Економічні горизонти

Homepage: http://eh.udpu.edu.ua

ISSN 2522-9273 (print)
ISSN 2616-5236 (online)

Economies' Horizons, No. 2(17), pp. 5-17.

DOI: https://doi.org/10.31499/2616-5236.2(17).2021.243887

UDC 65.011

Some properties of socio-economic systems

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Abstract. *The purpose of the research.* The main purpose of the article is to study some aspects and features of socio-economic systems within the management of their dynamic stability. *Methodology.* To improve the conceptual apparatus, in ("economic system", "dynamic stability", "stability") used methods such as generalization, analysis and synthesis. *Results.* The study found that most economic scientists do not consider this issue an integral part of the system-universal component of management of socio-economic systems and the corporate sector of the economy as signs of stability and reliability in a complex environment. It is confirmed that the stability parameters allow a certain deviation from the trend of the values of the generalized indicator as a function of time: it makes a stochastic dependence on the system parameters. Dynamic stability can be defined as a mode of system operation when it is able to achieve the target function when externally excited, when the system parameters approach the limits of stability corridors, or when the system chooses its own path when reaching the bifurcation point. It is determined that the socio-economic system is an artificially created system in which the primary elements are a person who makes decisions at his level of hierarchy. *The practical significance* of the study lies in the applied nature of the study, in particular, the authors highlighted the properties of systems: self-organization, communication with the environment, evolution, hierarchy, adaptability and integrity as a set of factors influencing and determining the dynamic stability of socio-economic system. Further research by the author will be devoted to this. Another area *of further development* will be the improvement of scientific and methodological principles of managing the dynamic

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stability of socio-economic systems and the formation and implementation of the appropriate type of mechanism for rapid response to threats and risks of specific functions in the context of objectification of enterprise value.

Keywords: *dynamic stability, socio-economic system, stability corridor, system development, self-organization, cooperative thinking*

Деякі властивості соціально-економічних систем

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Анотація. *Мета дослідження.* Головною метою статті є дослідження деяких аспектів та особливостей соціально-економічних систем в межах управління їх динамічною стійкістю. *Методологія.* Для вдосконалення понятійного апарату, в («економічна система», «динамічна стійкість», «стійкість») використано такі методи як узагальнення, аналізу та синтезу. *Результати.* В результаті проведеного дослідження з'ясовано, що більшість представників економічної наукової думки не вважають дану проблематику невід'ємною системно-універсальною складовою управління соціально-економічними системами та корпоративним сектором економіки у якості ознак стійкості та надійності функціонування в умовах складного оточення. Підтверджено, що параметри стійкості допускають певне відхилення від тренду значень узагальненого показника, як функція часу: вона вносить стохастичну залежність від параметрів системи. Динамічну стійкість можна визначити в якості такого режиму функціонування системи, коли вона при збудженнях ззовні, при яких параметри системи наближаються до меж коридорів стабільності, в змозі досягати цільової функції або коли система при досягненні точки біфуркації сама обирає свій путь розвитку. Визначено, що соціально-економічна система – це штучно створена система, у який первинним елементів виступає людина, яка приймає рішення на своєму рівні ієрархії. *Практичне значення дослідження* полягає у прикладному характері дослідження, зокрема *а*вторами виділено властивості систем: самоорганізація, зв'язок із середовищем, еволюційність, ієрархічність, адаптивність і цілісність як сукупність факторів, що впливають і визначають динамічну стійкість соціально-економічної системи. Цьому буде присвячено *подальші дослідження* автора. Іншим напрямом наступних розробок стане удосконалення науково-методологічних засад управління

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динамічною стійкістю соціально-економічних систем та сформування і запровадження у практику господарювання відповідного типу механізму швидкого реагування на загрози і ризики результативності реалізації специфічних функцій в контексті об'єктивізації вартості підприємств.

Ключові слова: динамічна стійкість, соціально-економічна система, коридор стабільності, розвиток системи, самоорганізація, кооперацийне мислення.

