

APPLICATION OF A SYSTEM-SYNERGISTIC APPROACH TO MANAGING THE SUSTAINABLE DEVELOPMENT OF REGIONAL ENTERPRISES WHILE ENSURING THEIR ECONOMIC SECURITY

Yuliia Klius¹, Kseniia Sieriebriak², Denys Fomenko³

Abstract. The formation of an effective economic system on an innovative basis is one of the most important tasks of the current stage of socio-economic development, since the systemic interaction of all elements of the economic system, forming a single economic space, allows for the most effective realisation of the benefits of the division of labour and specialisation in innovative forms. At the same time, the ability of production and economic entities to maintain the ability to expand the reproduction of innovations (while maintaining the scale and pace of innovation reproduction) in the event of disturbing internal and external actions – innovation sustainability – is becoming increasingly important. This is particularly important in the formation of integrated associations and integral economic complexes as sustainable systems to increase the dynamics and balance of the proportions of the innovation reproduction process. In the context of continuity and heterogeneity of innovations, it is extremely important to consider their innovation sustainability from the perspective of a systemic approach to the management of an economic system. *Purpose of the article.* The scope of research on strategic management of regional development is quite wide, but given the current economic situation, the consequences of the pandemic and martial law, this issue needs even more attention, as most regions of Ukraine are unstable and economically unprofitable, so it is necessary to consider special levers and directions that will help strategically effective management of regional enterprises and ensure their economic security. *Methodology.* The methodological basis of the article is a set of methods and principles of scientific knowledge, general and special methods and techniques used in the study. The theoretical basis of the study is the scientific work of domestic and foreign scientists on sustainable development, economic security and innovation. The information base is based on official statistics, reports and accounting information of enterprises, resources and publications of the Internet, and the results of the author's own research. *Practical implications.* The results obtained and the recommendations developed form the basis for improving the strategic management of the sustainable development of regional enterprises while ensuring their economic security. *Value/originality.* A mechanism of strategic management of sustainable development of regional enterprises was created using a system-synergistic approach, which includes a system of resources, methods and tools for influencing innovation processes and is based on the principles of self-organisation of complex systems in the process of their adaptation to changes in an unstable environment and ensuring economic security, which will allow to coordinate the goals and directions of management of investment, operational and financial activities of regional enterprises to ensure their sustainable development.

Key words: sustainable development, innovation, economic security, management, enterprise.

JEL Classification: O18, O31, D81, L53, O12

1. Introduction

The task of managing the sustainable development of regional enterprises is to maintain optimal levels

of sustainability, in which the costs associated with ensuring sustainability guarantee an acceptable level of efficiency of innovative projects in terms of

¹ Volodymyr Dahl East Ukrainian National University, Ukraine (*corresponding author*)

E-mail: docentklus@gmail.com

ORCID: <https://orcid.org/0000-0002-1841-2578>

² Volodymyr Dahl East Ukrainian National University, Ukraine

E-mail: serebriak@snu.edu.ua

ORCID: <https://orcid.org/0000-0002-7025-2399>

³ Volodymyr Dahl East Ukrainian National University, Ukraine

E-mail: fomenkodenys@ukr.net

ORCID: <https://orcid.org/0009-0001-2980-450X>



This is an Open Access article, distributed under the terms of the Creative Commons Attribution CC BY 4.0

the criterion for choosing a management decision. For optimisation, it is advisable to use economic criteria, i.e., minimising the cost of maintaining sustainability while achieving development objectives. Balancing the level of efficiency and risk is a key task in creating and maintaining a mechanism for strategic management of regional development. The article examines a set of developed strategic and tactical methods for selecting innovative projects for implementation, determining the sequence of their inclusion in the investment programme, and finding organisational forms for implementing innovative projects within the limits of financial, structural and dynamic sustainability of the enterprise, which are part of the mechanism of strategic management of sustainable development of regional enterprises.

The resource base for the sustainable development of regional enterprises is the aggregate potential of industrial enterprises. Development at any level of the economy is based on the availability and use of potential, which on the one hand determines the opportunities for development, and on the other hand, through development, the potential of the business entity grows and its economic security is ensured. Functioning is a source of resources in development that creates opportunities that are realised in the process of sustainable development. It is the qualitative and quantitative characteristics of the economic potential of an enterprise, formed in order to ensure its economic security, that determine both the direction of innovative development of an enterprise and the peculiarities of its management. Development means using potential in such a way as to ensure its transition to a qualitatively and/or quantitatively different, higher level; in the process of development, the economic potential itself is "developed". For the successful implementation of regional sustainable development strategies, enterprises need to increase their asset potential (through efficient production activities) and ensure the sustainability of their financial position in order to prevent bankruptcy and attract new resources from the external environment (efficient financial activities, use of financial management mechanisms).

2. Clarification of the Concept of Innovation Sustainability of Regional Enterprises

In an innovative economy, there is a qualitative shift in the economic system in the course of continuous change, which requires a clarification of existing approaches to understanding the "innovative sustainability of a company".

