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# CHAPTER 1

## CURRENT TRENDS IN ECONOMIC DEVELOPMENT

### ACTUAL DIRECTIONS OF REGULATION AND STIMULATION OF INNOVATIVE DEVELOPMENT OF INDUSTRIAL ENTERPRISES

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**Abstract.** The article explores current directions of regulation and stimulation of innovative development of industrial enterprises with the introduction of new, revolutionary technologies consisting of three main key components: providing state support and stimulating scientific and technical activities; assistance in promoting newly created innovations in industrial production; formation and development of the ecosystem of Industry 4.0. The purpose of the article is to study the current directions of regulation and stimulation of innovative development of industrial enterprises. The main objectives are to study the directions of state support for the introduction of new technologies and the renewal of production capacities of enterprises; systematization and classification of these areas, research of conditions and technologies that will ensure the technological and economic development of enterprises and ensure the development of a new digital economy in the country and active social and economic development. In order to substantiate the actual directions of regulation and stimulation of innovative development of industrial enterprises, a logical, dialectical approach and methods of scientific knowledge were applied: observation, comparison, abstraction. The comprehensive, systematic introduction of these innovations is possible to transfer innovation activity in Ukraine to a new level of high-tech digital development and will ensure dynamic integration, industrial introduction of newly created innovations, strengthen the relationship between science, education and industrial production and build a new national ecosystem of "Industry 4.0" in Ukraine on its basis. The main priority areas of technological development are: the field of information and communication technologies; Engineering; aerospace; military industrial complex; complex engineering; creation of new materials; and the creation of technologies in the field of alternative energy. These sectors are important, their development will have a significant impact on the development of other areas and industries. An important task in the development of innovative technologies of scientific technological developments with the introduction of technologies is the formation and development of the domestic market of technological innovations, companies that create innovations, their offers on the market and companies, enterprises that are in demand for these implementations.

**Keywords:** innovation, industrial development, regulation and stimulation of innovative development, digital technologies.

**JEL Classification:** E22; G18; L59; O32

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**Introduction.** In the context of the development of a new digital economy, the socio-economic state of the countries of the world today depends on the state of technical technological development of their enterprises. In the twentieth century, the basis for the formation of the country's economic development was resources, in the twenty-first century such a basis is intellectual potential and technology. The modern economy is determined by the global transformation of existing and the formation of

industrial production and social systems of a new level of technical and technological development, based on the mass introduction of digital technologies and the Internet as the main technological basis for the creation and introduction of new technologies in industry. This is not only the introduction of new equipment or technologies by individual enterprises by innovators. Together with the prospects for rapid dynamic industrial development and digitalization of economic and social life, there will be a transition to a new level of development of economic and social systems. The processes of technological development taking place in the world actualize the need to restore and develop national production, national industry on the basis of modern digital technologies. Implementation of the best world experience, subject to the formation and implementation of a strategic state policy aimed at the development of industry, energy using the most revolutionary technologies will give Ukraine the opportunity to become one of the world's active manufacturers of both high-tech products in the production of equipment, instrument making, aircraft manufacturing, and in the production of chemical, metallurgical, food and light industries. The main resource and direction of development is to preserve the potential and ensure the creation and implementation of new developments and technologies created by domestic developers, scientists, specialists and stimulate demand for industrial innovation, developments created by domestic enterprises and products of domestic production.

**Literature Review.** The issues of innovation, innovative development, determination of current directions of regulation and stimulation of innovative development of industrial enterprises were studied in the works of many scientists.

Thus, Drucker P. [1, pp.170-173], considered innovation as a tool or a means of achieving significant competitive advantages under the conditions of systematic introduction of innovation, changes and improvement of goods and technologies. Skull A. [2, p.154] considered innovation as the final product or technological solution, the end result of innovation in the form of a finished product, technology or service.

According to the research of Chukhrai N. [3, p.12], innovations are the use of new ideas and their implementation in goods, services, processes, in the management systems of the organization.

According to the research of Chukhrai N. [3, p.12], innovations are the use of new ideas and their implementation in goods, services, processes, in the management systems of the organization. Peltek L. [4], evaluated innovative changes, the use of technology or technology in the processes of organization of production and management, which lead to changes in production.

Bazhal Yu. [5] drew attention to the change in production technologies, which is of outstanding historical importance and is necessary. Deineka L. [6] it is noted that innovative development is a complex process that includes the development, creation, implementation and commercialization, dissemination of a new technical or other solution aimed at meeting certain needs.

Kindzersky Y.[7] focused on the innovation potential as a component of the industrial potential of the enterprise. Geyets V. [8] investigated innovation and

innovation as a system that arose in the process of creating, implementing and implementing the results of scientific research.

Lapko O. [9], noted that innovations are aimed at improving technical, industrial, organizational and other relations in science, production, education and other areas of social activity. In the writings of Matyushchenko I. [10], the development and implementation of new innovative technologies in Ukraine in the context of a new digital industrial revolution was investigated.

**Aims.** The purpose of the article is to study the current directions of regulation and stimulation of innovative development of industrial enterprises.

