Ensuring the Socio-Economic Security of the Healthcare System in Terms of Improving the Efficiency of Public Administration of Economic Policy

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Abstract: The main purpose of the article is to provide information support for the application of technology for ensure the socio-economic security of the healthcare system. Within the framework of this goal, the main scientific objective of the article is to model the process of applying engineering technologies for ensure the socio-economic security of the healthcare system. The object of the study is the socio-economic security of the health care system. For this, a modern modeling methodology was applied, which includes the presentation of appropriate graphical diagrams with processes related to the application of engineering technologies for ensure the socio-economic security of the healthcare system. As a result, modeling of the application of technology engineering for ensure the socio-economic security of the healthcare system was carried out. As an element of novelty and innovation, we can talk about the established models of application of engineering technologies for ensure the socio-economic security of the healthcare system. The study has a limitation in the form of not taking into account all possible engineering technologies for ensure the socio-economic security of the healthcare system. The prospects for further research will be devoted to the expansion of technology engineering for ensure the socio-economic security of the healthcare system.

Keywords: Socio-Economic Security, Technologies, Security, Model, Healthcare, System, Public Administration, Economic Policy.

1. INTRODUCTION

The globalization of the world economy, the development of new activities, in particular, innovative and technological services in the industrial market, increased competition and the transformation of its nature determine the growing role of international engineering services. The results of engineering activities largely reveal the important properties of the production and economic activities of companies and the effectiveness of the implementation of investment and innovation projects (especially in medicine). At present, the diversification of engineering services production and the international fragmentation of production has allowed medical companies located in different countries to participate in global value-added production chains, which means close connection with such diverse activities as design, construction, research and development, industrial production, healthcare, project management and project management, warranty service. However, due to the complexity of production processes and the increase in the stages of project implementation, from concept development to the creation of the final product, object or medical know-how, there was a need not only to coordinate work in various locations, but also to control project implementation in accordance with the timing, quality and planned cost. . Thus, the diversification of engineering services and the emergence of global production chains and their spatial and organizational differentiation have led to an increase in the importance of engineering in the world and an increase in demand for engineering services in the field of healthcare.

In a dynamic modern world, where new market relations are developing and more and more new medical enterprises appear in innovative sectors of the economy, the absence of anymore or less harmonious system that connects all existing forms of investment projects in the pharmaceutical, high-tech and IT sectors, medical and other industries, has led to the fact that the dialogue of participants in investment processes has ceased to have not only a generally accepted and unambiguous basis for the perception of the same terms, but also a general systemic understanding of processes in the system of socio-economic security.

The current market situation has created the prerequisites for the development and demand for a new type of activity, called "engineering" and is understood as ingenuity, invention, knowledge. Its main function is to link all aspects of engineering activity from pre-project work, such as conducting market research, preparing a feasibility study, engineering surveys, performing design work, including the development of project documentation, project cost assessment, cost calculation for the creation and operation of the facility and the implementation of the project itself. At the same time, engineering gradually began to find its application in the provision of a whole range of engineering and technical services related to innovative design, development, construc-

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tion and commissioning of facilities or technological solutions, the development of new technological processes at customer enterprises, as well as the improvement of existing ones production processes and up to the introduction of products or products into production and even their marketing in the system of socio-economic security.

The main purpose of the article is to provide information support for the application of technology for ensure the socio-economic security of the healthcare system. The object of the study is the socio-economic security of the healthcare system.

The structure of the article provides for a review of the literature, the presentation of the methodology and the main results of the study, their discussion and conclusion.

2. LITERATURE REVIEW

As Hu et.al., (2019), Al Azzam, (2019) described in the scientific and practical literature, the value creation of engineering focuses on the provision of highly qualified services by highly educated workers, which is often closely associated with research and development in this area. Workers' knowledge is often (though not always) certified by a professional body and/or public authority. Services are provided based on a thorough professional assessment or diagnosis by medical experts. The services are very individual according to the needs of each client. These professional services create value through the use of specialized knowledge and are provided by personnel with recognized qualifications who are accredited and licensed by professional organizations or public authorities. These services are maximally tailored to the needs of each client and are delivered with a high degree of discretion and are based on the qualifications of specialists who assume responsibility and obligations for the services provided. The provision of services involves a high level of interaction with the client and is guided by a professional code of ethics and conduct".

