

Modeling Information Support for State Economic Security Management Amidst Economic Turbulence: a Case Study on Sustainable Regional Development

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Abstract: The main purpose of the article is to provide ways of information support for the state management of economic security in the framework of the sustainable development of the region. The object of the study is the system of sustainable development of the region. The scientific task is to model the information support of the state management of economic security within the framework of the sustainable development of the region. The research methodology involves the use of a modern method of information modeling using a graphic language. The DFD method formed the basis of information support modeling. Innovation is revealed through the illuminated method of modeling and the use of modern features. As a result, a model of information support for the state management of economic security was obtained within the framework of the sustainable development of the region. The innovativeness of the study is revealed in the presented not only new ways of modeling the information support of the state management of economic security in the framework of the sustainable development of the region, but also the use of modern functions to facilitate this process. The study has a limitation by taking into account the specifics of ensuring sustainable development of only one region. Such restrictions affect the content of the simulation. The article includes relevant sources and information on the issues raised in the study. There are practical implications in the work on regional sustainable development. Prospects for further research should be devoted to expanding the process of modeling and taking into account not only the informational aspect of security management

Keywords: Sustainable Development, Economic Security, State Management Information System, Model, Finance, Sustainable Regional Development, Turbulence.

1. INTRODUCTION

1.1. Impact of Economic Turbulence on Sustainable Development

Sustainable development is the development of the economic, political, social and environmental spheres with their intrinsic characteristic of striving for balance and reducing disparity, which ensures balance, the progressive movement of the region, which should result in an improvement in people's lives under the influence of turbulence.

One of the components of sustainable development is stability and balance in the system of state management of eco-

nomie security in an era of turbulence. The effectiveness of the functioning of the system of sustainable development of the state in solving the complex socio-political problems of our time is directly related to the work of public associations and citizens. This dependence is most clearly manifested in the conditions of the need to counter threats to the economic security of the state. At present, informatization has acquired the status of an important object, a strategic resource of both the state and any management structure in the sustainable management system (Peng, Chen, Yu, 2017).

The sustainable development of the latest information technologies causes an increase in the technological gap between the requirements, which are constantly becoming more complex to the indicators of the security of information resources for government entities and the capabilities of information technologies and software and hardware used to ensure economic security. There is a growing need for scientifically

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based methods and technological solutions to restore and improve the system of ensuring economic security not only of the state, but also of society and the individual in particular. That is why, at the present turbulent stage of sustainable development, it is extremely important to solve the problem of state management in the field of economic security. A significant reason for this, on the one hand, is the imperfect mechanisms of state management in this area, and on the other hand, this is due to the lack of scientifically based methods and technological solutions for restoring and improving the system for ensuring economic security in an era of radical changes in the information and psychological space. The existing imperfection of the current information security system leads to enormous damage to the state, society and the individual.

Thus, the need to restart the current system of economic security in accordance with modern public demand and turbulent challenges is becoming relevant. The improvement and structuring of the regulatory, technical, information-organizational, medical-psychological and preventive-educational functions are urgent (Karpenko, Izha, Chuntyska, Maiev, Hunko, 2021).

1.2. Turbulence in the Economic Security Management System

Under the economic security of the state understand the state of the socio-economic system within the limit values and its ability to counteract threats and contribute to the implementation of national economic interests in the framework of sustainable development.

The scientific search for comprehensive measures and methods for improving the system of economic security of political structures, increasing the managerial potential, especially of executive authorities, determines a high degree of relevance of the study in the framework of sustainable development. At the same time, the paper outlines on a unified systemic basis the foundations of the economic security of the state, the place and role of information security in the national security system of the state in an era of social chaos, the essence of information wars as a source of information threats to the national interests of the state. We have to admit that in the system of state management there are still no comprehensive scientific studies devoted to the theoretical aspects of the formation and functioning of the system of state management to ensure economic security in the conditions of turbulence in sustainable development planning.

The results of the literature review (Kryshchanovych et al, 2020; Marhasova, 2022) show that there are enough shortcomings in ensuring sustainable regional development within the framework of economic security, and one of the reasons is the real economic turbulence.

As part of our study, we raise the following research question: How to effectively provide information to the system of state management of economic security, in such a way as to establish the sustainable development of the region?

