UDC 338.2
DOI https://doi.org/10.32848/agrar.innov.2025.30.35

AUTOMATION OF INNOVATIVE ACTIVITY IN THE MANAGEMENT SYSTEM

HUSEYNOVA N.L. – PhD in Economics, Faculty of Business and Logistics
orcid.org/0000-0002-7940-8628
Azerbaijan State University of Economics (UNEC)

Introduction. Any changes in the management system of the enterprise should be aimed at improving the characteristics of manufactured products and increasing the economic efficiency of the processes of their creation. The most effective way to achieve these goals is through both product and process innovations. Thus, according to calculations conducted in economic publications, innovation provides an opportunity to transition to new technological platforms, with the help of which the foundations of significant economic growth are formed.

Analysis. The role of innovations in economic development is confirmed by the following state documents:

• National priority economic development of Azerbaijan until 2030 [8];

• Strategy of scientific and technological development of the Republic of Azerbaijan;

• Methodological materials on the preparation of innovative development programs for joint-stock companies with state participation, state corporations and state enterprises, prepared by the Ministry of Economy of the Republic of Azerbaijan.

However, there is still no unified approach to forecasting innovative development, systematic methods for measuring innovations, and taking into account their impact on the strategic development of the enterprise. The most widespread method of managing the innovative development of large national enterprises (with the participation of the state) in Azerbaijan is the implementation of innovative development programs, which are a set of activities aimed at creating product and process innovations from a functional point of view. The way to control the implementation of innovation programs is to prepare annual reports on their implementation in accordance with methodological recommendations on the implementation of innovation development priorities presented by the relevant executive authorities [7].

It should be noted that the creation of a management system for the innovative sphere of activity of an enterprise, its measurement, change management and the development of a strategy (forecast) taking into account the innovative component are one of the main tasks of enterprise management. When solving the problem of creating a management system for innovative processes of an enterprise, the problem arises not only of creating a methodology for self-management of innovative development, but also of reducing the resources spent on its implementation. Within the framework of modern trends in enterprise development, manual control is becoming increasingly ineffective. The digitalization trend reflected in “Azerbaijan 2030: National Priorities of Socio-Economic Development” [8] requires the creation of an automated management system for the innovative development of an enterprise (AMIAS).

Thus, the main problems of managing the innovative development of enterprises can be formulated:

• lack of effective methods for managing the innovative component of enterprises;

• low level of automation of management in large enterprises (in most of the non-manufacturing sector, that is, in enterprises whose task is not industrial production, but the creation of new knowledge, design, etc.).

Management of innovative development of the enterprise should be considered as an element of strategic management. To assess the implementation of strategic goals, it is proposed to consider the Balanced Scorecard (BSC) developed by Robert S. Kaplan and David P. Norton [6]. The balanced scorecard is a strategic management system of the company based on measuring and evaluating the effectiveness of the organization using an optimally selected set of indicators that reflect all aspects of its financial and non-financial activities (human capital, science, material resources, etc.).

The Kaplan-Norton model is used to analyze the implementation of the strategy and understand the versatility of the elements of the enterprise (this reflects the fact that the analysis and analysis cannot be limited to financial indicators). However, the main point is that it is more a concept of implementing existing strategies than developing new ones, that is, the system cannot ensure the implementation of the management cycle. Taking into account the main principle of the BSC (versatility of analysis), it is proposed to use the innovative potential of the enterprise as a system for assessing the innovative component of the enterprise. The concept of innovation potential (in relation to the country) was formulated by Michael Porter in 2001 [3]. Porter proposed a quantitative method for assessing the innovative potential of the state – the Innovation Capability Index (ICI). When it comes to the innovative potential of an enterprise, there is a lack of a single definition of it (innovation potential).This study proposes the following definition of innovative potential: it is a measure of the ability to obtain its own innovative product, with unique characteristics and designed to meet new consumer needs, in a competitive market environment, taking into account external environmental influences and with sufficient resource provision. A high innovative potential of an enterprise contributes to the formation of the main types of competitive advantages: price advantage and product differentiation.It determines

the quality characteristics, uniqueness of the manufactured product and forms the protection of advantages. The results of the analysis of innovation potential indicators can be the basis for regulating the activities of the enterprise. Knowing the value of innovative potential allows you to determine the role and place of the enterprise in the market, its development prospects, take measures to increase its competitiveness by adjusting individual indicators, purposefully influencing specific areas of its activity, and achieve increased operational efficiency.