The main objectives are to study the directions of state support for the introduction of new technologies and the renewal of production capacities of enterprises; systematization and classification of these areas, research of conditions and technologies that will ensure the technological and economic development of enterprises and ensure the development of a new digital economy in the country and active social and economic development.

**Methods.** In order to substantiate the actual directions of regulation and stimulation of innovative development of industrial enterprises, a logical, dialectical approach and methods of scientific knowledge were applied: observation, comparison, abstraction.

**Results.** The development of domestic industry, its technical, technological renewal should occur with the introduction of the most new technologies. Such development requires innovative support – the availability and possibility at enterprises to use new modern digital technologies and investment and financial support for the processes of their implementation. State regulation of the processes of investment support for innovative development requires today updating the legislative framework for investment support for innovative development of industry, and the formation of mechanisms and tools of state regulation that will stimulate the demand for innovations, their implementation by industrial enterprises.

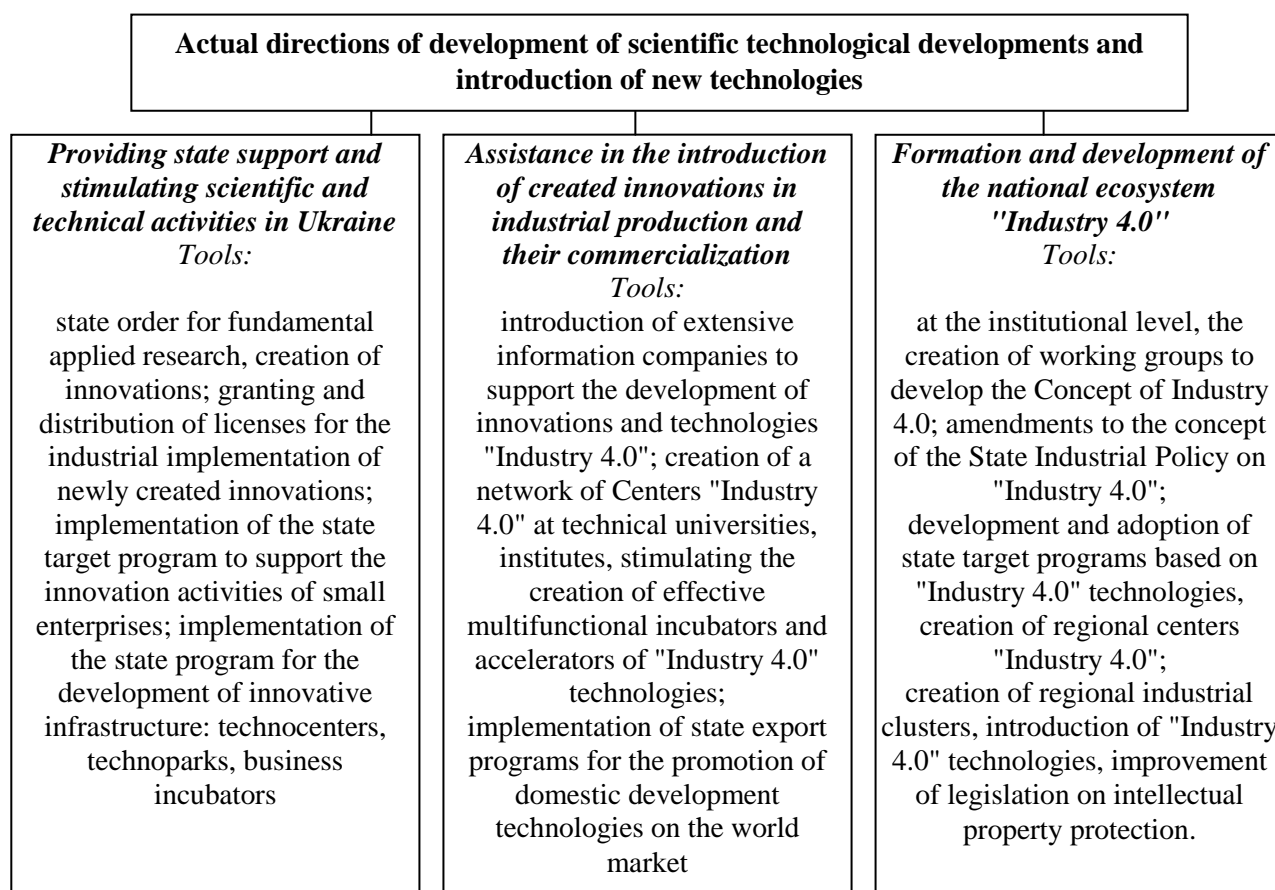
In Ukraine, there are more than 70 companies in 16 highly technological segments. Dynamic technological development and mass introduction of technologies in Ukraine is possible subject to the introduction of an updated industrial policy, in accordance with the vectors of development and innovative priorities. The country has the necessary resources for this. The most important resource is the intellectual resources of the country, the second necessary resource is the scientific base and developments of institutes, laboratories, design bureaus that carry out fundamental applied developments, the third is the existing new technologies created by domestic manufacturers that require their further implementation and commercialization, and the fourth is human resources – young specialists who study today studying modern information technologies and will be able to implement them. The country is provided with innovative resources only the question of their effective direction and use, because today they are little used.