1. Introduction.

The successful development and operation of enterprises requires the development of effective business management tools (integrated management system) aimed at improving the efficiency of economic entities engaged in the transportation of goods. A specific feature of freight road transport is the need for its interaction with other participants in the supply chain: suppliers, freight forwarders, other modes of transport, warehousing operators, customs brokers, because road transport is one of the elements of the supply chain, which depends on the reliability of the logistics chain. in general. On the other hand, the state of infrastructure and coordination of all participants in the chain affect the efficiency of road transport. At present, the impact of a complex set of factors inherent in the relevant field should be taken into account when assessing the efficiency of road hauliers.

In the modern economy, when there is a gradual "erasure" of state borders for companies in the global market, in the world of information technology and in a fleeting environment, the study of the behavior of large associations: business groups, which are socio-economic systems, becomes especially relevant . It should be noted that it is important to understand the sustainability of these associations, as they often play a decisive role not only in a particular industry, but also in global markets. Socio-economic system is a complex dynamic system. The question of the stability of such entities is of interest to economists studying various areas of economics, and it is of interest to practitioners. Various issues related to this phenomenon, which makes the firm stable, what factors affect the stability, how to achieve stability over a long period of time. However, a holistic theory of sustainability management (and / or mechanisms of its operation) does not yet exist.

2. Literature review.

It should be recognized that various aspects of the sustainability of socio-economic systems and ensuring their sustainable development of enterprises are studied in the works of many Ukrainian and foreign scientists and modern economists, as V.V. Artyukhov (2012), E.A. Erokhina (1999), Yu. N. Lapigin (2005), D. Markova, E. MacArthur (2017), W.D. Mogilevsky (1999), Yu.A. Urmantsev (1988), D.C.

Boytim (1982). However, despite the significant number of scientific papers on the sustainability of socio-economic systems of different levels of organization and management, there is still no single definition of such categories as "sustainability", "sustainable operation", "dynamic sustainability"; the question of the correctness of the term "stability" in relation to dynamic socio-economic systems has not been resolved, the conditions and models for predicting the stable functioning of dynamically developing systems in an unstable environment have not been considered, not enough attention has been paid to studying the dynamic features of these systems.

Therefore, we can say that the existence of different approaches to defining the essence of stability confirms the multifaceted and complex nature of this concept, as well as the existence of a variety of types of stability. Therefore, at present, it is extremely difficult to develop a generally accepted universal definition of sustainability as one of the properties of the socio-economic system. This necessitates further research on the essence of the dynamic stability of the socio-economic system and practical ways to ensure it in accordance with the specific conditions of operation and goals of enterprises at a given time.

3. Methodology.

The following methods were used in the study of the conceptual apparatus and classification: generalization and analysis in the process of studying the features and essence of socio-economic systems, definitions of domestic and foreign scientists, and synthesis in the process of developing their own definition and classification.

4. Research objectives.

The aim of the article is to study some aspects and features of socio-economic systems within the management of their dynamic stability.

5. Results and discussions.

The application of a systematic approach in the analysis of the firm is often voiced by economists in research. The system as a method of research and application is designed to better understand the problem, more accurate formulation so as to take into account all the relevant circumstances in their relationship, to select the best methods and tools for developing and implementing strategies (goals) of the firm. The firm and the processes connected with its vital activity as a subject of the economic analysis can be considered as system. However, the system is not the same as the object, but also certain relations associated with this object. The complexity of the system is manifested in how many different components of this object or phenomenon are taken into account when solving a particular problem. The concept of the system first appeared and spread in technology, when individual machines (hardware) and their interrelationships became very complex, so that one person could simultaneously observe their functioning. Therefore, the concept of a

system was introduced, which is a set of elements that form a unity (synergetic effect) to perform a task.

The economic system is "a set of resources and economic entities interconnected and interacting with each other in the field of production, distribution, exchange and consumption, forming a single whole" (*Artyukhov, 2012, p.1*). In order to classify the subject of economic analysis as a system, it must be endowed with certain features, in particular: integrity, hierarchy, integration, diversity, stability and a number of other properties inherent in the system.