As Almuzaini, (2018) and Saleh, (2020) noted in the literature, biomedical engineering is the design of systems, equipment and devices for use in medical practice, involving physicians, nurses, technicians, and researchers, in order to determine, understand and satisfy their requirements for systems, equipment and devices.

Various literature describes (Raut, 2017; Lysenko, 2023) that global demand for engineering services has increased, related to the existing infrastructure, the development of public administration of economic policy, expanding the possibilities of financing and contributing to the growth of demand, despite the reduction in public spending. The development of the economy in countries with a growing middle class has led to an increase in the construction of medical facilities in some emerging markets such as India and the Middle East. But few take into account socio-economic safety and security aspects.

The literary sources (Zhang, et.al., 2021; Bobrov, 2021) describe the development of engineering, as well as its separation into an independent separate type of international commercial activity, which has become a reflection of the development of scientific and technological progress that has affected all industries and, above all, construction and mechanical engineering. The consequence of this is significant shifts in the overall structure of the direction of international trade and an increase in trade in various complex types of equipment needed in more complex production facilities and specialized knowledge to solve organizational and technical problems, from the design stage of a medical enterprise to its commissioning.

Large medical enterprises often create their own engineering services and project offices. In this case, they are structural units that carry out several internal projects to modernize the production process or product innovations. Again, the team has to go through many of the mistakes that are typical for newcomers to this field. After the completion of projects, the service is usually disbanded. This means that specialists lose their accumulated competencies, and a medical enterprise does not receive additional profit from bringing these competencies into economic circulation - for example, when providing services to other companies or expanding the scope of their own enterprise.

An analysis of the development of engineering technologies in the world is devoted to a lot of theoretical and practical literature, but at the same time it should be noted that the study of the application of engineering technologies to ensure the safety and security of the healthcare system in the context of improving the efficiency of public administration is not the subject of a wide range of studies today. Also quite overdue is the scientific substantiation of practical steps for modeling the integration of engineering technologies for the development of the healthcare system in the context of increasing the efficiency of public administration of economic policy. Within the framework of this goal, the main scientific objective of the article is to model the process of applying technologies for ensure the socio-economic security of the healthcare system.

3. METHODOLOGY

The basis of our methodology will be one of the CASE tool modeling methods. CASE tools are software tools that automate the processes of creating and maintaining information systems, including analysis and formulation of requirements, design of application software (applications) and databases, execution of a certain process, testing, documentation, quality assurance, configuration public management and management technology engineering. One way to CASE is DFD.

The DFD (Data Flow Diagram) methodology is intended to describe how each process transforms its inputs into outputs. DFD models can be used to detail the application of technology engineering for the development of the healthcare system in terms of improving the efficiency of public administration in the system of socio-economic security.

Diagrams of this kind of modeling are a means of modeling the functional requirements for the system being designed and are used to describe the implementation of a particular process associated with the use of engineering technologies to ensure the socio-economic security of the healthcare system in terms of increasing the efficiency of public administration. With their help, these requirements are presented as a hierarchy of functional components (processes) associated with information flows. The main purpose of this presenta-

Table 1. Matrix of PEST-analysis of LLC "Ridan - Engineering" activity (Development by the authors).

P	E	S	T
The need for compliance		Low labor motivation	
	Suspension of economic growth		Reducing innovation activity
Problems of privatization		Lack of engineering	
	Making it harder to pay taxes	Manpower	Dependence on the supply of spare parts
Problems of Technology Patenting			
	Low effect from the use of technology	Gap in needs	Use of non-advanced technologies
Deterioration of politicization		Staff outflow	

tion is to demonstrate how each process turns its inputs into outputs, as well as to identify the relationship between these processes in the framework of the application of engineering technologies for the development of the healthcare system in terms of improving the efficiency of public administration in the system of socio-economic security.