For the development of investment resources, the country needs to create the necessary investment climate and state guarantee mechanisms that would activate, ensure participation in the investment process of domestic investors - society, the

population as the main financial participants in the process of development of the country's industry and the development of a new economic system. The investment resources that the state has are well-developed mechanisms of public private partnership that will ensure partnership and participation in the process of reviving the national economy of the state, business, society, and citizens of the country.

The first important direction in the development of scientific and technological developments is to provide state and public support for scientific technical activities in Ukraine with the introduction of fundamental, applied research and research, which will ensure the direct creation of a new level of scientific knowledge and innovation. A significant step in ensuring support for the development of scientific technical activities in Ukraine with the introduction of new technologies is the definition of strategic priority directions for scientific technological developments.

Actual directions of development of the sphere of scientific technological developments and introduction of new technologies are presented in Figure 1.



**Figure 1. Actual directions of development of scientific technological developments and introduction of new technologies**

*Sources: formed by the author*

The development of new technologies in the leading developed countries of the world is carried out within the framework of the implementation of state programs, while it is necessary and expedient to develop and implement a set of programs for the development of scientific research in the field of innovative technologies.

The state target program to support fundamental applied research is aimed at activating the conduct of fundamental, applied research and research works by scientific and scientific research institutions of the country of all forms of ownership in the direction of creating and developing new scientific knowledge, technologies, new methods, 3D printing technologies, development of cyberphysical systems, introduction of production technologies, biotechnologies, nanotechnologies, alternative energy technologies, robotics and other technologies. The implementation of this program and financial, resource support can be carried out through the placement of state orders for the development of innovations in each of the areas of scientific technical research.

The state target program to support the innovation activities of small and medium-sized businesses is aimed at developing the activities of small and medium-sized businesses in the field of creating and integrating new innovative technologies. Today, in the leading countries of the world, programs for attracting small and medium-sized businesses to innovative activities are effective.

The implementation of the state target program for the development of innovative infrastructure will ensure the development of innovation infrastructure in the country, the opening and development of technical centers, technoparks, business incubators, and other structures necessary for the functioning of the innovation sphere and the subsequent effective introduction of innovations. The introduction of Industry 4.0 technologies in industry requires the availability and installation of appropriate equipment at enterprises, the establishment of accounting with the preservation and transmission of data in digital format and the availability of appropriate network infrastructure. This level of necessary automation is present only in part of domestic enterprises.

Technologies of "artificial intelligence" require the formation of a new level of automation of production, so the question of ensuring the "digital leap" is being raised and actualized, which will make it possible to overcome the "digital gap" in development technologies and sell production at a new digital level. This requires a significant change in equipment and production processes with the introduction of new digital technologies and significant investment resources. Promoting the promotion of newly created innovations in industrial production is the next important direction of the state industrial policy, since a significant part of the development remains developments and has no practical implementation.

One of the most promising and expected according to experts is the introduction of digital platforms and predicative analytics technology and technologies for rapid integration of production using appropriate devices and controllers. For example, in Germany in 2018, more than 400 digital platforms of the industrial Internet were already functioning.

The second area requiring industrial implementation is virtual, augmented and mixed reality technologies used in product design, inventory management, personnel training and maintenance.

The third direction is the technology of creating a virtual copy of a real object, which is able to predict the stop of equipment and improve quality. One of the most



popular new technologies in the world has become the use of robotics, which has broad prospects for industrial use in flow-transport and harvesting production and in other operations.

With the introduction of the industrial Internet, the ability and need to implement artificial intelligence technologies used to increase production productivity with increased data processing volumes will increase.

Technology is actively used and implemented, which makes it possible to optimize supply chains and production processes. One of the main obstacles to the industrial introduction of new technologies in Ukraine is the lack of awareness of domestic business about these technologies and the possibility and prospects for implementation. In the industrial introduction of innovative technologies, the presence and effective functioning of integrator companies that introduce new technologies developed by institutes, research organizations and technologies developed by leading international companies is important.

These companies integrate technological innovation into the production process of the enterprise using devices, software. Ecosystem development with the introduction of industrial high-tech technologies consists of several categories of participants: directly organizations of technology developers, developers of devices and devices; companies of system integrators of information technologies; integrators of automated control systems; manufacturers of new machinery, equipment; technological and engineering companies; end customers of industrial enterprises. Today, several powerful companies are market innovators in terms of demand formation, but the real functioning of the market with the involvement of a wide range of participants requires the formation of demand among a wide mass of domestic industrialists and entrepreneurs. To form such a market, it is necessary to inform specialists, the public and disseminate information about the benefits of introducing innovative technologies in the work of companies; state stimulation of introduction of new technologies and modernization of domestic enterprises; availability and access for domestic business and the scientific sphere to the financial investment resources necessary for the implementation of investment innovative projects and programs. The need to inform and advise business, industry, society and disseminate information on innovative technologies activates the creation of a network of Centers for Education and Promotion of Innovations at technical universities, institutes. Several such centers have already been established and are functioning in Ukraine. It is necessary to create a network of centers whose activities will be interrelated and aimed at achieving common goals.