The transition to an innovative development model is a twofold process. On the one hand, it opens new opportunities to achieve goals determined by technological capabilities, because, according to

S. Lem, "technology is the way to achieve the goals set by society, including those that no one had in mind when starting a business, due to the state of knowledge and social efficiency" (Putsenteilo, Zavytii, 2017). On the other hand, the innovative development model requires new forms and methods of management. According to C. R. McConnell and S. L. Brew, "the industrialised countries of the world are distinguished mainly by two features: the form of ownership of the means of production and the way in which economic activity is coordinated and managed" (Schendel, Hatter, 1972).

The innovative sustainability of an economic system, as a complex property, has a double affiliation: on the one hand it acts as an element of the sustainability of economic systems, on the other hand it is part of the innovation management system. And it has the qualities characteristic of these systems: the ability to perform the specified production and economic functions (as a result of effective implementation of innovations) and to maintain its basic characteristics (the level of innovation of the development of the production potential and the level of innovation activity), to act as a tool for increasing the positive effect of innovation activity by creating conditions for the growth of innovation of the production potential, receptivity to innovation and innovation activity. The importance of the latter quality of the economic system is growing in the context of uneven innovation development and requires the development of new approaches to the study of innovation sustainability of economic systems and the management of innovation activity of economic systems.

Systems analysis is based on the principle of systemicity, while synergetics is based on the principle of development. These two principles are complementary and even form a unity, which is expressed in the fact that synergetics is based on the methodology and theoretical conclusions of systemic research. However, the methodology of the synergetic approach also uses tools that allow for a more complete study of complex non-equilibrium systems, including modern economic complexes. These tools can also be used to study the complex properties of an economic system, which are themselves a set of interrelated elements, such as its sustainability.

Today, industrialised countries are developing an innovation system characterised by the following features. Firstly, a research environment that has incentives to cooperate with the business environment; secondly, a competitive business environment that has incentives to innovate and the ability to adapt knowledge; thirdly, the existence of a mechanism of interaction between these two environments that ensures knowledge transfer and

transformation of knowledge into competitive technologies (Zhavoronkova, Zhavoronkov, 2010).

Thus, in relation to the study of the sustainability of an economic system in the context of innovation, it is possible to discuss, on the one hand, the complementarity of the systemic approach with the synergistic approach within the framework of the system-synergistic approach and, on the other hand, the independent functioning of the synergistic approach, which have their own scope for solving specific problems.

The duality of the systemic characteristic of the innovative sustainability of economic systems has necessitated the use of the tools of the systemic approach in the formation of integrated management in the face of disturbing influences. With this aim, the study of sustainability of economic systems in the framework of managing their innovation activities is carried out in the following areas of analysis:

- Systemic-element analysis addresses the inquiry into the constituent elements contributing to the stability of an economic system and their influence on shaping its overall level;
- systemic-structural analysis reveals the internal organisation of the stability of an economic system, describing how its elements interact during the process of innovative activities;
- systemic-functional analysis illustrates the functions performed by the stability of an economic system and the elements shaping it in the management of innovative activities;
- systemic-communication analysis identifies the communication links within the structure of the stability of an economic system, as well as its interactions in exchanging information with other systems horizontally and vertically;
- systemic-integral analysis allows determining when a simple aggregation of individual elements becomes a holistic system, demonstrating the mechanisms, factors of preservation, improvement, and development of innovative stability in the economic system within the management of its innovative activities;
- systemic-historical analysis addresses the question of how the comprehensive property of innovative stability in an economic system is formed, the developmental stages it undergoes, and its historical prospects.

Regarding the systematic study of the concept of sustainability of an economic system, it should be noted that one of the model concepts of an economic system as an economic system only distinguishes financial, production, technical, organisational and social components of the system's sustainability. Such a division of economic systems does not seem entirely correct as it does not reflect

the interaction of sustainability components and represents only one level of its elements.

The authors suggest a different structure of the elements of sustainable development, which is related to the allocation of its elements based on the quality of the elements of the economic system itself, since they determine its ability to function in different conditions.

For the purposes of the study, the following elements were identified:

The project block is the company's business area and its results in the form of products and services.

The functional block is the operator of the transformation of resources, organisational structure and management, products and services in the course of labour activity of the company's employees at all stages of product movement, production, sales and consumption.

The resource block is a set of material and technical, labour, information and financial resources.

The organisational block includes the organisational structure, process technology for all functions and projects, and organisational culture.

The management block is the general management of the enterprise, the management system. The elements are grouped into blocks (Figure 1).

Consideration of the sustainability of the economic system from the point of view of systemic-element analysis, based on the definition of the structure of the system itself, allows to identify the following components (Figure 1):

The sustainability of resource provision characterises the quality and timeliness of resource flows in the process of innovation implementation (resource sustainability). This sustainability in turn consists of the elements of component sustainability, which are distinguished according to the internal structure of each type of resource. For this purpose, it is suggested to highlight the sustainability of feedback channels because of their particular importance in providing information on the unfavourable decline in the sustainability of individual elements, their blocks and the economic system as a whole.