They are detailed using lower level diagrams. This decomposition continues, creating a multi-level hierarchy of diagrams, until it reaches a level of decomposition at which the processes become elementary, and it is impossible to detail them further. Information sources (external entities) generate information flows (data flows) that transfer information to subsystems or processes. Those, in turn, transform information and generate new flows that transfer information to other processes or subsystems, data storages or external entities - consumers of information.

It is the transformation of input data streams into output ones in accordance with a certain algorithm. Physically, the processes can be implemented in a variety of ways: it can be a medical device organization unit that handles input processing and reporting; program; hardware implemented logical device and the use of certain engineering technologies. Shown as rectangles with rounded corners.

In DFD, arrows can merge and branch, which makes it possible to describe the decomposition of arrows. Each new merging or branching arrow segment can have its own name. In DFD, each job number can include a prefix, a parent job number T, and an object number. The object number is the unique number of the work in the diagram. A unique number has datastores and external entities, regardless of their location on the diagram.

For such a methodology, one should select a specifically operating company engaged in the implementation of engineering technologies to ensure ensure the socio-economic security of the healthcare system.

We have chosen LLC "Ridan - Engineering" as the object of modeling. Why did the choice fall on this socio-economic system? The answer is characterized by the fact that the authors of the article work right there and therefore understand well all aspects of the application of engineering technologies for ensure the socio-economic security of the healthcare system within the framework of LLC "Ridan - Engineering".

In addition, the PEST-analysis method was applied to identify all possible factors influencing the process of applying engineering technologies to ensure the socio-economic security of the healthcare system at LLC "Ridan - Engineering".

4. RESULTS OF RESEARCH

To begin with, we present a matrix of PEST-analysis of LLC "Ridan - Engineering" activities in order to identify key weaknesses, with their further consideration in our modeling (Table **1**).

Thus, one of the weaknesses in the activities of LLC "Ridan - Engineering" is the inefficient use of engineering technologies to ensure the socio-economic security.

You should decide on the purpose of modeling and the processes that will accompany its achievements for the selected engineering company. Such a goal will be "Improving the effectiveness of the application of engineering technologies for ensure the socio-economic security of the healthcare system in terms of improving the efficiency of public administration" (Fig. **1**).

1T. Formation of the base for the international transformation of technologies. Free forms of transfer of engineering technology, including intercompany transfer, do not need strict regulation. Commercial forms of transfer of engineering technology, both domestic and international, are drawn up in the form of an agreement (licensed, on scientific and technical cooperation, joint production or a contract of sale). The buyer is obliged to inform (and know himself) the seller in a timely manner about the legislation in force in the territory of his country, about the current norms and standards, including environmental ones, about the protection of intellectual property, including medical, about the certification procedure, etc.

2T. Formation of a technology application program. The engineering work program should be in accordance with the program of technical and organizational development of the medical enterprise under study, i.e.

3T. Formation of the plan of technical and economic calculations. The program of engineering works must be properly substantiated by technical and economic calculations. These calculations should relate not only to each project of technical and organizational development, but also to projects of those engineering works that are envisaged to be performed in the process of developing and implementing health care measures in the system of socio-economic security.