The main purpose of the article is to provide ways of information support for the state management of economic security in the framework of the sustainable development of the region. The object of the study is the system of sustainable

development of the region. The structure of the article provides for a review of the literature, presentation of the main results of the study, discussion of the results and conclusions.

2. LITERATURE REVIEW

2.1. Economic Turbulence as a Challenge to Sustainable Development

As noted in the scientific literature (Rushchyshyn, 2021; Bondaruk, Momotiuk, Zaichko, 2022; Kryshchanovych et al, 2023), with the development of information technologies and the information society, in the context of globalization, a whole range of unresolved issues and problems has arisen, the characteristics of the challenges and threats to civilization have changed significantly. The main values for the protection of which states seek to form effective mechanisms to counter challenges and threats are peace, security, human rights and sustainable development of the state.

In general, it is noted in the practical literature () that caring for citizens has been and remains the main function of the state at every historical stage of its sustainable development. At the same time, any changes in the paradigm of existence necessarily lead to the modernization of the goals and objectives of the state and society to protect against internal and external threats. Recognition of a person as the highest value of the state remains unchanged. Judging by the totality of global environmental, economic, social, political and cultural processes, it can be argued that the "epoch of turbulence" has begun, characterized by the instability of both the world system in general and the socio-political situation in a single country. There is a synergistic effect of the superimposition of past (unresolved) problems and new global challenges: one cataclysm "creeps" onto another, inter-crisis periods are reduced, and the exit from the next crisis becomes protracted, most conflicts are not resolved, but only "frozen". The existing balance of relationships between man and nature, man and society, society and the state is disturbed as a result of turbulent phenomena, resulting in chaos and unpredictability of events.

As the review of the literature (Kuznyetsova et al, 2021; Ilyash et al, 2022; Verbivska et al, 2022) shows, in the conditions of turbulence, the problems that have undergone a fragmented solution of the theoretical basis of state management in the field of economic security are also actualized, in particular: the conceptual and categorical apparatus of the study; identification, classification and assessment of economic security risks when making managerial decisions; conceptual foundations for the formation of a system for ensuring economic security; Methodology for strategic planning of sustainable development Along with this, state regulation needs attention in the system of organizing medical and psychological assistance, rehabilitation, habilitation, coordination of support for patients with anxiety disorders due to progressive informatization, and the introduction of national programs to improve information economic culture.

It is often noted in the scientific literature (Sylkin et al, 2018; Waller, 2019; Al Azzam, 2019) that the considered state management of economic security based on the interpretation of security in terms of risk management, unlike threats,

takes into account the dynamic nature of the challenges that arise in a turbulent society. Economic security management is based on four paradigms: systemic, synergetic, phenomenological and cognitive. At the same time, these approaches to state management, firstly, are not delimited and universal, and secondly, they must take into account the peculiarities of the management process that inevitably arise in a situation of growing turbulence in society, nature and the technosphere. In conditions of turbulence, new approaches are proposed, one of which may be the concept of heterogeneity. In this case, the emphasis in the management of economic security should be placed at the micro level, that is, on direct practices of interaction that take into account local specifics and features of sustainable development.

The era of turbulence will be difficult for humanity as a whole; at the same time, it will have not only negative and destructive, but also positive, synergistic consequences necessary for further development. Thus, taking into account the laws of turbulent entropy logic, it is necessary to determine not one trajectory for the development of the socio-economic system, but a set of the most probable (sustainable) changes.

2.2. Economic Security and Sustainable Development

As a result of a review of the literature (Stankevičienė, Sviderskė, Miečinskienė, 2014; Saleh, Alazzam, Zavalna, 2020), it can be argued that economic security is an organism, a system that will work if it is managed. Obviously, economic security will always be a derivative of the development strategy of the state itself. After all, it is the actions of citizens, the implementation of their plans and lifestyle that should be ensured by an improved system of economic security.

Considering the review of scientific and practical literature (Sylkin et al, 2019; Kryshchanovych et al, 2022), an urgent problem that requires a comprehensive and systematic solution in an era of turbulence is ensuring the economic security of the individual, society and the state, since the role of accumulation, processing and dissemination of information has significantly increased, the number of subjects of economic relations and consumers has increased. information. During social changes, the rapid development of information technology, the possibility of using various means of influencing human consciousness, the problem of the psychological safety of the individual is of particular relevance. Violations of security through damage to the mental state of a person need a timely response in the form of medical and psychological assistance aimed at strengthening stress resistance and improving the quality of life. The problem of a shortage of qualified management personnel in the field of information security with a high level of professional and business qualities, capable of making effective management decisions to ensure sustainable development, is becoming more and more acute.