In this regard, the process of globalisation of analytical activities in the field of studying these innovative projects becomes relevant in the context of increasing the innovative sustainability of economic systems. The non-transparency, unreliability and untimeliness of obtaining information on innovation processes, which has developed in the form of organisation of the innovation process in the domestic environment, leads to a decrease in the efficiency of innovation activities and innovative sustainability of economic systems, and in some cases to the realisation of innovative industrial risks. This implies the search for new forms of innovation management

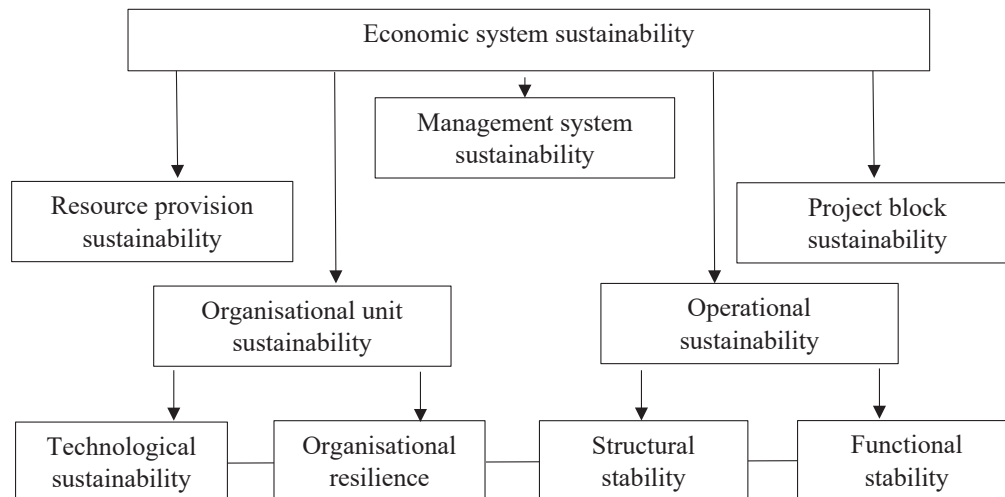


Figure 1. Elements of economic system sustainability

Source: clarified by the authors

by reducing uncertainty in the implementation of innovations, which would increase the level of sustainability of innovation. The paper proposes the use of a new paradigm of doing business which, in contrast to the prevailing approaches, provides for a more flexible intellectual property policy, defined by its ideologist G. Chesborough as "open innovation":

- Organisational unit sustainability illustrates the quality of the organisational structure and technological processes in the context of innovative changes (organisational and technological sustainability);
- sustainability of the system's functioning reflects the quality of the processes of transformation of resources, organisational structure and management at all stages of innovation activity (functional and structural sustainability);
- management sustainability determines the ability of the management system to maintain its functions in the process of dynamics of the internal and external environment, including flexibility and adaptability of the management system, complexity, innovation, balance, survivability (including the ability to create reserves) and alternatives, efficiency;
- sustainability of the project unit shows the quality of the processes of organising, selecting and implementing innovative projects, which are used to carry out the system's innovative activities, as well as the ability to maintain the degree of project efficiency during its implementation (project sustainability). This approach in the national context requires institutional and organisational design.

Indeed, as noted in the works of authors who have studied the current development of complex production and economic facilities in the domestic environment, the complexity of innovation is currently complicated by the presence of two constraints: time and resource. Acceleration of the pace

of global economic development based on innovation and shortening of innovation cycles require, in order to achieve efficiency of development of economic systems, an increase in the speed of implementation of innovation activities, making the innovation process continuous, reducing the time for preparation and use of innovations by overlapping innovation cycles. In this respect, the starting time of one cycle does not coincide with the final stage of the previous one, and the cycles are implemented in parallel or with a small time lag. Nevertheless, at the same time there is a need for comprehensive and elaborate implementation of innovation, which requires a large number of resources for effective management of innovation activities of economic systems. Under these conditions, innovation activity in Ukraine is realised through the implementation of ready-made innovation projects, which are assembled into innovation packages by the enterprises themselves in order to save money. In this regard, the innovative sustainability of economic systems is primarily related to the ability to manage by selecting projects that increase its level and thus lead to an increase in the efficiency of innovation. Hence, in this study, innovation activity is considered as a continuous process of evaluation, selection and implementation of innovative projects by different economic systems.

3. Sustainability Research from a Systemic-Structural Analysis Perspective

Studies of sustainability from the perspective of systemic-structural analysis have shown that the quality of development of the elements of an economic system is determined, first of all, by the nature of changes in the components of its production

potential and their interaction in the process of innovative modernisation.

This means that the basis for determining the innovative efficiency of economic systems and their innovative sustainability is the analysis of the quality of changes in the components of the production potential in the process of their interaction arising in the course of innovative modernisation. The sustainability of these components from the point of view of innovative processes of the economic system is determined by the quality and timeliness of resource flows necessary for innovative activity (resource sustainability) and the ability of the organisational structure and all technological processes to change in accordance with innovative requirements (organisational and technological sustainability) without reducing the existing parameters of innovative development.

