практиці управління. Доведено актуальність процесного підходу в управлінні підприємством, який в поєднанні з функціональною забезпечує оптимальний варіант функціонування системи управління із урахуванням ступеня складності виробничо-економічних об’єктів. Розглянуто сутність процесного управління через виділення бізнес-процесів як послідовності дій, що спрямовані на досягнення конкретного, вимірюваного і конкретного результату. Авторами дана характеристика бізнес-процесів, та охарактеризована процесна модель підприємства як бізнес-системи, у якій всі процеси спрямовуються на реалізацію стратегії розвитку та впровадження інновацій. Установлено безпосередній взаємозв’язок бізнес-системи з відповідною інноваційною бізнес-моделлю, яку обирає підприємство до вибору бізнес-діяльності для забезпечення їх конкурентоспроможності та прибутковості на основі інновацій. Дано визначення інноваційного бізнес-процесу та відношення основних видів бізнес-процесів, інноваційних бізнес-процесів, їх цільове спрямування та інформаційні зв’язки. Запропоновано науково-методичні підходи до оцінювання ефективності впровадження інформаційних технологій в інноваційний бізнес-процес.

Ключові слова: інформаційні системи, автоматизація, управління підприємством, ефективність, бізнес-процеси, інновації.

М.П. Войнаренко, д-р экон. наук, професор, Заслуженный деятель науки и техники Украины, член-корреспондент НАН Украины, проектор по научно-педагогической и научной деятельности, Хмельницкий национальный университет (г. Хмельницкий, Украина);
Л.В. Джулій, канд. экон. наук, доцент, доцент кафедры учета и аудита, Хмельницкий национальный университет (г. Хмельницкий, Украина);
А.Н. Кузьмина, канд. техн. наук, доцент, доцент кафедры экономической кибернетики и информационных систем, Винницкий торгово-экономический институт Киевского торгово-экономического университета (г. Винница, Украина);
Т.В. Янчук, канд. экон. наук, доцент, доцент кафедры маркетинга, Донецкий национальный университет имени Василия Стуса (г. Винница, Украина)

Управление развитием инновационных бизнес-процессов с использованием автоматизированных информационных систем

В статье проведен анализ развития науки об управлении. Систематизированы этапы формирования научных школ и интегрированных методов в практике управления. Доказана актуальность процессного подхода в управлении предприятием, который в сочетании с функциональным, обеспечивает оптимальный вариант функционирования системы управления с учетом степени сложности производственно-экономических объектов. Рассмотрена сущность процессного управления через выделение бизнес-процессов как последовательности действий, направленных на достижение конечного, измеримого и конкретного результата. Авторами дана характеристика бизнес-процессов, и представлена процессная модель предприятия как бизнес-системы, в которой все бизнес-процессы направлены на реализацию стратегии развития и внедрения инноваций. Установлено непосредственную взаимосвязь бизнес-системы с соответствующей инновационной бизнес-моделью предприятия. Дано определение инновационного бизнес-процесса, выделены основные виды бизнес-процессов, инновационных бизнес-процессов, их целевое назначение и информационная связь. Предложен научно-методический подход оценки эффективности внедрения информационных технологий в инновационный бизнес-процесс, который предусматривает поэтапный учет всех расходов и рисков.

Ключевые слова: информационные системы, автоматизация, управление предприятием, эффективность, бизнес-процессы, инновация.

Отримано 14.03.2017 р.