The stages of innovation potential management can be presented as follows:

1. Determining the goals of innovative potential management;
2. Assessing innovative potential;
3. Assessing the degree to which the actual level of innovation potential corresponds to the required one;
4. Taking measures to increase the level of innovation potential;
5. Analysis and control of results;
6. Conclusions and decisions on further steps to monitor or increase the level of innovative potential.

The given sequence of steps corresponds to the universal management cycle. However, the value of innovative potential can be used not only to take measures aimed at its immediate development, but also to manage the innovative activity of the enterprise as a whole. For this, it is proposed to ensure the formation of an innovative activity strategy of the enterprise based on the value of innovative potential. In accordance with the proposed concept, the initial data for calculating the innovative potential should consist of the results of the operational activities of the enterprise and external factors. The value of innovative potential is used to complete the management cycle and form an innovative development strategy.

The result of the enterprise's activities is considered as a function of the implementation of the strategy and external factors. The creation of an effective enterprise management system is ensured by solving the following tasks:

1. Creation and support of the enterprise's activities in the form of a coordinated, consistent work system;
2. Designing an organizational structure and creating a system for achieving goals.
3. Increasing the efficiency of business processes;
4. Providing information support to business processes.

Tasks 1 and 2 can be considered as input data for the innovative potential management system, and tasks 3 and 4 are solved by implementing the defined strategy and automating the management process. After automating tasks 3 and 4, automation of tasks 1 and 2 can be ensured. Digitalization of enterprises significantly increases their competitiveness.

The use of modeling as a decision support tool can provide a competitive advantage over enterprises operating in the same market segments and not using automated methods in management. Currently, the functions of the management cycle: forecasting, planning, analysis, and often accounting are performed in a large number of enterprises (including those with state participation) manually or using standard computer programs. The process of collecting and analyzing data to calculate the innovative potential of the enterprise requires significant resource costs. In addition, based on a large amount of disparate information, it is difficult to obtain an overall picture of the situation and build an enterprise development strategy.

Most automation control systems are aimed at solving the following problems [2]:

- automation of repetitive processes;
- tracking of incomplete processes;
- formation of a general picture of the work (production) process;
- reflection of performance indicators. The most widespread automated systems are:
- ERP systems–enterprise resource planning systems;
- CRM systems–customer relationship management systems;
- MES systems–production control systems;
- WMS systems–warehouse management systems;
- SCM systems–supply chain management systems;
- MRP systems–manufacturing resource planning;
- DSS systems–decision support;
- CAD systems–computer-aided design systems.

Most of these systems can only be used to solve individual problems, they automate "routine" management processes, but do not provide solutions to strategic problems; Also, in large Russian enterprises, fragmentation of various information systems is observed, which leads to the complexity of automation processes (this problem is more common in non-production enterprises, for example, scientific research, scientific and technical, etc.). In practice, the level of automation of some state enterprises does not even reach the creation of a centralized database. An information system often consists of unrelated information products that perform the following functions:

- electronic document flow;
- project management (often such a system is of a formal nature; many elements, such as time planning, resource allocation, degree of project completion, are only nominally automated, but in fact are filled in, adjusted and analyzed manually by the assistant. Automation in the project manager system is in the visual presentation of information);
- management of the results of intellectual activity (RIA) (a consolidated database of intellectual activity with the ability to create intuitive queries);
- management of high-tech equipment (also a database), etc.

Methods. Thus, there is an urgent need to unify disparate information resources into a common information system. The listed systems do not solve the problem of strategy development. In this regard, it is necessary to pay attention to CPM systems (Corporate Performance Management, business performance management systems). This is a set of methodologies, industry models, measures, processes and systems for monitoring and managing a company's activities [1]. Based on the CPM approach, several software products have been developed (for example, the Gartner product) that provide analysis of strategic planning and strategy implementation. Despite the usefulness of such products, they are rarely used in Azerbaijani enterprises, which is due to the lack of readiness of employees

for their implementation due to the labor-intensive nature of their use for lower-level employees. At the same time, CPM systems have a significant drawback from the point of view of innovation-oriented management: strategic planning usually involves the creation of a financial model based on the balance of costs and revenues and possible financial flows [1], and the management of the innovative activity of the enterprise and the construction of an innovation strategy require consideration of various aspects of the company's activities.