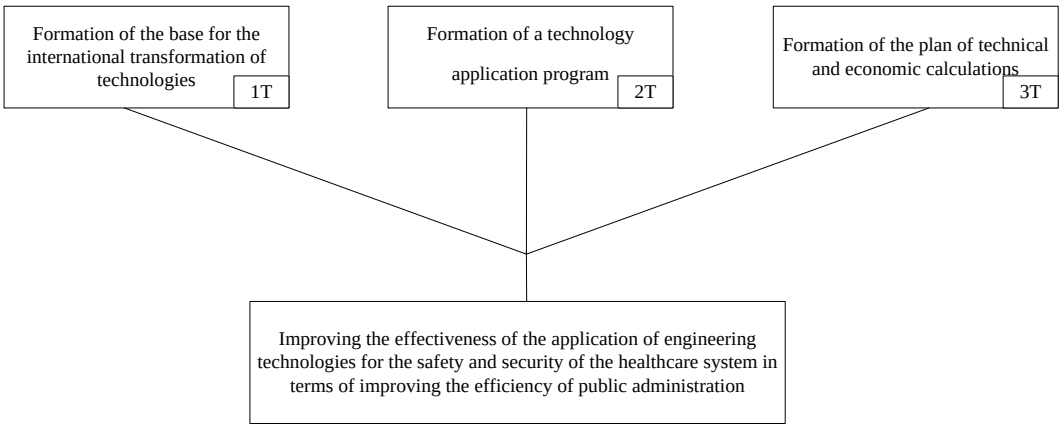

Fig. (1). Lines of blocks for achieving the goal of modeling (Development by the authors).

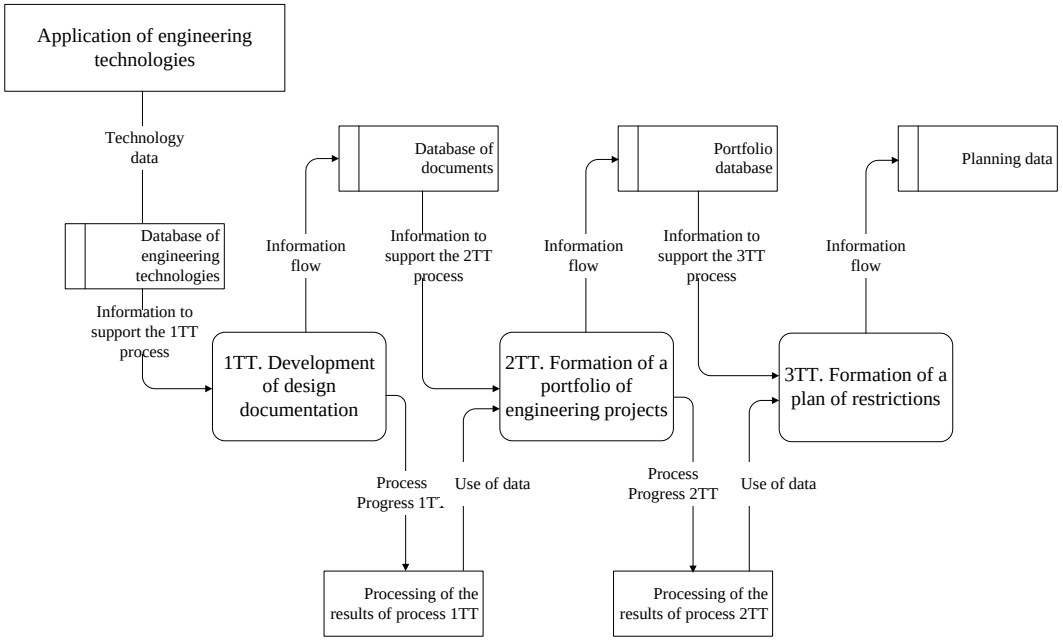

Fig. (2). Modeling of the information process of ensuring the fulfillment of the set goal (Development by the authors).

We will present the results of modeling according to the set goal (Fig. **2**).

In addition, the model for the formation of information support for the application of engineering technologies for the development of the healthcare system in the context of improving the efficiency of public administration is shown in Fig. (**3**).

1TT. Development of design documentation. One of the most important areas of engineering activity is the development of design documentation (in particular, healthcare projects). Often, the preparation of such documentation is a laborious process that requires significant expenditures of funds for its implementation. Therefore, if an enterprise decides to order the development of design documentation from an engineering firm, it must incur certain, sometimes quite significant, costs, which (as a result of their one-time nature) will be part of the investment (capital) costs in the implementation of a particular activity (or group of activities), for planning the implementation of which the preparation of this documentation is provided.