These three elements of resilience interact in the process of innovation to form the functional resilience of the system.

It should be emphasised once again that the sustainability of an economic system is a complex structure of interconnected and interacting elements, changes in each of which affect its overall level, which requires the formation of an effective system of innovation management based on the principles of systematicity of existing influences. The schematic

connection of the elements within the structure of innovation sustainability of the economic system is shown in Figure 2. It is particularly worth noting that all elements interact with each other through feedback and the changing elements influence each other, which determines the overall state of innovation sustainability of the economic system. On the other hand, sustainability itself, represented by a set of interrelated elements, is a reflection of the quality of the process of managing the transformation of the economic system in the course of implementing innovation activities.

Transformation processes based on innovations that change the sustainability of the economic system according to the specifics of the new conditions create its new quality. Since transformation is an object-subject process, on the one hand it takes place according to objective laws, and on the other hand it is initiated and regulated by subjects in order to accelerate it and give it a certain direction. The study presents the mechanism of its influence on the structure and functions of innovation sustainability. The characteristics of this mechanism form the basis of the management system of innovation activity of economic systems. According to the researchers, in the process of innovation, the economic system, with the accumulation of changes, enters the transformational development. It includes a stage of

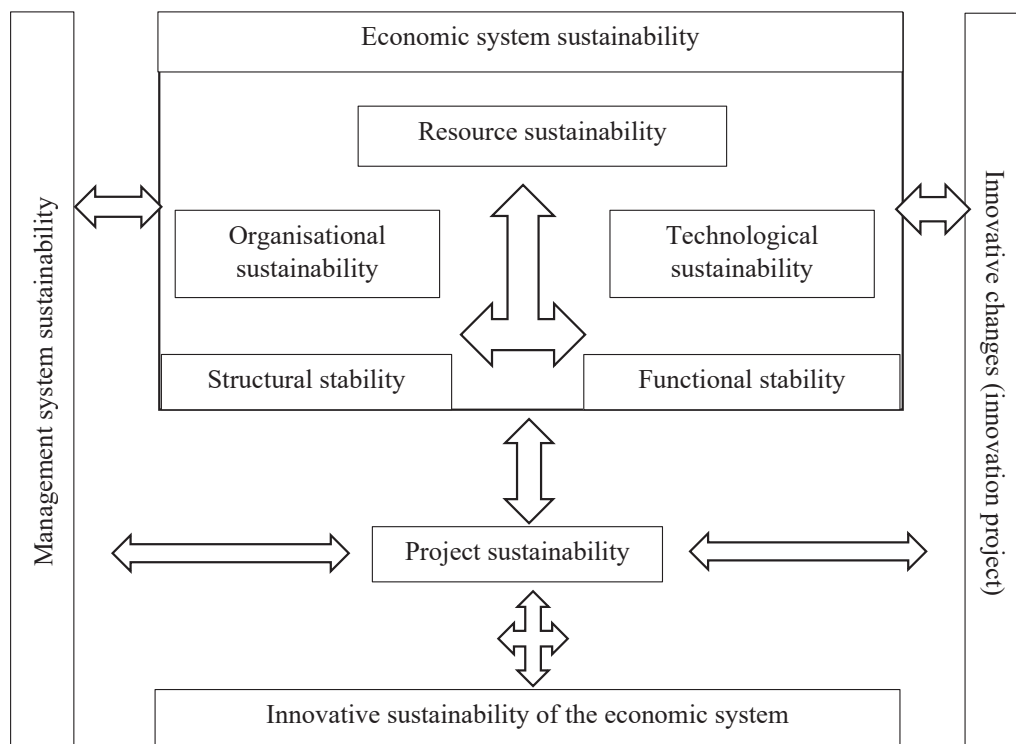


Figure 2. Scheme of interconnections of elements of the structure of innovation sustainability of the economic system