Taking into account the described automated systems, approaches to the assessment of innovative potential and its management, it is proposed to build an automated enterprise development management system based on innovative potential, taking into account the innovative component of the enterprise and having the ability to offer. One of the features of the proposed system (ASU IRP) should be the ability to integrate it into a single information system of the enterprise.Integration consists of the following functions:

• combining separate information resources of the enterprise;

• queries from a single information system to data from various sources;

• transferring analysis results to databases;

• transferring management decisions. The queries that must be performed for the system to function are mainly required to calculate the innovative potential and are SQL queries to the enterprise database.

Examples of SQL queries:

• Select Purchase_Date from Equipment;

• Select ICT_Expenses from Expenses;

• Select Code from Publications;

• Select Issue_Date from Patents_and_Intellectual_Property.

The elements that make up the innovation management system of the enterprise (see Figure 1) act as a closed structure that provides a means of controlling the current processes of the enterprise and the transfer of work results. This also ensures the emergence of effective innovations.

The decision-making block is an expert system. The block processes information from the innovative potential assessment and forecasting tool (based on a mathematical model of innovative potential and methods for predicting stochastic processes) and the current situation block (the degree of implementation of the current strategy) and converts the results of the analysis into strategy recommendations and a model representing control signals for various

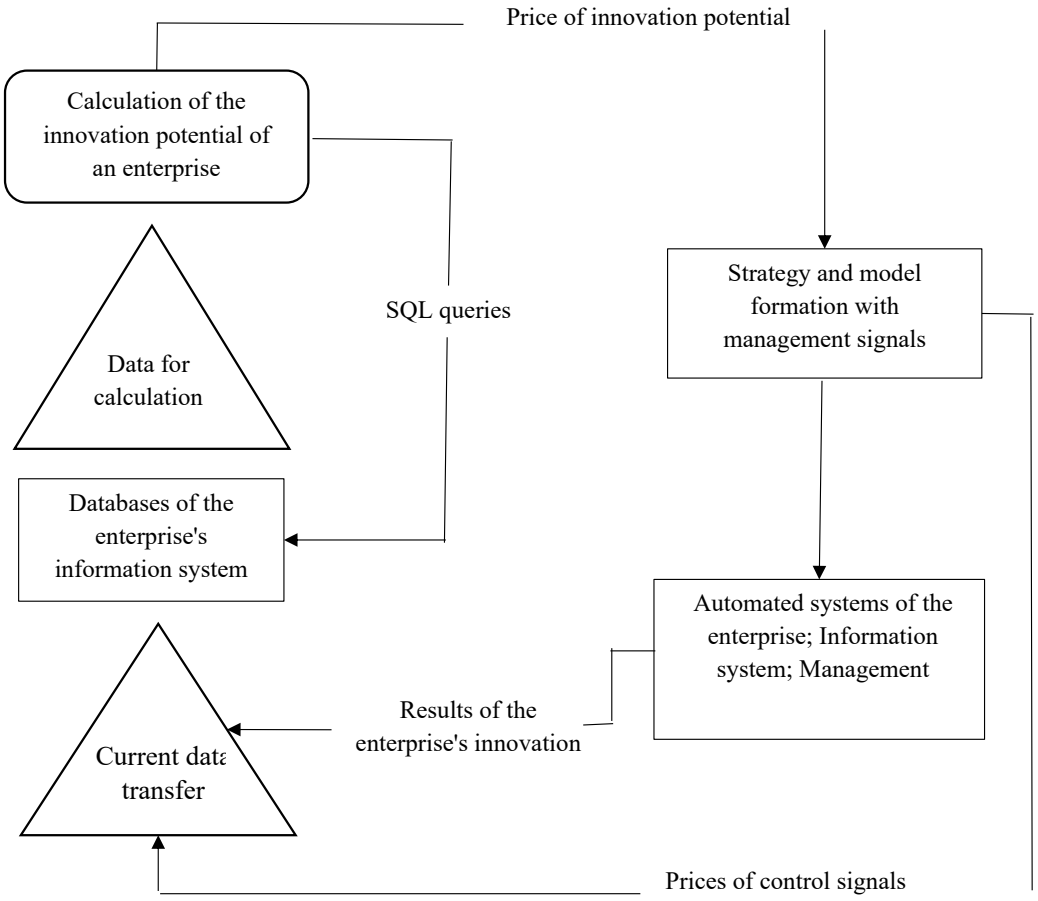

Fig. 1. Algorithm for integrating the innovation potential assessment system into the enterprise's information system

Source: image compiled by the author

areas of the enterprise's activity, taken into account in the innovative potential.

Research results. It should be noted that when developing strategic decisions, the innovative component, the quantitative assessment of which is proposed to be carried out using the innovative potential of the enterprise, should be taken into account. Its value can be used as an element of the control effect on the enterprise system. In addition, the inclusion of a component that provides a solution to the problem of strategic planning in the automated management system of the enterprise will increase its competitiveness. The proposed approach, according to the author, reduces resource costs for accounting for innovations and strategic forecasting, reduces the costs of management activities related to the innovative development of the enterprise by increasing the accuracy of calculating the innovative potential of the enterprise, and ultimately ensures the "learning" ability of the decision-making system.