The integrity of the system is manifested in the fact that the change in structure (merger, disintegration, disappearance of the firm, etc.), relationships (change of suppliers of raw materials, consumers, including those caused by changes in product range, etc.) and behavior (expansion into foreign markets). a change in the structure of financial transactions, etc.) of any economic entity entails a change in the system as a whole, just as a change in the system as a whole (for example, a change in interest rates by the National Bank) affects an economic entity.

Hierarchy is that a system can be considered as an element of a higher order system, and each of its components, in turn, can be considered as a system. For example, the national economy is part of the world economy, and changes in the world economy affect the national economy (changes in energy prices, armed conflicts, etc.). The integration of the system is that it has properties that are missing from the components included in it.

In practice, the system is in a constant process of change over time. A certain idea of the concept of system development is set out in the definition of Yu.N. Lapygina: "Development - a characteristic of the system, which is a set of related and directed changes in the properties and processes of the system" (*Lapygin, 2005*). The process of development occurs constantly with the development of the environment: every day the system communicates with the environment, exchanges data (information, resources, etc.), forms an information block of memory ("portrait of the object" - the idea of it as a the object of communication, the results of interaction, etc.), and therefore learns (or does not learn), adapts and / or does not adapt (responds) in a continuous mode. Each new step in the time of the system is the acquisition of experience to coordinate a clearer interaction of the elements of the system and adjust the required time of its response to internal and external excitations, which ensure the dynamic stability of the socio-economic system.

Stability is an immanent quality of systems. "Often, maintaining stability in biological and ecological systems is reduced to maintaining homeostasis, ie maintaining a certain dynamic balance, which ensures the maintenance of parameters in a certain range that

determines the existence of the system. Thus, the concept of homeostasis is a limited characteristic of stability, obtained by observing the critical parameters and keeping them within acceptable limits "(*Lapigin, 2005, p.39*).

The system must be organized in such a way as to ensure its stable state in the event of any disturbances from the external and / or internal environment, and at the same time, to move towards a certain goal, ie to develop, to evolve. "This duality is one of the main contradictions in the system, which is resolved through its development. Indeed, the need to maintain stability, stability gives the system the property of conservatism, resistance to attempts to transform it, resistance to influences, including control influences. On the other hand, the need for purposeful change, movement towards the goal, improvement obliges the system to change, form and implement management functions "(*Urmantsev, 1988, p.40*). Any firm strives for a state in which it could realize its survival function with minimal losses; with the maximum benefit to interact with the environment and at the same time to be in some range of stability.

Note that at the stages of formation of the system and its initial growth, when the links in the system have not yet been fully strengthened, metabolic processes have not yet been established, the system is most prone to deformation, even with the slightest impact. In the process of development there is an accumulation of new properties in the system, which (according to I. Prigogine) is associated with the phenomenon of bifurcation. This phenomenon is characterized by the emergence of qualitatively different behavior of the system element with a quantitative change in its parameters. This stage in the development of the system is very responsible, because after reaching the bifurcation point changes the direction of development of the system in evolutionary or involutionary directions. In evolutionary development, the system acquires new qualitative characteristics, in involutionary development, the system loses some of the previously acquired characteristics and begins to degrade. "The more progressive the system, the greater the diversity it has, which is manifested, in particular, in the diversity of its relations with the external environment" (*Lapygin, 2005*).

In order for the evolution in the system to take place, a necessary condition is the influx of energy and exchange with the environment. The magnitude of the impact on the system is determined by the type and degree of impact (internal and external). Typical influences include internal influences that can disrupt the work and interaction of individual elements of the system and lead to a change in structure, which contributes to the loss of a stable state (prerequisites for the destruction of the system). For example, unregulated relationships between business owners can lead to the destruction of the system: each partner may have different views on its development and they may not come to

agreed decisions. Even with a stable internal structure, external influences can have a significant impact on the system, including cessation of foreign investment, economic or political crisis, unstable political and economic relations between countries in the region, fluctuations in the market environment, significant sectoral changes such as consolidation of the industry.

The environment evolves when its basic characteristics change qualitatively for the better, acquire a new quality. The external environment interacts closely with each socio-economic system, its elements, they interact with each other. The environment changes with the firm and cannot evolve in the absence of interaction, which is not just about gaining experience - it is necessary to analyze negative reactions to mutual inadequate actions and create appropriate solutions that eliminate the results of these actions and prevent inadequate reactions in the future.