Source: developed by the authors

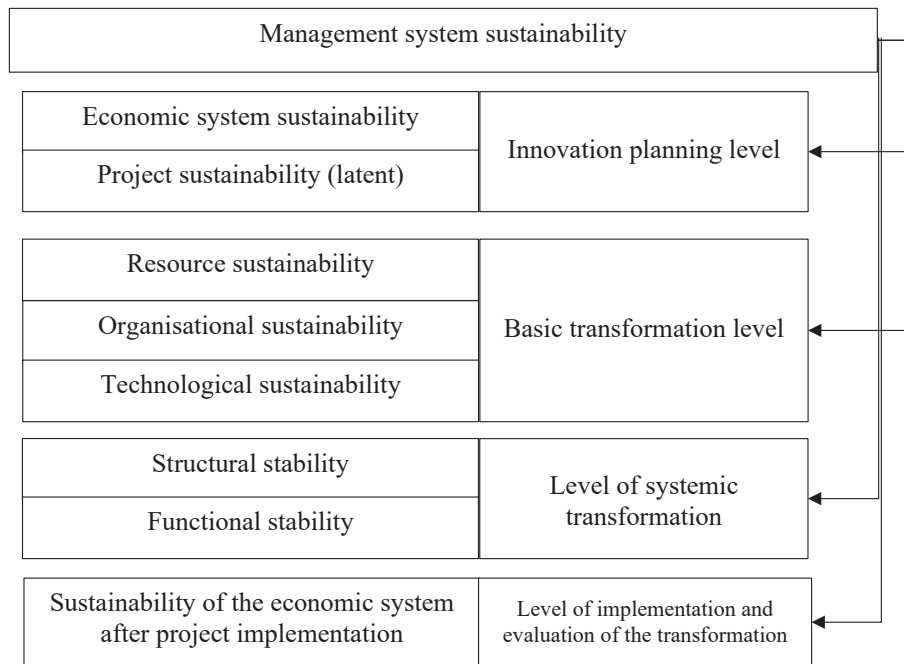


Figure 3. Structure of levels of sustainability of the economic system in managing the process of implementation of innovative projects

quantitative and qualitative changes in the system (where its stability is maintained) and a stage of system recovery (it is associated with qualitative changes, with a violation of stability and can end either with the establishment of a new system or with its collapse). The preservation of sustainability at the first stage is due to the presence of a certain quality of the management system, and the probability of system collapse at the next stage is due to the lack of this quality for the system. This problem of using sustainability as a tool to improve the quality of management of innovative transformation and change processes and the efficiency of innovation activity leads to the need to consider the sustainability structure of the economic system when introducing innovations (Figure 3).

Figure 3 shows that organisational, resource and technological sustainability are elements of the basic transformations level, which is the beginning of the transformation process. According to the definition, transformation is the process of replacing an object with a similar one that is derived from the first one when modified according to certain rules. At this stage of change in the elements of sustainability, a new quality is created as a result of the development of the economic system based on innovations, which will allow innovative sustainability to be maintained in the changed conditions. This is initially achieved through individual improvements to the elements of the economic system, while maintaining the existing structures and mechanisms of their interaction, which, as the changes accumulate, require further

transformations at a higher level. In other words, it is at this level that the innovative potential of the economic system is maintained.

It should also be noted that all processes of changing the structure of systems and their elements are accompanied by changes in entropy, so their analysis will be incomplete without studying the dynamics of entropy at each stage of transformation. At this stage, in the absence of a sharp increase in the entropy of the system, the level of its innovation sustainability can be maintained due to the stability of the elements of the transformation level. However, as the entropy of the system increases, the role of higher-level sustainability elements, which represent the boundary between the two stages of transformation, increases. Therefore, functional and structural sustainability, which change in the process of qualitative transformation of interactions and interdependencies of elements of the economic system, depend on the timeliness and efficiency of system change through management interventions and are elements of sustainability at the system transformation level.

This stage of changing the sustainability of the system is more complex, as it largely depends on the balance of changes in the elements of the economic system, their readiness, the speed of their course and the availability of the necessary resources for their implementation, and will allow to determine the effectiveness of the innovation management system at this level. All these parameters depend on how accurately the innovation project is chosen, taking

into account the specifics of the economic system, and whether its management system can organise its implementation with a given result in the existing conditions.

The peculiarity of project sustainability is that it, being an element of the innovation planning level, is formed at the previous level (resource transformation) and exists in a latent form, practically not manifesting itself during the transformation, but is assessed at the next two levels through the sustainability of the relevant elements. This allows to determine how the project in the process of implementation affects the sustainability of the economic system, which management tools are most effective at different stages, how sustainability changes when external conditions for innovation change, but does not give a clear picture of the effectiveness of the project itself. It is necessary to analyse the change in sustainability as a result of the project implementation at the stage of implementation and control, so this element of sustainability is determined at two levels: planning innovations and implementing transformations and evaluation, and can be one of the criteria for the effectiveness of managing the innovation activities of economic systems. Therefore, a comprehensive assessment of the project's impact on the sustainability of the economic system in the process of managing its innovation activities is the main stage of selecting innovative projects.

4. Study of Economic System Sustainability from the Perspective of a System-Synergistic Approach

Studying the sustainability of an economic system from the perspective of a system-synergistic approach requires complementing its research with a systemic-functional analysis to make the management system constructive. According to the definition of the sustainability of an economic system, its functions

are clearly manifested in the event of any changes in the development of the system. Since the system is exposed to various perturbing influences during the implementation of innovations, the study of the characteristics of sustainability is an important analytical tool in this case. For this purpose, it is necessary to refer once again to its dual nature, which is manifested in the conditions of innovative development, since this determines the peculiarities of the functions of sustainability of economic systems in innovative processes. Innovative sustainability should create the basis for the transition of the economic system to new stages of development without reducing the quality of the functions performed by the system, i.e., the effectiveness of innovation. As an object of the management system, sustainability is intended to ensure the preservation of the pace of innovation activity of the economic system, to return it to this pace after disturbing actions. In other words, the sustainability of the economic system in carrying out innovation activities is one of the tools for improving its efficiency. Since, in most cases, economic systems carry out innovation activities through the implementation of innovative projects, it is advisable to consider the sustainability functions at each stage of project implementation (Table 1).