Thus, the need to build a single digital space that fully automates not only the described process, but also the processes of collecting and processing other types of innovation sources becomes clear. The implementation of such a solution will allow the enterprise to build a systematically managed and transparent process for selecting ideas, establish communication between all participants in the process, optimize the costs of selecting initiatives, and minimize the risks of refinancing similar ideas. The proposed solution for implementation in the enterprise is a digital platform that provides management of the process of creating innovative products. A digital platform is a system of algorithmized mutually beneficial relationships between a significant number of independent participants of an economic sector (or field of activity) in a single information environment, which leads to a reduction in transaction costs through the use of a package. This system fully takes into account changes in the division of labor system by using digital technologies to work with information. The digital platform has significant advantages such as the ability to expand to all subsidiaries of the organization and the absence of platform restrictions, which will allow, if necessary, to connect additional services or functional modules to the platform. Currently, there are no widely used methodologies and digital platforms to support the process of creating innovative products by organizations, including the earliest (pre-investment) stages. Since an important condition for the project of developing and implementing a system in an enterprise is internal development, digital platforms developed by Azerbaijani companies that can solve the problem were analyzed (see Table 1).

None of the presented solutions fully meets the proposed criteria, therefore, a new digital platform is required to manage the process of creating innovative products. To fulfill the task of developing a digital innovation management platform, the technological part of the platform was designed and developed using a microservice architecture approach.The microservice architecture will allow the use of both services that provide certain technical functions (screen form editor, print form creation service, crypto-service, etc.) and modules (i.e. a set of functionality limited in scope, a set of predefined functions) within the platform. configured to meet specific user needs). The joint use of technical services and functional modules within the digital platform will allow us to obtain a highly adaptive product, the final configuration of which (the composition of the necessary elements) can be determined by the Customer himself. The proposed architecture of a digital platform consisting of services and modules is presented in Figure 2.

One of the expected impacts of the development and implementation of a digital platform for managing the innovation process is the release of labor resources, as the process of collecting and verifying applications will be carried out automatically using the platform.

The release of employees' working time is achieved by removing unnecessary actions (operations) of employees from processes and reducing the duration of operations that cause loss of working time. Using the following formula, for example, let's calculate the amount of free time for the reporting period in person/hours:

$$Vbv = Tixt * Sə.i. \quad (1)$$

Where: Vbv – the amount of working time freed up for employees by reducing the duration of operations;

Tixt – release of the duration of a transaction;

Sə.i. – number of operations with reduced duration.