It is obvious that at different ratios of interaction environment - firm, the question of stability of social and economic system acts as fundamental for its existence.

VD Mogilevsky singled out a number of actions that have a strong influence on the system. The most interesting, in our opinion, are the following:

«1. The most vulnerable to loss of stability is the structure of the system, ie the relationship between elements, their relationship, rather than the laws of operation of these units, which, of course, also determine the dynamics of the system, but to a lesser extent - its existence.

2. The structure is also unequally sensitive to destruction. Most painfully, the system refers to violations in the upper levels of the hierarchy, namely, in the centers of processing of generalized information and decision-making.

3. The destruction of the structure is equivalent to the rupture of information channels or their overload, as this leads to difficulties in communication between the elements» (*Mogilev, 1999, p.37*).

Any reaction to external influences on the system is feedback to the environment. Feedback can have both positive and negative effects on the stability of the system. When the feedback loop balances the system, it is in a stable state. If the feedback significantly changes the parameters of the system, it can go out of equilibrium. The amplifying loop can be so strong that it can even cause a resonant effect, which can lead the system to self-oscillating mode, ie external influences are ineffective (the system can go into a chaotic state). If the system reaches the bifurcation point, then there may be two scenarios: the process of frustration or the implementation of one of the new ways of development. Any feedback loop is a cause-and-effect relationship in time. In this case, the time interval between events may be different (hours, months, years). In order to control the amount of feedback, it is necessary to understand that it will also be the cause of

future events in the same system.

Feedback can be represented schematically (Fig. 1). The input stream (value r) acts on the controlled process and in accordance with the transfer function characteristic of this object, is converted into an output value c.

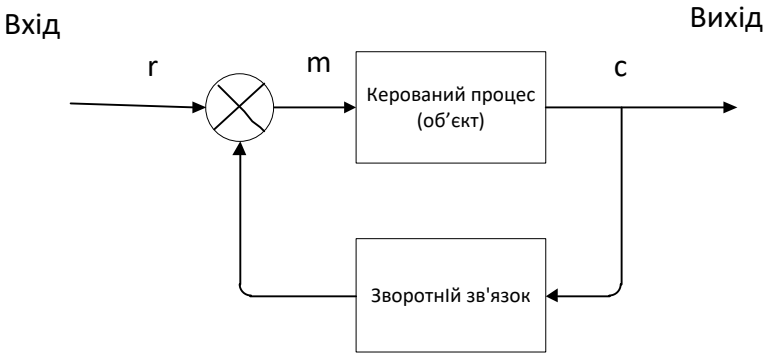

Fig. 1. ***Feedback in the system***

Part of the value through the feedback channel is fed back to the system input, adjusts the input value r and in the form of a control signal m affects the object. in time, then we are talking simply about sustainability. If these parameters of the system begin to improve over a long period of time, the system evolves and is in a certain range of values of these basic parameters (there are small deviations from the main upward trend), then we can talk about dynamic stability (this indicates the presence of adaptive mechanisms).

A synthesized definition of the stability of the socio-economic system is proposed, consistent with the general theory of systems: dynamic stability is a property of the system - firm (property of system "C"), which characterizes its ability to implement the objective function while maintaining parameters in a given stability range (coincide with the signs of "O" before and after changes "C") in external / internal excitations (caused by the action of factors "F") due to managerial (compensatory) actions. By management actions we mean the creation of a set of appropriate adaptation mechanisms that allow you to save the basic parameters of the system in a certain area of stability for a long period of time. The implementation of dynamic stability is due to the action of internal and external feedback mechanisms, which provides the so-called adaptive stability.

This definition of stability can be attributed to the fourth fundamental class of stability (true stability) according to the classification of VV Artyukhov (*Artyukhov, 2012, p.99-101*) with the following restrictions: the set "P" = const. The response time of the adaptive system to the action should be less than or equal to the excitation time. Coordinated definition of stability with ZTS, allows to use in full the methodological device of ZTS. On the other hand, it enriches the definition of STS with the presence of qualities inherent only in living socio-economic systems, such as corporate

thinking, creative potential of system elements.