At present, further improvement of activities related to the protection of state secrets and ensuring economic security is necessary. Issues of national security management need a priority decision on the part of the state, since it is the basis for determining the most important directions and principles

of the state information policy of the country. One of the first steps may be to model the information support of the state management of economic security in conditions of turbulence for sustainable development. The scientific task is to model the information support of the state management of economic security within the framework of the sustainable development of the region.

3. METHODOLOGY

Data flow diagrams or DFD (short for English Data Flow Diagrams) provide a convenient way to describe the information transmitted between parts of the system, as well as between the system and the external entity. Data flow diagrams are a graphical structural analysis methodology and are widely accepted and used both as a structural analysis tool and in the design of modern systems. As a tool, DFD was actively used long before the popularization of UML, the so-called notation language, since it did not have strict syntax restrictions and, as a result, was widely used. With the help of DFD, it is possible to create diagrams more quickly and conveniently, including different variability, but at the same time it remains clear to the end user making a management decision to ensure sustainable development. As a notation, DFDs are widely used in sustainability planning.

Arrows in DFD represent how objects, including data, move between actions. When choosing names for objects of DFD diagrams, the mathematical notation in the form of SD is most often used.

While data streams reflect objects in the process of their movement, data stores, in turn, reflect their presence in all possible other states. In the process of designing systems, the data warehouse is used as a place for temporary storage, where information is located in between stages of processing.

Separately, the PEST-analysis method should be used in order to determine the key factors influencing the state management of economic security in the context of the impact of turbulence on sustainable development.

PEST-analysis allows you to effectively organize strategic planning for sustainable development and implement the process of making managerial decisions to ensure security in the country's region.

It should be understood that turbulence is not only economic factors, it personifies everything from politics to technology. One way or another affects everything, thanks to the PEST analysis, we will be able to highlight the key determinants of turbulence and take into account during the modeling.

It is necessary to select a specific region and its system of state management of economic security. We chose the Saxony (Germany) region due to issues with sustainability and residency of the author team. The selected region has a number of problems associated with a low level of economic security and the lack of consideration of the impact of turbulence on its own sustainable development strategies. The use and collection of data was supported by the Department of Sustainable Regional Development.

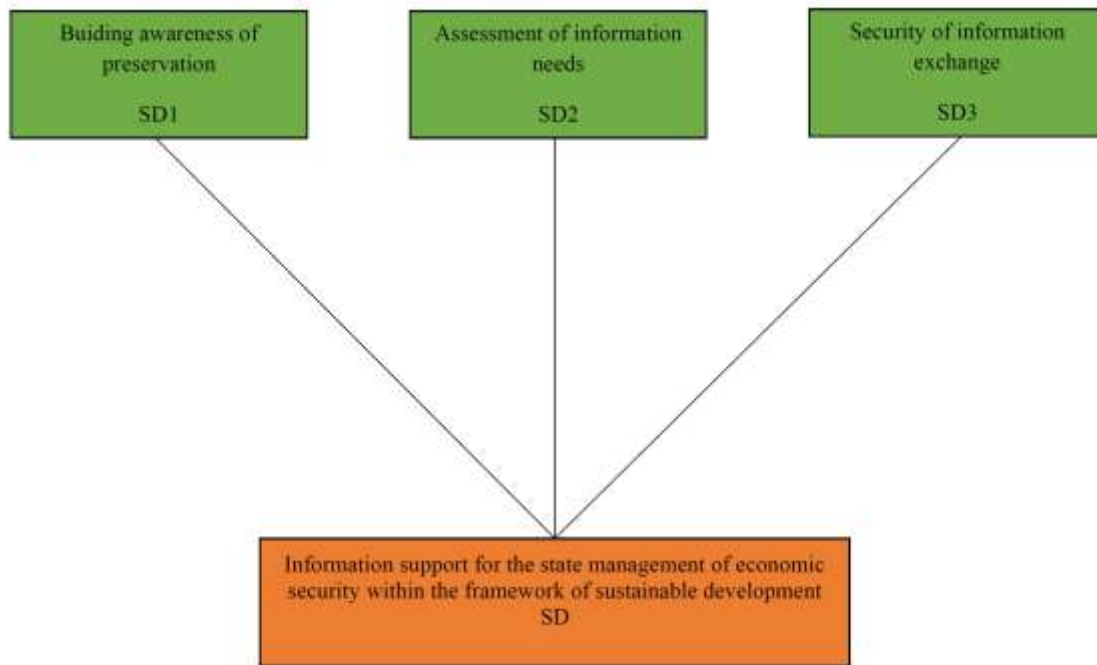


Fig. (1). The processes of achieving SD (developed by the author).