As a result of the implementation of the digital platform, the estimated reduction in the duration of one operation at the enterprise is 32 hours, since the process of selecting applications takes a long time. The estimated number of operations whose duration will be reduced is 20. Thus, the amount of freed working time for employees will be 640 person/hours. Let's calculate the value of free time for the reporting period in thousand manats using the following formula:

Table 1

Comparative analysis of digital platforms for innovation management

	4İ	**1C-Bitriks**	**LOSMAN: KB**
The degree to which the innovation encompasses the entire creation process of the product	Covers the process completely	Does not fully cover the process	Covers the process completely
Flow of technologies used	Outdated	New	Outdated
Possibility of process customization without involving developers	None	Partially, but not all processes	None
Scalability and customization possible	None	Yes	None

Source: The table is based on source [7, 8].

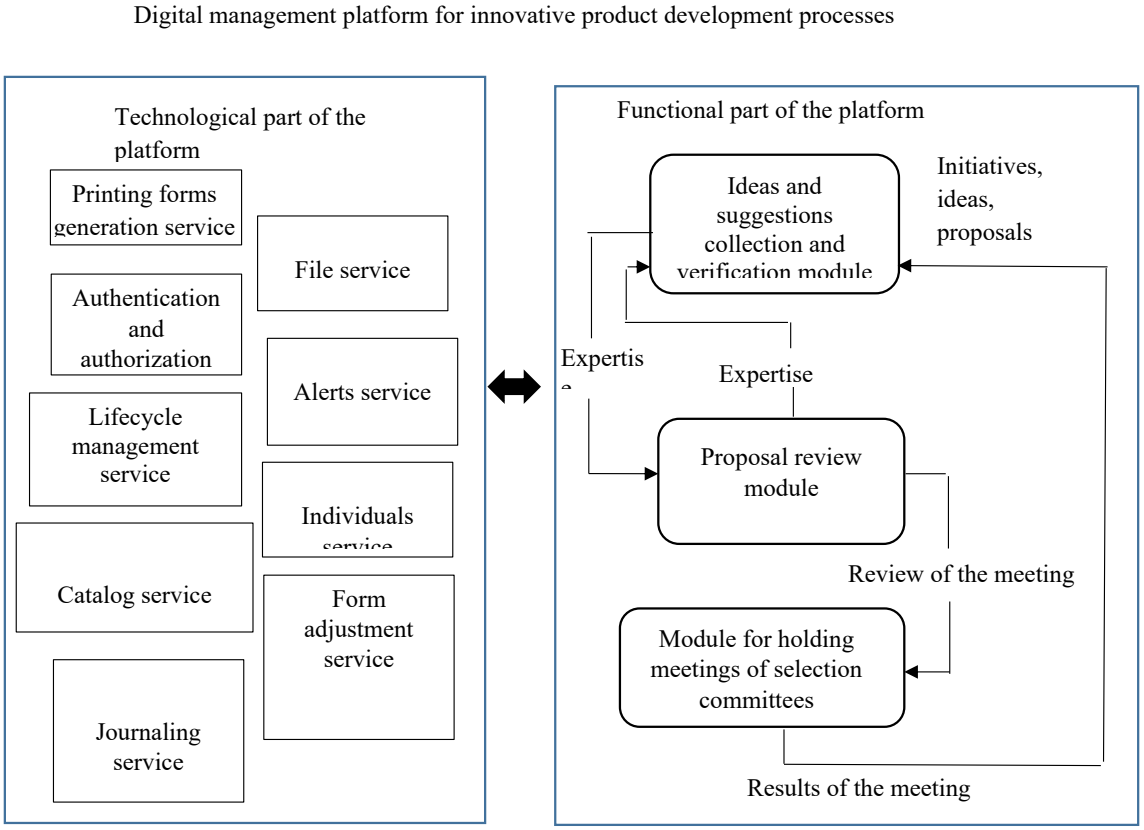

Fig. 2. Structure of the proposed digital platform

Source: image compiled by the author.

$$Dbv = Vbv * Od \quad (2)$$

Here:

Dbv – the value of the employees' freed working time;

Vbv – volume of employees' free working time, person/hour;

Od – average price per person/hour.

The average cost of one person/hour at the enterprise is 950 manats. Thus, the cost of the freed working time of employees will be 608 thousand manats. The main economic effect is expected to be a multiple increase in the flow of initiatives from employees, as well as an increase in the level of development of submitted initiatives, since interaction between applicants and experts will occur through the platform. Using the example of the successful implementation of digital platforms, we can draw some conclusions about the expected flow of innovation and the expected income from them. Among them:

– The implementation of the ideas collection platform "Powerful Ideas for a New Era" can increase the flow of incoming ideas several times.