Information educational and educational work of these centers will contribute to the introduction of new ideas, and will ensure the dissemination of innovative technologies by domestic developers. It will provide information on suppliers of new technologies – global companies and will provide familiarization with new projects and ideas that require investment. Such centers can ensure the maximum dissemination of ideas in the educational, scientific sphere, educational and scientific institutions, in the market environment of industrialists and entrepreneurs in the region.

This will make it possible to take the first steps in the creation and functioning of future regional innovative industrial clusters. The task of the centers should be to popularize ideas among young people, students and acquire the necessary knowledge, information, experience in creating and implementing modern technologies. The next step in supporting scientific technical activities is the creation of effective multifunctional incubators and accelerators of innovative technologies that will ensure the development and promotion of domestic projects with the involvement of domestic and international investors, international organizations. The creation and operation of incubators and accelerators of industrial high-tech technologies will make it possible to promote revolutionary projects more widely and develop domestic companies in the field of industrial technologies. An important direction is the implementation of export programs to promote the export of domestic technologies, developments on the world market. The export potential of domestic innovative developments, the entry of manufacturers and developers into foreign economic markets and the export of technologies is one of the leading important strategic tasks.

Innovative development in Ukraine has its own characteristics from other countries of the world, its uniqueness and provides the country with opportunities for significant technological development. Ukraine has the potential to focus on innovations in services, the creation and implementation of complex unique technologies that improve, change services and production processes.

**Discussions.** The development of scientific technical developments and the introduction of technologies of "Industry 4.0" requires the formation and development of the national ecosystem of "Industry 4.0" the priority on the way of its creation is to conduct a full independent audit of the state of the main elements of the existing system of scientific and technological sphere. This will make it possible to determine the existing positions, developments and personnel and technological potential, to identify potential participants who will enter the new established ecosystem of industrial high-tech technologies. The next step is to establish technology transfer from domestic developers to their end customers both in the development of domestic industry and in the direction of export of high-tech technologies.

It is necessary to audit the existing infrastructure, determine its place in the new architecture of the Ecosystem "Industry 4.0" and form new elements that are currently missing. Thus, it is critically necessary to open Centers for expertise, laboratories, incubators and accelerators of Industry 4.0. The next necessary step is to create conditions for the development of investment activity and attract investments that will provide financing for the future ecosystem.

An integral part of the ecosystem of "Industry 4.0" is the provision of training of strategic specialists for the ecosystem of engineers and technologists. A significant increase in the volume of training of these specialists in four, five years will make it possible to activate the work of the entire system and stimulate its transition to a new, more active level of development. It is important to improve the skills of specialists working in the industrial sphere, to obtain new necessary knowledge.

An important integral element that can significantly strengthen the newly created ecosystem and contribute to the financial and staffing and activation of the transition to a new level of development is the activities of informal institutions, public organizations, associations in the field of national economy development and interaction of state and non-state institutions, on the formation and dissemination of the Movement "Industry 4.0"; and building the digital economy and digital society. Formation of the national ecosystem "Industry 4.0". requires the adoption of an institutional regulatory legal framework and the development of institutions that will plan, organize, control and ensure the formation of a new ecosystem.

The creation and implementation of an ecosystem will require a number of planned actions. In the institutional spectrum, it is necessary to initiate the creation of working groups, to develop and adopt the Concept and Strategy of Industry 4.0, as well as to amend the concept of state industrial policy regarding Industry 4.0. It is necessary to develop and adopt state target programs for the development of industry on the basis of "Industry 4.0" technologies. The next step should be the creation and organization of the work of regional centers of industry 4.0 cells and the initiation of the creation and development of regional innovative industrial clusters that at the regional level will be able to interact with the parties in the industrial implementation of Industry 4.0 technologies.

**Conclusion.** Summarizing the research, we note that the current directions of regulation and stimulation of innovative development of industrial enterprises consist of three main components: providing state support and stimulating scientific technical activity; assistance in promoting newly created innovations in industrial production; formation and development of the ecosystem of "Industry 4.0" in Ukraine.

Systematic implementation of measures and tools of state regulation in these areas will make it possible to raise innovation activities in the country to a new level of high-tech digital development, ensure the integration and industrial implementation of newly created innovations, strengthen the relationship between science, education and industrial production and, on its basis, begin the development of the national ecosystem of "Industry 4.0" in Ukraine.

The creation of a new innovation ecosystem in the country is carried out with the creation of chains of interconnection and interaction of all elements of the system, the introduction of "Industry 4.0" in Ukraine and the establishment of their interaction. The development of an innovation ecosystem involves changes in the field of education, with the formation of new skills and knowledge; changes in the management of the processes of introduction of information technologies, innovation management; introduction of information technological network infrastructure, data storage, technical equipment of workplaces, basic and special software; development of infrastructure of industrial high-tech technologies; promotion, presentation, presentation of the accumulated results of innovation. An important task in the development of innovative technologies of scientific technological developments with the introduction of technologies is the formation and development of the domestic market of technological innovations, companies that create innovations and companies in demand for these implementations.