2TT. Formation of a portfolio of engineering projects. An important direction in the implementation of the principle of algorithmization is a purposeful enumeration of possible options for forming a portfolio of engineering projects that an economic entity plans to implement, providing for finding such rules of action in which there is no need to consider all possible such options, but only a separate relatively small set of them which a priori is the best of these options in the system of socio-economic security.

3TT. Formation of a plan of restrictions. When developing a program for the introduction of engineering technologies, one should also take into account possible restrictions on the volume of these works. The main such limitation is the amount of financial resources that are at the disposal of the enterprise (or can be attracted from external sources). At the same time, such financial restrictions should concern not only the existing amounts of funds that it can use to finance the relevant engineering technologies for ensuring socio-economic security, but also financial resources for the implementation of the results of such work (in particular, certain medical projects).

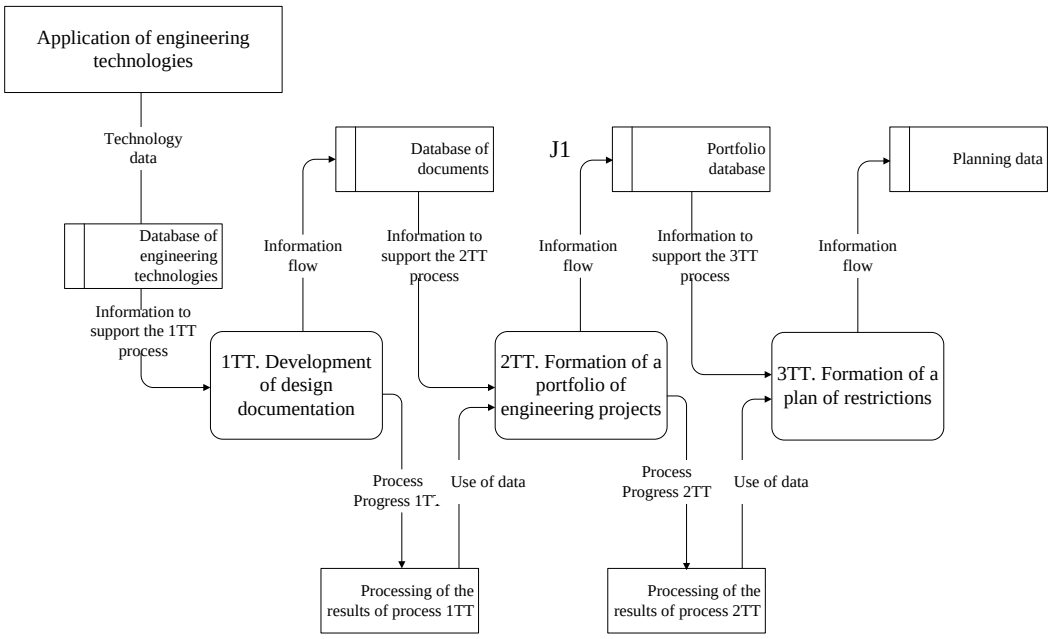

Fig. (3). Modeling of the information process of ensuring the fulfillment of the set goal (Development by the authors).

5. DISCUSSIONS

Discussing the results of the study, it should be noted that similar ones should be presented for comparison. For example, Wang, (2021), Almuhareb, (2020) and Sylkin et.al., (2018) of various kinds focus attention in their results on fragmentation. The advantage of choosing to fragment production and services is to minimize the risks and costs that an engineering firm incurs when entering foreign markets, when certain stages of production or services are transferred to the company, which can make it cheaper or faster in the healthcare industry. The main disadvantage of the fragmentation of the production of engineering technologies is the low level of control of selected intermediaries in the target country. In this case, the engineering firm must take into account additional leverage on its co-executors and intermediaries so that they comply with the accepted rules and agreements and contribute to the promotion of the services or products of the engineering firm to the local market.