4. RESULTS OF RESEARCH

First, we need to present the results of the PEST analysis in order to identify problems that should be taken into account in the modeling (Table 1).

Table 1. Matrix of PEST analysis (developed by the author).

P	E	S	T
Inefficient state management	Low economic security	Low labor motivation	Reduction of innovative activity
Low information security	Rising inflation	Staff shortage	Dependence on foreign supplies
Distrust of authority	Unfavorable business environment	Downsizing	Obsolescence of security technologies
		Ineffective media	

The order of modeling and its components should be clarified:

1. We have a key modeling goal and SD1, SD2, SD3 are blocks that are connected by arrows that display information support.
2. SD cannot be provided without functions, so an additional, functional model is being built.
3. The whole modeling process is carried out through a vector computer program.

The very purpose of modeling should be defined. In our case, this is SD - Information support for the state management of economic security within the framework of sustainable development. Thus, the processes of achieving it are presented in Fig. (1).

SD1. Building awareness of preservation. Awareness is a unique category. It is derived from one of the three fundamental substances (matter, energy, information) that make up the essence of the universe. Awareness as the presence in people of the received information, ideas, facts, knowledge, which have elements of novelty for them, encourages consumers of information to make appropriate decisions and adequate actions. Without awareness, a person, society, state and sustainable development cannot exist. This is especially evident today in turbulent conditions. With an information explosion, information hunger, like misinformation, is like death. Awareness of the population is the result, the achievement of which is subject to the information policy and information culture of the society, information technologies and systems, information processes and information processes. The peculiarity of awareness as a result lies in the fact that through its consumers it affects not only the information sphere, but also all spheres of the material and spiritual life of people.

SD2. Assessment of information needs. It is necessary to assess and ensure information needs within each management function of a particular public authority; organization of document circulation and information exchange; optimization of information flows and exchange procedures to ensure sustainable development. The volume of competence of each public authority should correspond to the volume of information support necessary for implementation, while economic security will be negatively affected by both the lack of information and its excess. This leads to the need to determine the amount of information support for a particular