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# COMPETITIVENESS ANALYSIS OF INDUSTRIAL ENTERPRISES OF UKRAINE IN THE SECURITY SYSTEM

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**Abstract.** The relevance of the study is accompanied by the issue of the development of the industrial sector is also a relevant and topical issue both in a conceptual and practical sense. The issue of organizing a competitive industrial management policy, both theoretically and at the level of practical implementation, is a topical issue in all countries of the world. Given the existence of the global crisis, the industrial sector also experienced significant negative consequences, which forced the leading countries of the world to look for ways to overcome these crisis phenomena. Today, Ukrainian industrial enterprises are faced with significant internal and external pressure, which could not but affect their efficiency and competitiveness. The most critical problem faced by Ukrainian enterprises is, of course, the impact of active hostilities throughout Ukraine. The purpose of the article is to analyze the state of competition in the industry market. The main object of research is industrial enterprises and their economic and financial activities, as one of the key factors of competitiveness. To analyze the activities of industrial enterprises in Ukraine in the context of studying their competitiveness, the following methods were applied: induction and deduction, comparison and systematization - when characterizing the activities of industrial enterprises in Ukraine; synthesis and analysis - to determine the content of the main aspects of the activities of industrial enterprises in Ukraine; morphological analysis - to clarify the essence of the modern understanding of the competitiveness of industrial enterprises in Ukraine; abstract-logical - for theoretical generalizations and conclusions of the study. Based on the results of the study, key aspects of the financial and economic activities of industrial enterprises in Ukraine were analyzed.

**Keywords:** industry, management policy, industrial enterprises, economic security.

**JEL Classification:** D41, L60

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**Introduction.** When we speak in the thesis about economic security, market competition, and complex socio-economic systems, all of this is very relevant for the industrial sector. The industrial sector in the world today is considered the technically most advanced sector of the economy and, as the basis of industrialization, occupies a leading position in ensuring the economic security of the state. Here we have power generation, engineering, fuel, processing, etc. Thus, it is impossible not to talk about the importance of competitive advantages. Without them, an industrial enterprise cannot survive.

**Literature review.** Analyzing the scientific and practical literature, one should generalize the opinion of scientists [1-3] that the competitiveness of an enterprise is one of the most important categories of a market economy. It characterizes the possibility and efficiency of adaptation of the enterprise to the conditions of a competitive environment. In the market system of management, competitiveness as an economic category is the key one, reflecting the economic, scientific, technical, production, organizational, managerial, marketing, and other capabilities of the enterprise.

Most scientists [4-6] note that the main ways to increase the competitiveness of an enterprise are to search for competitive advantages and key success factors and formulate a specific market (competitive) strategy aimed at increasing competitiveness in given conditions.

We agree with the opinion of individual scientists [7-9], however, that the effective development and implementation of innovations create unique competitive advantages for an enterprise and helps to increase its competitiveness. At the present stage of economic development, the main sign of the competitiveness of an enterprise is its innovative orientation, that is, the ability of an enterprise as a system for continuous innovative development, renewal, and improvement of activities based on the introduction of innovations.

Considering the scientific achievement of the leading scientists of the world, it should be noted that today the problems of competition in the Ukrainian industrial market in the post-COVID environment are still relevant.

**Aims.** The purpose of the article is to analyze the state of competition in the industry market. The main object of research is industrial enterprises and their economic and financial activities, as one of the key factors of competitiveness.

**Methods.** To analyze the activities of industrial enterprises in Ukraine in the context of studying their competitiveness, the following methods were applied: induction and deduction, comparison and systematization - when characterizing the activities of industrial enterprises in Ukraine; synthesis and analysis - to determine the content of the main aspects of the activities of industrial enterprises in Ukraine; morphological analysis - to clarify the essence of the modern understanding of the competitiveness of industrial enterprises in Ukraine; abstract-logical - for theoretical generalizations and conclusions of the study.

**Results.** If we consider the features of the activity of industrial enterprises in the United States, it should be noted that government policy is aimed more at maintaining the technological superiority of production compared to others at the international level. Thus, the US government sends significant financial subsidies and tax breaks to industrial enterprises that allocate significant amounts of their own financial, human, and other types of resources to maintain their own technological superiority, innovation, and research work. Thus, one of the forms of such incentives is the official permission of the state to withdraw funds and assets of industrial enterprises to countries with cheap labor in order to improve the competitiveness of an industrial enterprise. At the same time, an important condition is that production facilities that are considered high-tech must remain in the United States in order to maintain the status of an innovation center and ensure a certain level of dependence on international partners.

In the last two decades in the United States in the field of industrial enterprise management, trends in the implementation of cluster policy have intensified. Thus, the US government is forming a powerful sphere of support for innovative enterprises in the context of the territorial formation of innovative infrastructure, venture funds, centers, and advisory organizations, which form grant programs for industrial

companies that have a significant share of innovation in their structure and focus on the development of high-tech goods.