Dynamic stability allows the system to evolve smoothly, without jerks. If you do not manage the stability of the system, you can lose its efficiency (time, financial and other resources, etc.) or get rid of this system when it is destroyed. It is necessary to introduce mechanisms for managing the dynamic stability of the firm and develop recommendations for managers, including indicators that characterize this state of the socio-economic system, to link the risk management system, which will inevitably lead to improved system efficiency. determining the dynamic stability of the socio-economic system, you can build a management system for its dynamic stability, because this definition takes into account a number of points that were not previously used by economists, but are of fundamental importance for understanding the economic system. The definition emphasizes that any system has a purpose (only then is it a system). Stability is a property of the system, ie immanent quality.This suggests that any system seeks to be stable and in violations of internal and / or external nature, trying to return to its original state or for a dynamic system - to keep their elements (signs) unchanged within a certain corridor before and after excitation. The definition highlights the constituent elements (system properties, features, changes, factors) that allow with a sufficient degree of reliability to build a stability management system of the firm.

As a basic hypothesis of our reasoning, we can suggest the existence of such laws and adaptation mechanisms of the socio-economic system that allow it to be in the corridor of stability, and with strong excitements (external and / or internal), sometimes artificially induced, to move to higher quality level and form a new interval of stability, ie with small external and internal recovery, the main parameters of the socio-economic system are restored to trend, in the presence of significant disturbances, the system moves to a new state of stability. Trend parameters as parameters of a certain trend of the system determine the vector of system development when reaching the target function. These parameters, in turn, are the cumulative result of the system, ie form a certain trend. When the trend has a smooth trend and fluctuations have a small amplitude, then the state can be called stable. If the system evolves, and its parameters change and are in some range of values (small deviations from the main trend), then there is a dynamic stability (in the presence of adaptation mechanisms). With significant external influences, the system must have the ability to transition to another stable state.

That is, passing through the bifurcation point, the system must move to a new range of stability. In fact, such a range of stability is a variance of the mathematical expectation of the average value of the trend of the main parameters of the socio-economic system.

Thus, the stability interval of the socio-economic system characterizes its

state, which proceeds over time (for a fairly long interval), in which the following is observed: with any significant external influence on the system, the deviation from the growth trend is in a certain range of values, located at a distance from the trend (+ - a certain value). Each subsequent step in the development of the system occurs whenever there is such perturbation (external or internal pathogens), in which the system responds to such perturbations by self-reinforcing or relaxing behavior and begins a significant deviation from a given growth trend, if not rebuilt under newly formed conditions. That is, it is necessary to adjust the system so that the feedback loops make the necessary adjustments so that the system does not go beyond the range of stability.

The stability of the socio-economic system is one of the essential characteristics of its state. When external excitation occurs, the system is in a certain area of stability and is determined by such a vector of development over time, which allows the system to achieve the target function without significant restructuring, if the system is economically stable. At the same time, the organization of the system must be optimized, that is, with any significant external excitation, the system must have a high level of adaptability that will allow it to carry out evolutionary development.

The socio-economic system must also have the ability to self-organize, which consists in the presence of flexibility and minimal response time to external excitations. Flexibility should be understood as the presence of algorithms for selecting options for management decisions depending on the strength of the excitation on the system. The system response time should be minimal. The socio-economic system, like any system of living organisms, has feedback mechanisms, which plays the role of new principles of selection, reduces the number of options for the behavior of the system within a single synergetic process. - is a state of the system in which the laws that determine the relationship of its elements are such that allow the system to be in constant development, which does not allow the system to go beyond the realm of stability. Although it should be borne in mind that crises and catastrophes are often necessary conditions not only for the preservation of the system, but also for its development.

System, maintain its homeostasis. In the case of a firm, such rules (or in the terminology of neo-institutional theory - institutions) are many rules that are established within the organization from the Charter to the job description, which actually limit the opportunistic behavior of contract agents (agreements). In contrast to biological systems in socio-economic systems, homeostasis is an artificially created set of rules or institutions.Such a set can actually keep the system stable, or rather, homeostasis is an internal mechanism of the system that keeps it stable.