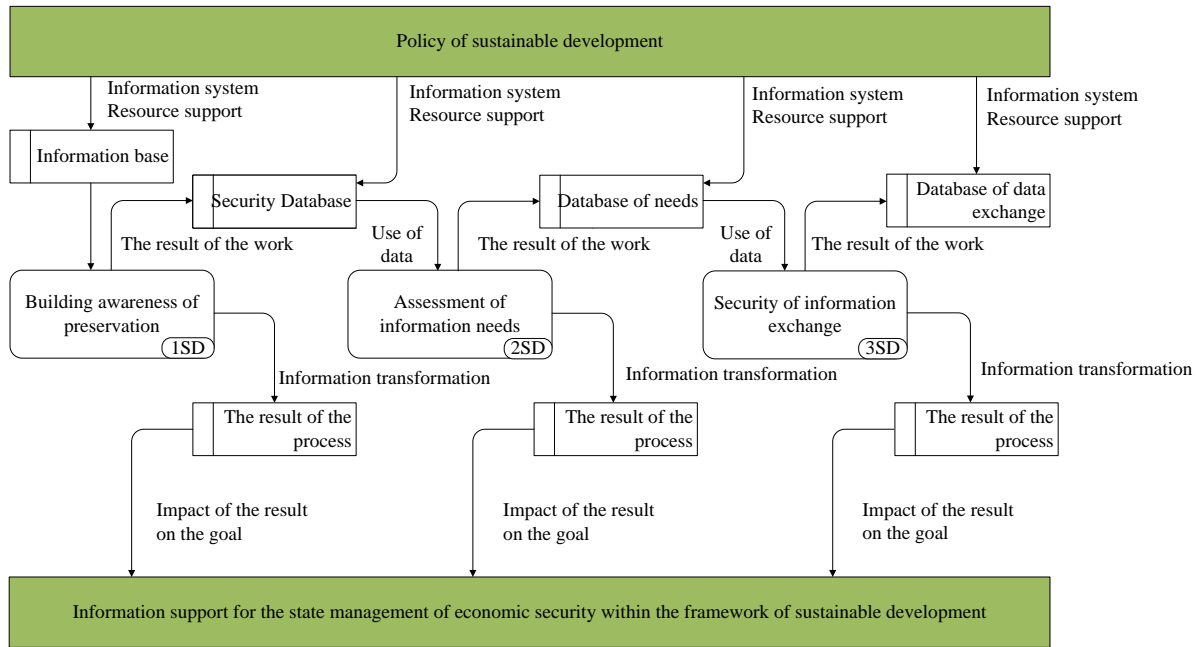


Fig. (2). The result of modeling the information support of the state management of economic security in the framework of sustainable development (developed by the author).

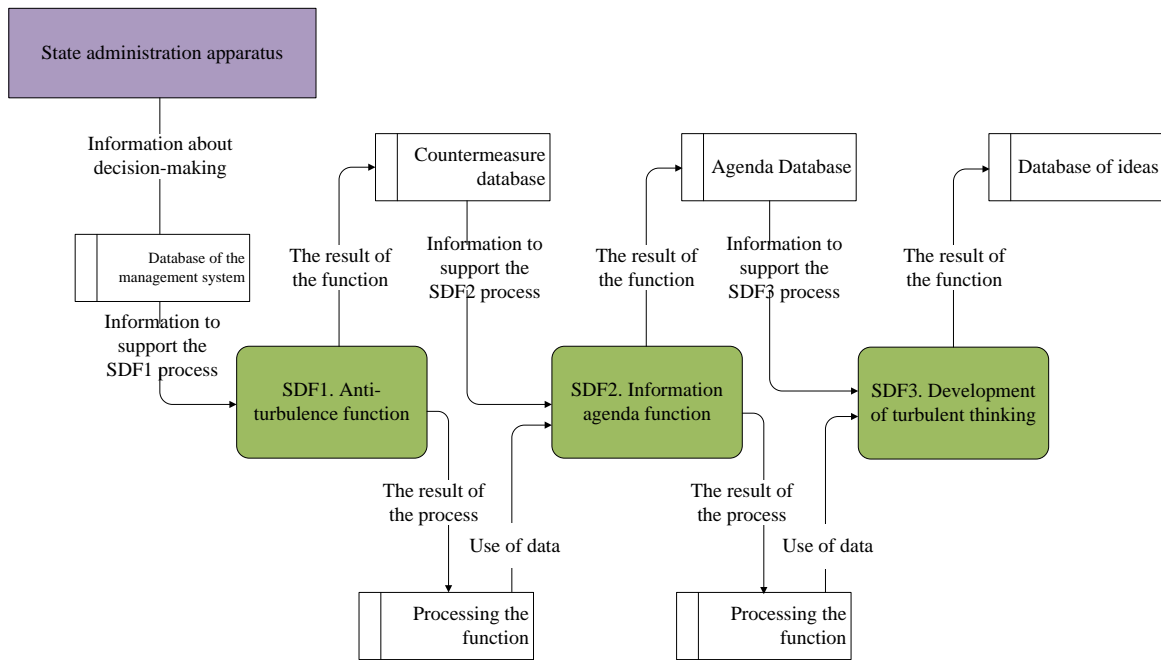


Fig. (3). The main functions that will contribute to the information support of the state management of economic security in the framework of sustainable development (developed by the author).

public authority in the regulation on this body, in other words, to establish its information status based on the tasks assigned to it and the amount of powers granted.

SD3. Security of information exchange. The security of telecommunications and exchange is one of the components of the information security of public authorities. Information technologies have found wide application in the management of critical life support facilities, which are becoming more vulnerable to accidental and deliberate actions. The increase in vulnerability is associated with a number of factors, the

main of which are the decrease in the level of international security, the development of international terrorism, and the increase in the number of potentially dangerous objects.

The result of modeling the information support of the state management of economic security in the framework of sustainable development should be presented (Fig. 2).