Thus, if we consider the experience of the United States in the field of managing the activities and competitiveness of industry, it should be noted that, unlike Germany, where the policy of the state apparatus is more aimed at ensuring the functioning of a free market environment and non-intervention, the United States is characterized by a significant level of intervention in activities of industrial enterprises, while stimulating the production of unique goods and services for the rapid capture of sales markets and the formation of a stable dependence of the American manufacturer.

The issue of ensuring competitiveness as the main factor in ensuring the optimal and sustainable functioning of industrial enterprises is also relevant for France.

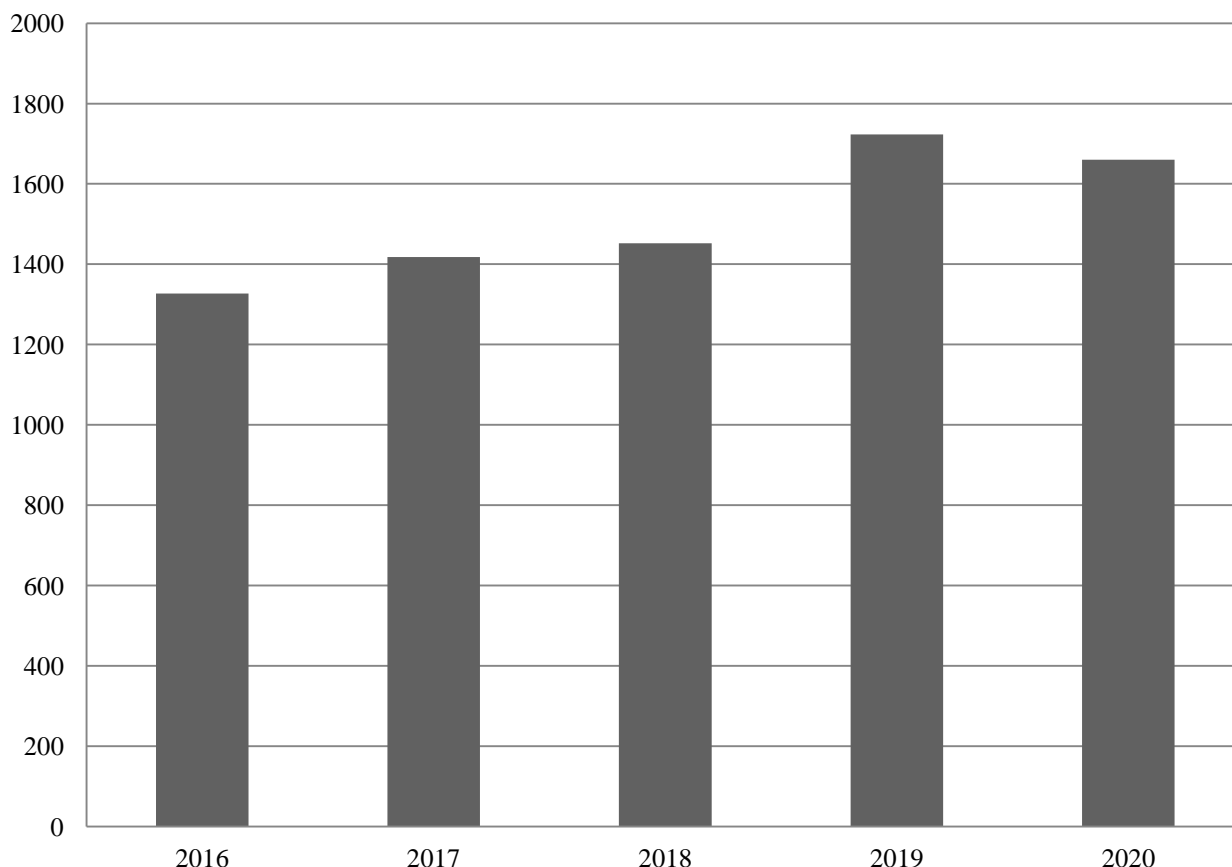
Since the beginning of the 1940s, upon the adoption of relevant legal acts on the creation of a decentralization policy of the central state regulator concerning industrial enterprises, the issue of providing equal opportunities for the functioning and ensuring the competitiveness of industrial enterprises throughout France has become particularly acute. Such a sharp change in the policy of the central regulator was because with the manifestations of industrial revolutions, the vast majority of the workforce, and, accordingly, industrial enterprises were concentrated in large cities. The results of this policy manifested themselves quite quickly, creating more or less equal conditions for geographically equal space for the functioning of industrial enterprises in the context of competitiveness.

In general, the European industrial market is one of the most powerful in the world and is constantly developing every year. The leaders of European industrial enterprises have already clearly understood the importance of safety during operations, and have realized the fact that without safety mechanisms it is impossible to achieve a high level of competitiveness. Ukraine, as the center of Europe and a country that has chosen the European course, also does not lag behind them and seeks to introduce socio-economic activities as safely as possible and form the so-called “healthy” competition in the industrial market.

We will conduct a detailed analysis of the state of the industrial sector of Ukraine over the past five years. Of course, at the time of this writing, we have a very difficult situation in Ukraine caused by military actions.

Today, Ukrainian industrial enterprises suffer from a frivolous attitude to their own system of economic security and simply cannot effectively use security mechanisms to increase the level of competitiveness.