After determining the specifics of the project and its feasibility in a given economic system, the ways and tools for the most effective project implementation are selected, taking into account possible risks (based on the analysis of the system's strengths and weaknesses and the results of a forecast assessment of the external environment).

In addition, on the basis of the results of the assessment algorithms of alternative solutions to project bottlenecks are developed and necessary and sufficient reserves are created (such a reserve is survivability – the level of stability at the bifurcation point of innovation development), at this stage the

Table 1
Sustainable development functions at different stages of innovation projects

Stage name	Resistance functions
1. Decision to implement an innovation	Determination of the system's readiness for innovation and determination of the boundaries of innovation impact
2. Analysis of an innovative project	Selection of the project based on the assessment of its characteristics (maximum risk values) and analysis of the state of the economic system (minimum acceptable level of sustainability)
3. Analysis of the external environment	Assessment of the impacts of possible impacts of concern
4. Development of alternative solutions for the project	Identification of optimal alternative solutions, creation of a unique sustainable development management system
5. Project implementation	Preservation of the system's reactivity function during the implementation of an innovative project
6. Changes in the components of production potential	Maintenance of balance and coherence (in case of changes in the structure) of the economic system during the implementation of an innovation project
7. Evaluation of project implementation results	Ensuring the security and efficiency of the economic system, building readiness for new projects

project sustainability of the economic system is formed and the proactive character of innovation management is formed. After the project is selected, the process of innovative changes begins from its first stages with the components of production potential (resource, organisational and technological blocks) and their interaction in the process of functioning. System sustainability is manifested here through the preservation of the reactivity property in the process of innovative change, in which all elements of the economic system (changing and interacting) perform their innovative functions while maintaining the efficiency of the innovation process. In this case, the timely adoption and implementation of optimal, accurate and targeted decisions allow maintaining the state of safety in the implementation of disturbances – this is the stage of realisation of the flexibility of the management system (one of the parameters of its effectiveness in innovative conditions), which then, after the accumulation of changes, leads to adaptation, to new conditions and the formation of a new quality of the management system itself. At this stage of the economic system the degree of its equilibrium and the state of functional viability as the basic level of sustainability of the economic system becomes decisive for the effectiveness of innovative changes.

The changes in the economic system described above require a transformation of the structure in order to maintain the integrity and efficiency of innovation activities. In this case, the impact on the structure should be made taking into account its manageability (susceptibility to managerial influences of an innovative nature) and permeability to impulse influences (the degree of this permeability characterises the basic level of stability of the system structure or structural resilience), which will allow systemic modification of the economic structure of the system without losing its innovative aspects. The more precise and early the selection of the elements and links to be transformed in the process of innovative development, and the tools for its implementation, the more balanced and comprehensive the management will be, the more consistent the innovative changes will be, and the higher the final impact of the innovation. At the same time, the innovation impulse has both positive (change in the quality of the system) and negative effects on the system (increased risks, decreased efficiency), so the management task is to form a "filter" to eliminate the negative effects of the innovation risk management impulse. It seems expedient to use for further research the provision that when studying the problem of sustainability (the basic level), the centre of gravity should be shifted from general sustainability to functional and structural sustainability.

In strategic terms, the sustainability of an economic system is resilience – the ability to maintain the rate of change of innovation indicators (innovation activity, innovative development of production potential and innovation susceptibility) under the influence of disturbing actions, which is ensured by the efficiency and safety of the management of the innovation activity of the economic system and creates conditions for further innovative development. The effectiveness of the management system of an economic system in implementing innovations depends largely on the reliability of information about the system itself (its state, including sustainability, viability, limitations, potential, characteristics), the innovation project (its requirements, planned outcome, characteristics, risks) and the external environment. The creation of a sustainability management system requires knowledge of the communication relationships in the structure of the economic system, as well as its interrelationships in terms of information exchange with other systems horizontally and vertically, i.e., the implementation of the principle of systematicity in management. In this respect, the systemic-communication analysis of sustainability is used.

The process of organising the interrelationships between different elements of the sustainability of the economic system has been described in detail in the course of the system-structural and systemic-functional analysis. It should be noted that depending on the direction of changes (direct or reverse) in the communication process, elements of sustainability can be identified that determine the level and quality of other elements. Experience has shown that these are the elements of primary sustainability. In addition, there are elements of secondary sustainability which, if they change in the process of innovation, then influence the primary elements.

The first include the elements of resource, organisational and technological sustainability (in relation to each other, they can be both primary and secondary, depending on the nature of the innovative changes). Other elements can be both primary and secondary, depending on the choice of baseline for comparison.