It is necessary to present the main functions that will contribute to the information support of the state management of economic security in the framework of sustainable development (Fig. 3).

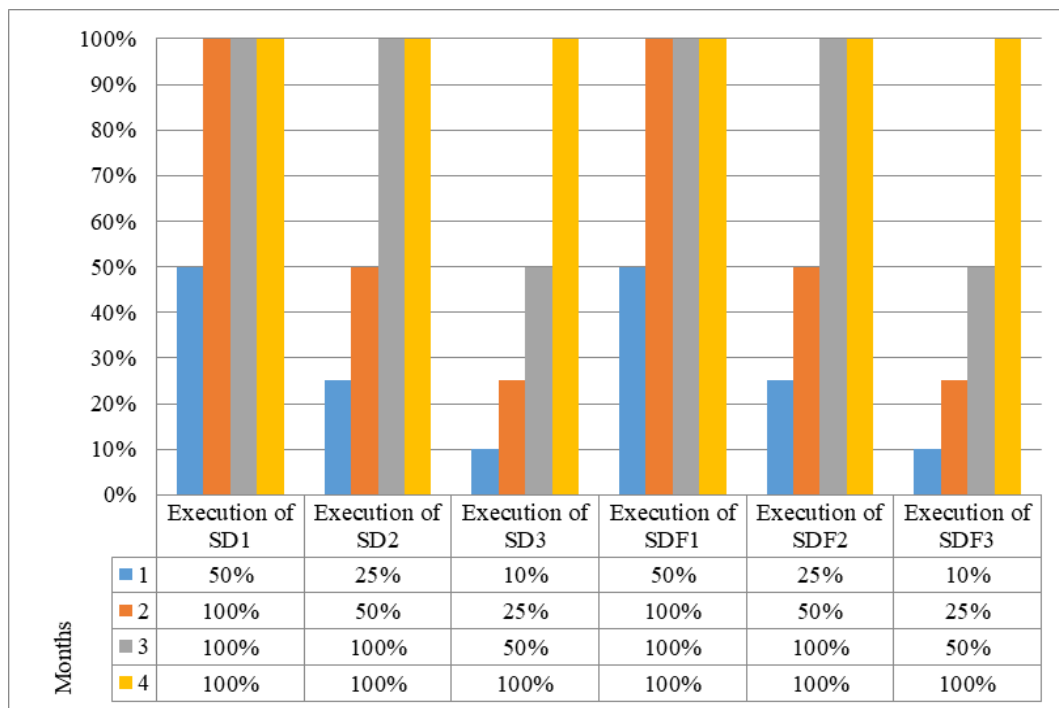


Fig. (4). The key aspects of the effective temporal implementation of the proposed model for Saxony, (developed by the authors).

SDF1. Anti-turbulence function. The priority of the state's economic security strategy is to overcome turbulence and achieve clear controllability. There is a need for systematization and algorithmic use of mechanisms to ensure internal security and the formation of sustainable development in the societies of the partner countries. The necessary complex nature of the actual risks of national security in the information sphere requires the definition of innovative approaches to the formation of a system for the protection and development of the information space in the context of globalization and free circulation of information.

SDF2. Information agenda function. The essence of the information agenda is that the media present to the audience some of the issues that are most important at the moment in the context of sustainable development. Usually there are no more than five of them. At the same time, it is important to understand that the agenda (agenda) does not have a direct impact on the behavior of individuals. The impact of mass communication on the audience is always mediated by interpersonal and intragroup communication. At the same time, several agendas can exist simultaneously, for example, informational, intragroup, interpersonal. At the same time, the political agenda can also be divided at the level (national, regional, local).

SDF3. Development of turbulent thinking. The main idea of information security in the era of turbulence lies in the sustainable development of turbulent thinking, which forms the prepared mind of the individual to confront information risks, the correct response to emerging challenges. Thus, a prepared mind is the presence of turbulent thinking and the readiness for its active application.

Let's present the key aspects of the effective temporal implementation of the proposed model for Saxony (Fig. 4).

Turbulence, especially economic turbulence, is a very dynamic phenomenon and depends on changes in the external environment. Therefore, the delay in time impairs obtaining the desired effect from the model.

It should be noted that our assumption of promoting sustainable development is based on the fact that through the model we can improve the adoption of certain managerial decisions at the regional level. Visualization and convenience allow you to better understand what and how to do. However, our assumption still remains at the theoretical and methodological level. In the future, more practical applications will contribute to this.