If we talk about the state of active, operating industrial enterprises in Ukraine, then the market is not very saturated, but there is a positive growth trend compared to 2016. This has a positive effect on the development of competition in the market, but this is still not enough, and we can talk about low market saturation (Fig. 1).



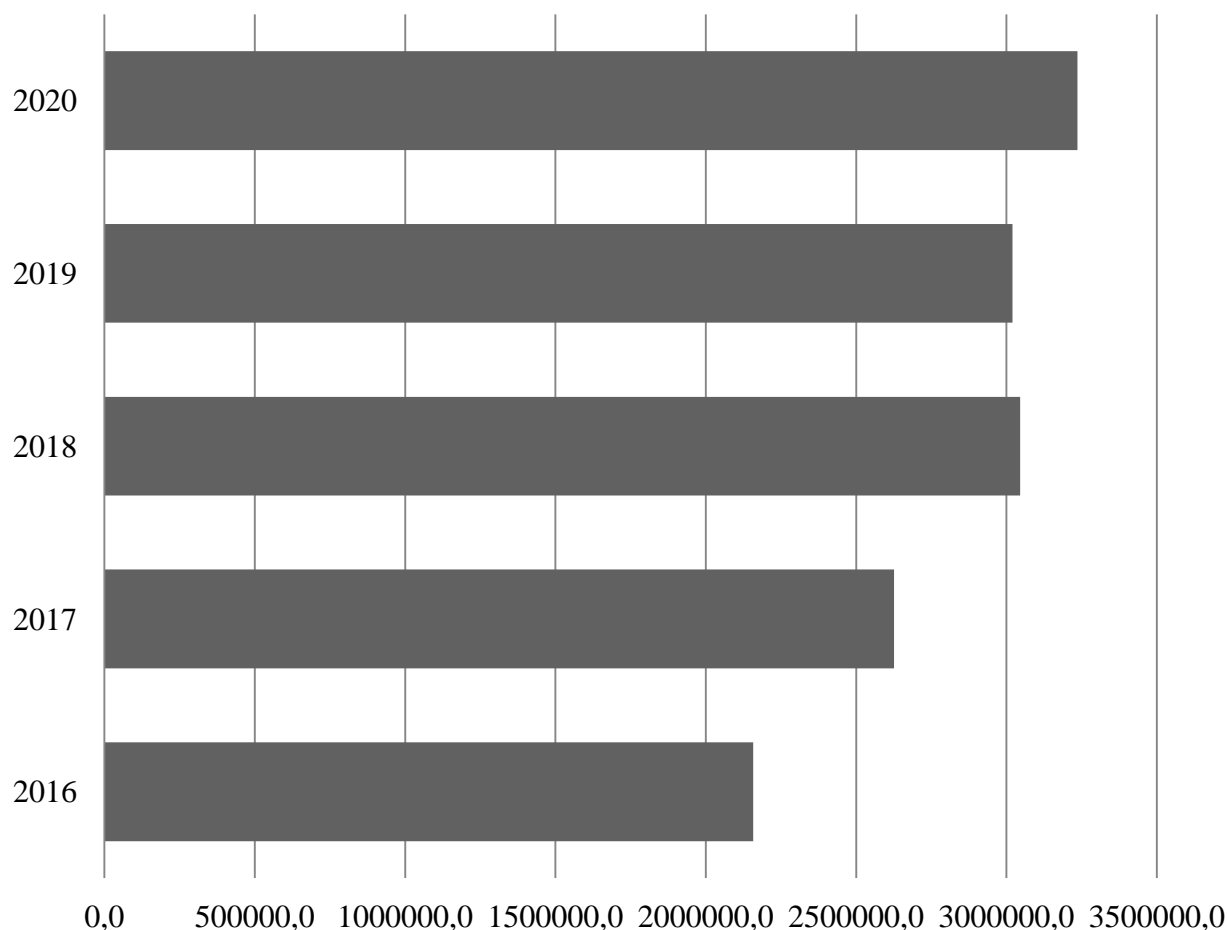
**Figure 1. The total number of operating industrial enterprises on the territory of Ukraine for 2016-2020, units**

*Sources: formed by the author based on [10]*

Starting in 2020, the global crisis phenomena began to significantly affect the economies and security of many countries. Ukraine occupies a special place in this since our economy and security rarely complain about the already very long-standing, by temporary standards, the global crisis of 2008. We have enough problems without it. Take into account at least the situation with military actions in the East in 2014 (and as of now the full-scale invasion of the Russian Federation). In addition, we are adding the global impact of COVID-19, which has forced the establishment of several rules and requirements within the framework of security that could not be ignored. Thus, the competition in the market also changed. All this is very sensitive for the industrial sector of the Ukrainian economy. Analyzing the dynamics of the volumes of industrial products sold, we see positive growth dynamics in Fig. 2, however, such an increase can be explained by inflationary processes, which will affect the volumes in UAH equivalent.