An important condition for the stability of the socio-economic system is

the presence of intelligent corporate thinking (collective mind), which has to provide strict conditions for the selection of elements of the system, as a necessary condition for any evolutionary development, and we cannot ignore this. "Over the past few years, neurophysiologists have made several important discoveries concerning the human brain and thinking and can significantly facilitate the task of interpersonal interaction. New discoveries and research show that we all influence each other much more strongly than previously thought. Each of us can both blunt the abilities of others and contribute to their improvement "(*Markova, MacArthur, 2017, p.8*).

Now the world is gradually beginning to live by the laws of collective thinking, which is not limited to the categories of problem analysis and the search for rational solutions. We have to think in a new way, think together. People who see each other for the first time must make the most important decisions together and solve the most difficult tasks. Today we think, throwing aside geographical, cultural and individual-typological differences "(*Markova, MacArthur, 2017, p.13*).

In this regard, it is necessary to add another essential condition for the stability of the economic system - the presence of cooperative thinking, which should provide strict conditions for the selection of elements of the system. This is a necessary condition for any progressive evolution, ie the ability to further develop. As Dennis K. wrote, Boytim, the creator of the "Unified Theory of Integral Differentiation": "Between people who work together, synergistically, there is a resonance that generates energy, increases their creative abilities. A strong resonant connection is achieved using a holistic approach. Then D.K. Boytim notes: "In a holistic system, everything is interconnected. Deviation in one part of it, causes the corresponding changes in others. Thus, the imbalance is compensated. Everyone has a physical, intellectual, emotional and spiritual personality. Awareness of the interaction of these "features" allows a person to manifest himself as a whole person. The principle of integrity connects the subsystems of one person, with similar subsystems of others, as a result, all individuals are interconnected. Similarly, various structures and organizations in human society can be considered "(*Boytim, 1982*).

It is necessary to learn to work together creatively, for the benefit of the whole team of employees, because collective intelligence is "the ability to think together with others in the name of common priorities and tasks. In order to achieve this intelligence, we need to learn to respect the differences in the way of thinking of each of us and to use these differences correctly "(*Markova, MacArthur, 2017, p.11*).

The creative process cannot be regulated, but it is at the same time necessary for the organization to balance the rules and must be sufficiently

manageable. If you follow these rules, the system will be easier to adapt to all kinds of influences and retain the property of self-organization. In particular, the Kaizen system (continuous improvement) involves small changes, which ultimately have a strong impact on the stability of the system itself. Those companies that do not have a creative component are less stable. When a firm's employees are given a degree of creative freedom, they create new rules that will need to be followed. In the presence of strict regulatory rules, the system will not be able to adapt to the rate of change of the external environment: the socio-economic system ceases to evolve, ie develop and inevitably comes to a process of frustration (self-destruction).

6. Conclusions.

In the absence of a dynamic stability management system, the loss of resources and / or efficiency is possible. Therefore, it is essential to develop a concept of dynamic stability management of the enterprise and relevant scientific and methodological recommendations to substantiate the indicators of dynamic stability in conjunction with the risk management system, which should increase the efficiency of the enterprise in unstable conditions. This concept should be based on the features and properties of any socio-economic systems: stability, self-organization, interaction with the environment (as the socio-economic system belongs to open systems), development, cooperative thinking.

Management problem The dynamic stability of socio-economic entities in Ukraine remains insufficiently studied both in terms of economic theory and in terms of economics and enterprise management. It was found that most representatives of economic scientific thought do not consider this issue an integral system-universal component of the management of socio-economic systems and the corporate sector of the economy as signs of stability and reliability in a complex environment.

There is a need for improved scientific and methodological principles of managing the dynamic stability of socio-economic systems and the formation and implementation of an appropriate type of mechanism for rapid response to threats and risks of specific functions in the context of objectification of enterprise value. The effectiveness of this process should include obtaining an economic degree of return from the rationalization of organizational, economic, communication and financial management structures of production and economic, investment, organizational activities of each firm.

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