In general, the proposed model will lead to the formation of sustainable development of the region. And this is a social order - a state of relative stability, balance, balance of social relations, activities, norms in society, which sets the appropriate models of behavior for individuals, groups, institutions. Sustainable development is a static, emergent characteristic of a social system that integrates its integrity, organization, harmony, normalization or structural, institutional, organizational, functional, normative orderliness. The balance of social relations presupposes the prevention of a decrease in social security as a component of economic security. Relative stability is the concept of maintaining constancy in a constant dynamic environment and turbulence

5. DISCUSSIONS

Discussing the results of the study, it should be noted that ours should be compared with similar ones.

So, for example, scientists (Bondarenko et al, 2020; Abramova et al, 2022) as a result get that the state policy of economic security should be determined by the priority of

actual national interests, the system of dangers and threats and carried out by implementing the relevant doctrines, strategies, concepts and programs in accordance with the current legislation. In this regard, the priority is the development of the Strategy for the sustainable development of state security and the concept of economic security of the state with a clear content of the general provision, the establishment of legal foundations, directions of state policy, the outline of existing threats, the definition of coordination and control of information security, as well as the outlined implementation mechanisms and appropriate calculations logistical support.

Scientists in their research (Alazzam et al, 2020; Hrybinenko, Bulatova, Zakharova, 2020) come to the conclusion that the interests of modern society are the use of information and information infrastructure for the sustainable development of all spheres of public life in accordance with fleeting changes. Then the content of state interests in this sector include the following: ensuring the interests of the individual in the information sphere; information support of state policy; creation of a legal social state; achieving and maintaining public peace; ensuring access of citizens to open state information resources.

Another group of scientists (Costello, Wight, Stone, 2016; Bilan, Vasilyeva, Lyeonov, Bagmet, 2019) notes that the professional activities of civil servants are accompanied by a large array of information content, an acute shortage of time and frequent switching of rhythms. Along with this, a long stay in a forced position, performance of work in a limited working space and with constant exposure to environmental factors on the body. Scientists note that the existence of an increase in the emotional intensity of labor associated with significant intellectual and emotional-volitional costs. All of the above leads to a decrease in efficiency and depletion of personal resources to ensure sustainable development.

As described in the works of other scientists (Bazyliuk, Shtangret, Sylkin, Bezpalko, 2019), according to the established challenges of the era of turbulence, a universal model is proposed for understanding the causes of imbalance in dynamic systems (individual, society, state). The presented development allows you to determine measures to balance them, identify challenges and establish risks from the progression of the latter, determine ways for further management to achieve specific objectives through the use of management methods, methods and functions.

Discussing our research, we should point out their novelty and innovativeness in terms of comparison with similar ones. The innovativeness of the study is revealed in the presented not only new ways of modeling the information support of the state management of economic security in the framework of the sustainable development of the region, but also the use of modern functions to facilitate this process.

6. CONCLUSIONS

Summing up, it should be noted that the rapid development of information technologies and the problem of their rapid implementation in all spheres of human life, the growing importance of information in making managerial decisions by public authorities and administration, a new format for the functioning of the media - these and other factors bring to

the fore the problem of the formation and implementation of strategic management of economic security within the framework of sustainable development. Protecting its national interests, each state takes care of its security within the framework of sustainable development. The strengthening of statehood requires the same. A balanced state economic policy of sustainable development is formed as a component of its socio-economic policy based on the priorities of national interests and threats to the national security of the country. From a legal point of view, it is based on the principles of a legal democratic state and is implemented through the development and implementation of relevant national doctrines, strategies, concepts and programs in accordance with applicable law.

As a result, a model of information support for the state management of economic security was obtained within the framework of the sustainable development of the region. The structure of the model proposed in Fig. (2) is structured in such a way as to convey the process of information support itself and to focus on the effect that certain stages give. The study has a limitation by taking into account the specifics of ensuring sustainable development of only one region. Such restrictions affect the content of the simulation. The article includes relevant sources and information on the issues raised in the study. Prospects for further research should be devoted to expanding the process of modeling and taking into account not only the informational aspect of security management. Information is not the only problem of sustainable development; attention should also be paid to investment in the region and innovation. The problem of investment and innovative sustainable development of the region is no less important and requires new research.

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