– Michelin's InnovaGo program saved 24.5 million euros in 2017 and half of the 59,000 ideas submitted were implemented [5].

– More than half of the company's employees participate in "Idea Factory" program: 50% of 450 thousand ideas have been implemented since 2012. Based on the impact of these projects, it can be expected that after the implementation of the digital platform with a flow of 5,000 ideas per year across all innovation sources, 5,000 * 3 = 15,000 applications are expected. With an expected flow of 15,000 ideas, 15,000 * 0.5 = 7,500 applications are expected to be implemented, which will potentially bring revenue to the company [4].

Conclusions. Thus, the development and implementation of a digital platform will bring potential revenue to the enterprise, one of whose activities is the management of the process of creating innovative products.

The digital platform will achieve the following business effects:

– a controlled and transparent process for selecting ideas/initiatives/innovations will be established across the entire group of companies;

– communication will be established between all participants in the process;

– costs for selecting ideas/initiatives/innovations will be optimized by freeing up labor resources and eliminating routine operations;

– a single information environment will be created, which will increase the launch of incoming ideas and innovative projects;

– the risks of refinancing similar projects will be minimized.

BIBLIOGRAPHY:

1. Bourne M., Franco-Santos M., Wilkes J. Corporate Performance Management. *Measuring Business Excellence*. September 2003. № 7 (3). DOI:10.1108/13683040310496462
2. Miller Neil. 10 Features Every Workflow Management System Should Have. 2019. URL: https://datamyte.com/blogs/workflow-management-system/
3. Porter M. E., Stern S. National Innovative Capacity. In M. E. Porter, et al., Eds., The Global Competitiveness Report, 2001-2002. New York: Oxford University Press, 2002. Pp. 102-118.
4. Unlock the potential of your startup. Accelerate your business and bring your vision to life. URL: https://startupcolorado.org/founder-coopetition/idea-factory/
5. Mauricio Manzano-Podversich. Michelin was built on innovation. *Business Services & Innovation*. URL: https://www.absl.ro/business-services-innovation-mauricio-manzano-podversich-michelin-was-built-on-innovation
6. Norton D. P., Kaplan R. S. System broadcasting. 2009. 392 p.
7. Aliyev T. N. Clusters: international experience and innovative development: monograph. Baku, Science and Knowledge, 2019. 536 p.
8. Azerbaijan 2030: National Priorities for Socio-Economic Development. Decree of the President of the Republic of Azerbaijan. Baku, 2021. February 2. URL: https://president.az/en/articles/view/50474

REFERENCES:

1. Bourne M., Franco-Santos M., & Wilkes J. (2003). Corporate Performance Management. *Measuring Business Excellence*, 7 (3). DOI:10.1108/13683040310496462
2. Miller, Neil. (2019). 10 Features Every Workflow Management System Should Have. URL: https://datamyte.com/blogs/workflow-management-system/
3. Porter M.E., & Stern S. (2002). National Innovative Capacity. The Global Competitiveness Report, 2001-2002. New York: Oxford University Press, 102-118.
4. Unlock the potential of your startup. Accelerate your business and bring your vision to life. URL: https://startupcolorado.org/founder-coopetition/idea-factory/
5. Mauricio Manzano-Podversich. Michelin was built on innovation. *Business Services & Innovation*. URL: https://www.absl.ro/business-services-innovation-mauricio-manzano-podversich-michelin-was-built-on-innovation
6. Norton D.P., & Kaplan R.S. (2009). System broadcasting, 392 p.
7. Aliyev, T.N. (2019). Clusters: international experience and innovative development: monograph. Baku, Science and Knowledge, 536 p.
8. Azerbaijan 2030: National Priorities for Socio-Economic Development. Decree of the President of the Republic of Azerbaijan. Baku, 2021. February 2. URL: https://president.az/en/articles/view/50474