Within this approach, it is necessary to consider the links and interactions between the sustainability of the economic system and its other systemic properties. A property is understood as an aspect of an object that makes it different from or similar to other objects; a characteristic is something that manifests itself in interaction with other objects; a feature is something that reflects some properties of a system. All system properties are interrelated. In fact, the property of system stability exists as long

as the system itself exists and the relationships and connections between its elements are maintained, which determines the degree of stability that the system possesses. On the other hand, through resilience, a system can exist and retain the property of efficiency as it evolves under different conditions. But as these connections change the elements of the system, the relations and connections between them, according to the emergence property, the level of sustainability of the economic system also changes.

When considering the relationship between system stability and organisation, it should be noted that the latter is determined by the structure and quality of the elements of which it is composed. During the system analysis, the study found that the elements and the structure of their interrelationships have a certain degree of stability, which in a dynamic environment allows the system not only to maintain organisation (a certain degree of structure) and efficiency (as a result of functionality), but also to bring them to a new level. However, it is the degree of organisation, the structural features and the quality of functionality that determine the sustainability of an economic system.

In addition, an important analysis of sustainability is the existence of system behaviour (the process of purposeful change in the state of the system over time). It is primarily related to the environment, including other systems with which it comes into contact or has certain relationships. In the process of realising this property, the sustainability of an economic system can either increase or decrease, depending on the nature of the changes implemented by the system and the degree of their compliance with the requirements of the external environment. That is, depending on the degree of congruence between the system's expectations of the external environment and its state and its readiness for such a discrepancy (manifestation of resilience), the efficiency of its activities will increase or decrease. In contrast to management, when a change in the state of the system is achieved through external influences on the object of management, the behaviour is realised exclusively by the system itself on the basis of its own goals, i.e., to sustainability, the system itself must have an internal desire for it, so that increasing sustainability becomes a priority when choosing the system's behaviour, behavioural attitude (behavioural readiness to act in a certain way) when implementing its continuous innovative development.

The behaviour of a system is also determined by the nature of its response to external influences. At the same time, sustainability itself is a fundamental property of systems that determines the life expectancy of the system. Simple systems have passive forms of resilience: strength, balance,

regulation, homeostasis, and they are mostly (except for strength) determined by their behaviour. And for complex systems, active forms are crucial: reliability, resilience and adaptability, and the defining form of sustainability of complex systems is mainly structural. All these internal qualities of a system are of a similar nature to the quality of sustainability. They differ in the level of fundamentality, with resilience being the highest. By successively moving from one state to another, the system achieves basic stability after reaching a certain level of viability. Almost all systems strive to achieve a state of survivability, most are stable, and only a few can achieve viability. However, the peculiarity of modern development is its nonlinearity and synchronisation of processes in the course of innovative development, which leads to the simultaneous pursuit of sustainability and efficiency. In addition, while reliability implies the ability to maintain the structure of systems despite the death of its individual elements, the destruction of links due to their replacement or duplication, sustainability implies the availability of mechanisms to counteract environmental factors and self-regeneration.

This means that the state of resilience implies that the system is prepared for possible negative impacts to the greatest extent compared to reliability and resilience. However, it is limited to the reserves that were built in when this state was established and requires constant support from the management system. If the conditions and/or the duration of the effects of disruptive actions change, the resilience of the system may decrease. In this case, its restoration depends on the reactive capabilities of the economic system triggered by the management processes; the faster the realisation of the reactive capabilities of sustainability, the higher the efficiency of the management system for the innovative activity of economic systems. Thus, in the event of prolonged perturbations, the resilience of the system may decrease to the minimum acceptable level at which the system realises the ability to actively overcome and reduce the harmful qualities of the perturbations, which is characterised as survivability. That is, the quality of resilience is necessary for an economic system to maintain its existence under the influence of disturbances and to initiate the system's reactive capabilities to restore sustainability in the light of changed conditions in the form of effective management. This means that the quality of resilience of economic systems is the basis for restoring sustainability in the course of their innovation activity. In the course of the system-structural analysis, the authors describe in detail the mechanism of interaction and organisation of the elements of economic system sustainability in the process of innovation activity in the formation of the innovative sustainability of the economic system.

5. Provision of Economic Security of the Region's Enterprises for their Sustainable Development

The main factors ensuring the economic security of a given territory (state, region) are traditionally considered to be the military potential of the territory, an effective domestic policy aimed at ensuring competitiveness and strategic development, as well as the existing mechanism of stakeholder relations based on the basic principles of legality, honesty and transparency. The growing interest in the issue of ensuring the economic security of individual territories has generated a significant number of studies in which scholars and practitioners examine the conceptual framework of this economic category, explore various aspects of quantitative and qualitative assessment, monitoring and management to reduce the impact of destabilising factors.