As a result, some scientists (Krasko, et.al., 2019; Al-Mistneer, 2018; Alazzam, 2023; Khalina, 2019) note that on a global scale, engineering companies have a significant impact on the global safe space and have the opportunity to realize their interests in other countries. An example of globalization can be considered the formation of a global system of engineering services for the use of modern technologies in healthcare. The wave of mergers and acquisitions within engineering firms, as well as the active development of other forms of international cooperation that have been taking place recently, indicate that the engineering services industry is transforming from independent national companies into a rather complex web of interconnected multinational corporations, the degree of integration of which is increasing. And the fragmentation process is most often "intelligence" and helps the engineering firm to assess the real demand for its services in the local market, to understand all possible shortcomings, taking into account local specifics.

Other similar results (Meshram, 2022; Karanikas, 2018; Kokhan, 2020) are that one of the directions of industrial policy in the current economic conditions is the formation of a high-tech, competitive industry that ensures the transition of the economy from an export-raw material to an innovative type of development. The transition to an innovative path of development is impossible without a developed industry of engineering technologies as an effective mechanism for creating, implementing and promoting science-intensive technologies in production, as well as factors stimulating the development of healthcare.

The process of globalization itself inevitably entails a new process of internationalization of production, which, in turn, certainly leads to the need to liberalize the economy in order to simplify interaction. Given this, in the context of globalization and liberalization, engineering firms are motivated to look for ways to diversify, which is also closely related to the fragmentation of medical production and concentration, as well as mergers and acquisitions, which, in turn, intensifies regulatory processes. And when discussing the results of our study, we should also take into account the aspect of globalization in modeling.

Discussing our own results of the study, we note that their innovativeness is represented by modeling information support for the use of engineering technologies to ensure the socio-economic security of the healthcare system in terms of improving the efficiency of public administration. As an element of novelty and innovation, we can talk about the established models of application of engineering technologies for ensure the socio-economic security of the healthcare system.

6. CONCLUSIONS

Summing up, it should be noted that our society has entered a period that is increasingly called the era of new technologies and new materials. The grandiose achievements of fun-

damental science, the unprecedented integration of science and technology have become catalysts for the changes taking place in our lives, and this applies to a greater extent to structural and functional materials. Medicine, unlike other fields of knowledge, to a greater extent uses everything that modern science and production have created. Biocompatible materials are currently in great demand in general and cardiovascular surgery, orthopedics and dentistry, as well as in the manufacture of blood vessel prostheses, artificial heart valves, circulatory systems, new generation dosage forms, and sorbents. The development of new materials for medical use, which must come into contact with the environment of a living organism, is a particularly difficult task and requires an appropriate level of safety and security. Fundamental in this case is the task of using existing and creating modern materials for the development of new technologies and the production of better medical equipment products. The more medicine penetrates deep into the human body, learns its laws at the cellular and genetic levels, the more there is a need to use existing and create new materials that are compatible with individual human organs that do not have a harmful effect on his health. All research in this direction is carried out at the intersection of macromolecular chemistry, biotechnology, biophysics, molecular and cellular biology and medicine.

An engineer working in the field of production, operation and maintenance of medical equipment often faces the problem of choosing the necessary materials, the solution of which, first of all, is determined by the knowledge of the specialist about the materials used in medicine, their properties, compatibility with human tissues and the nature of the impact. on them. The development of materials that come into contact with the living environment of the body is one of the most difficult tasks of biomedical engineering in the context of ensuring safety and security.

As a result, modeling of the application of technology engineering for the socio-economic security of the healthcare system was carried out.

The study has a limitation in the form of not taking into account all possible engineering technologies for the safety and security of the healthcare system. The prospects for further research will be devoted to the expansion of technology engineering for the socio-economic safety and security of the healthcare system.

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