Huseynova N.L. Automation of innovative activity in the management system

The purpose. Any changes in the management system of the enterprise should be aimed at improving the characteristics of manufactured products and increasing the economic efficiency of the processes of their creation. The most effective way to achieve these goals is through both product and process innovations. Thus, according to calculations conducted in economic publications, innovation provides an opportunity to transition to new technological platforms, with the help of which the foundations of significant economic growth are formed. **Research methods.** The creation of a management system for the innovative sphere of activity of an enterprise in Azerbaijan, its measurement, change management and strategy development taking into account the innovative component are one of the main tasks of enterprise management. When solving the problem of creating a management system for innovative processes of an enterprise, the problem arises not only of creating a self-management methodology for innovative development, but also of reducing the resources spent on its implementation. In the research work, the solution of this problem was carried out on the basis of statistical and mathematical methods. **The results.** Thus, the need to build a single digital space that fully automates not only the described process, but also the processes of collecting and processing other types of innovation sources becomes clear. The implementation of such a solution will allow the enterprise to build a systematically managed and transparent process for selecting ideas, establish contacts between all participants in the process, optimize costs for selecting initiatives and minimize the risks of refinancing similar ideas. The solution proposed for implementation at the enterprise is a digital platform that provides management of the process of creating innovative products. A digital platform is a system of algorithmized mutually beneficial relationships between a significant number of independent participants of the economic sector (or field of activity) in a single information environment, which leads to a reduction in transaction costs through the use of a package. **Conclusion.** The digital platform will achieve the following business effects: a controlled and transparent process for selecting ideas/initiatives/innovations will be established across the entire group of companies; communication will be established between all participants in the process; costs for selecting ideas/initiatives/innovations will be optimized by freeing up labor resources and eliminating routine operations; a unified information environment will be created, which will increase the number of incoming ideas and innovative projects.

Key words: innovative activity, strategic management, automated systems, evaluation, forecasting.

Гусейнова Н.Л. Автоматизація інноваційної діяльності в системі управління

Мета. Будь-які зміни в системі управління підприємством повинні бути спрямовані на покращення виготовленої продукції та підвищення економічної ефективності процесів її створення. Найефективніший спосіб досягнення цих цілей – це як продуктові, так і процеси інновації. Таким чином, згідно з економічними розрахунками,

інновації надають можливість переходу на нові технологічні платформи, за допомогою яких формуються основи значного економічного зростання. **Методика**. Створення системи управління інноваційною сферою діяльності підприємства в Азербайджані, її вимірювання, управління змінами та розробка стратегії з урахуванням інноваційної складової є одними з основних завдань управління підприємством. При вирішенні проблеми створення системи управління інноваційними процесами підприємства виникає проблема не лише створення методології самоуправління інноваційним розвитком, але й зменшення ресурсів, що витрачаються на її реалізацію. У дослідницькій роботі вирішення цієї проблеми здійснювалося на основі статистичних та математичних методів. **Результати.** Таким чином, стає зрозумілою необхідність побудови єдиного цифрового простору, який повністю автоматизує не лише описаний процес, але й процеси збору та обробки інших видів джерел інновацій. Впровадження такого рішення дозволить підприємству побудувати системно керований та прозорий процес відбору ідей, встановити контакти між усіма учасниками процесу, оптимізувати витрати на відбір ініціатив та мінімізувати ризики рефінансування подібних ідей. Рішення, що пропонується для впровадження на підприємстві, являє собою цифрову платформу, яка забезпечує управління процесом створення інноваційних продуктів. Цифрова платформа – це система алгоритмізованих взаємовигідних зв'язків між значною кількістю незалежних учасників економічного сектору (або сфери діяльності) в єдиному інформаційному середовищі, що призводить до зниження транзакційних витрат завдяки використанню пакету. **Висновок.** Цифрова платформа досягне наступних бізнес-ефектів по налагодженню: контрольованого та прозорого процесу відбору ідей/ініціатив/інновацій по всій групі компаній; комунікацій між усіма учасниками процесу; витрати на відбір ідей/ініціатив/інновацій будуть оптимізовані за рахунок вивільнення трудових ресурсів та усунення рутинних операцій; буде створено єдине інформаційне середовище, що збільшить кількість вхідних ідей та інноваційних проектів.

Ключові слова: інноваційна діяльність, стратегічне управління, автоматизовані системи, оцінювання, прогнозування.