With regard to regional development, the authors propose to understand economic security as the sustainable functioning of the entire economic system, capable of timely identification, systematisation and elimination of destabilising factors of development, as well as the development of a set of preventive measures to reduce the consequences of various types of threats. In order to create an effective mechanism for ensuring the economic security of regional enterprises, it is necessary to provide, within the framework of their socio-economic and spatial development strategies, a set of tools aimed at mobilising the region's internal resources and coordinating priority development actions through the introduction of project management methods and the need to improve the existing system for monitoring external and internal threats.

The core of the mechanism of economic security of a region is the regional economic system, which integrates the qualitative state of various industries and spheres of activity (production, social, resource, territorial), which involves systematisation of a set of interrelated factors in order to achieve regional and national strategic priorities.

In this case, special attention should also be paid to the economic security of individual business structures, the functioning of which determines the achievement of the forecast values of the region's economic security indicators, so in the current economic environment, business support measures should be developed, including through the development of the institution of consulting services. In general, however, it can be said that threats to the economic security of regions cause threats to the economic security of the state.

Ensuring the economic security of the region is a qualitative state of the entire economic system, which is characterised by the following:

- Mobilisation of resource potential to counter threats of different nature and strength, both internal and external;
- prompt adjustment of the current development strategy due to changes in government policy;
- timely monitoring of threats to the main systemic sectors of the region's economy;
- opportunities to reduce the consequences of threats and the scale of their manifestation with minimal time intervals;
- availability of conditions for active reproduction processes and efficient use of tax, production, financial, investment, innovation and digital potential.

The main objects of economic security in the region are the population and the territory within the administrative boundaries. To develop effective tools to ensure economic security, it is necessary, first of all, to identify the types of threats (destabilising factors), conduct a detailed analysis of them in order to classify them into potential and real ones, and develop a set of preventive measures to eliminate them.

6. Conclusions

In general, the study of sustainability from the point of view of system-synergistic and structural approaches has led to the conclusion that this concept is a complex characteristic of an economic system, which in the context of innovation activity acquires new features, creating the need to find new tools to achieve it by reducing the uncertainty of innovative development in an unstable environment. The study has shown that the basic sustainability of an economic system becomes the basis for the effective implementation of innovative activities of economic systems in modern conditions. The application of the systemic approach allows to consider the innovative sustainability of the economic system in terms of the totality of its components, connections and relationships, including relationships between systems. However, not all modern processes and phenomena can be explained in terms of the systems approach and areas of systems analysis (for example, the processes of transformation in the sustainability system of a complex organized economic system, the formation of sustainability in the development of non-equilibrium systems, sustainability management in the interaction of systems of different levels). Thus, to study the problems of improving the efficiency of managing the innovation activities of economic systems, systems analysis is complemented by a synergistic and structural approach. The study of the innovation sustainability of economic systems is based on these methodological positions. The final state of sustainability is also influenced by external factors, which are determined by the requirements

of legislation, the general level of sustainability of similar systems, the sustainability of integrated systems of a higher level, the territorial location of technologically related systems, and development conditions. The latter determine the peculiarities of

the sustainability of economic systems in modern conditions and require them, together with the preservation of systemic qualities, to maintain the quality and speed of change of innovative characteristics in the process of development in an unstable environment.

References:

- Chandler, A. (1962, 1990). *Strategy and Structure: Chapters in the History of the Industrial Enterprise*. Massachusetts Institution of Technology: The Mit Press.
- Porter, M. E. (1980). *Competitive Strategy: Techniques for Analyzing Industries and Competitors*. Free Press, New York.
- Putsenteilo, P. R., & Zavytii, O. P. (2017). Peculiarities of the formation of a strategy for managing economic development in the region. *Podilian Bulletin: agriculture, engineering, economics*, vol. 27, pp. 298–308. Available at: http://nbuv.gov.ua/UJRN/ZnpPdatu_2017_27_40
- Korytko, T. Yu. (2012). Strategic planning of socio-economic development of region. Strategy and mechanisms of regulation of industrial development. Available at: http://nbuv.gov.ua/UJRN/sim_2012_2012_14
- Zhavoronkova, G. V., & Zhavoronkov, V. O. (2010). Strategic management of region's development. *Problems of economic biotechnology*, vol. 1, pp. 26–31. Available at: <https://jrnل.nau.edu.ua/index.php/IMV/article/view/2872/2861>
- Rogatina, L. P. (2018). Strategic management of economic development, its peculiarities and role in formation of competitive advantages of the region. *Ekonomika ta derzhava*, vol. 2, pp. 92–96. Available at: http://www.economy.in.ua/pdf/2_2018/22.pdf
- Schendel, D. E., & Hatter, K. J. (1972). *Business Policy or Strategic Management: A Broader View for an Emerging Discipline*. Academy of Management Proceeding.
- How the war will change regional policy in Ukraine: decentralisation, hromadas, taxes, economy. Available at: <https://agropolit.com/blog/503-yak-viyna-zminit-regionalnu-politiku-v-ukrayini-detsentralizatsiyagromadi-podatki-ekonomika>

Received on: 12th of October, 2023

Accepted on: 25th of November, 2023

Published on: 28th of December, 2023