Investment plays an important role in the development of digitalization and competitive advantages. Today, the dynamics of capital investment in the industrial sector show good results as of the end of 2019, but by the end of 2020, such volumes decreased. This indicates a decrease in the activity of investing in assets and other investments. We can talk about the low investment attractiveness of this sector (Fig. 3).



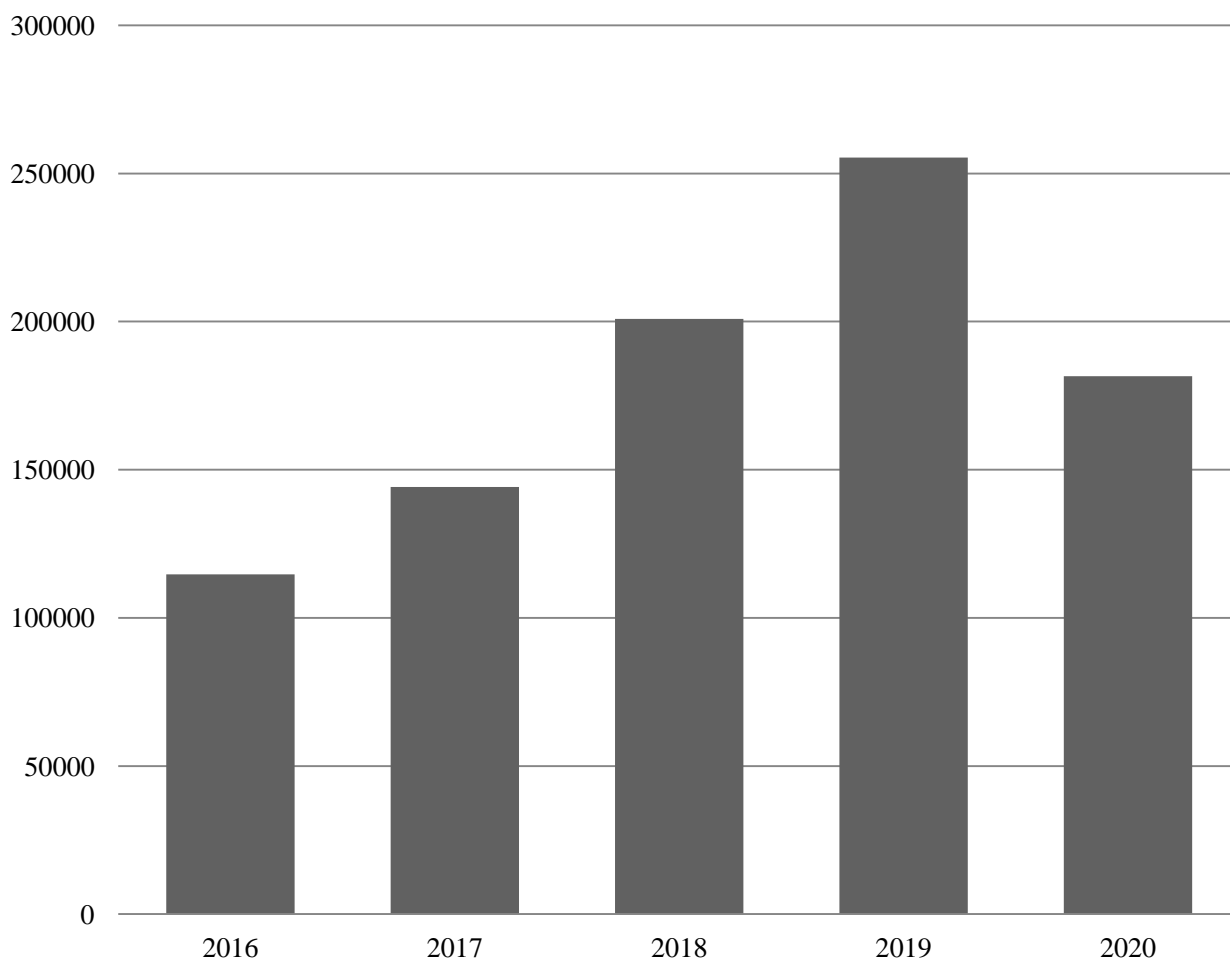


**Figure 2. Dynamics of the volume of sales of industrial products by Ukrainian enterprises in 2016–2020, UAH million**

*Sources: formed by the author based on [10]*

If we are talking about profitability, then there are a number of problems that arise as a result of the pandemic, inefficient financial management, and the lack of state support for industrial enterprises in Ukraine. As a result, a number of problems have formed the so-called "microcracks" in the industrial sector of the economy and now we have an increase in unprofitability (Fig. 4).

In general, the problem of the unprofitability of industrial enterprises in Ukraine is not new and is constantly becoming the scientific focus of many studies. There are enough solutions offered, but not all of them can be effective in practice or are not needed in the new conditions of development. Recent years have been very fast-paced, and therefore some of the solutions to this problem did not take into account new developments. For example, if we are talking about events before 2019, then no one could think of a pandemic and ways to ensure physical security on a massive scale for enterprises. Today, any manifestation of unprofitability directly or indirectly points to security problems and ineffective application of security mechanisms. A separate issue is a fact that low profitability and negative financial results in no way contribute to a high level of competitiveness.



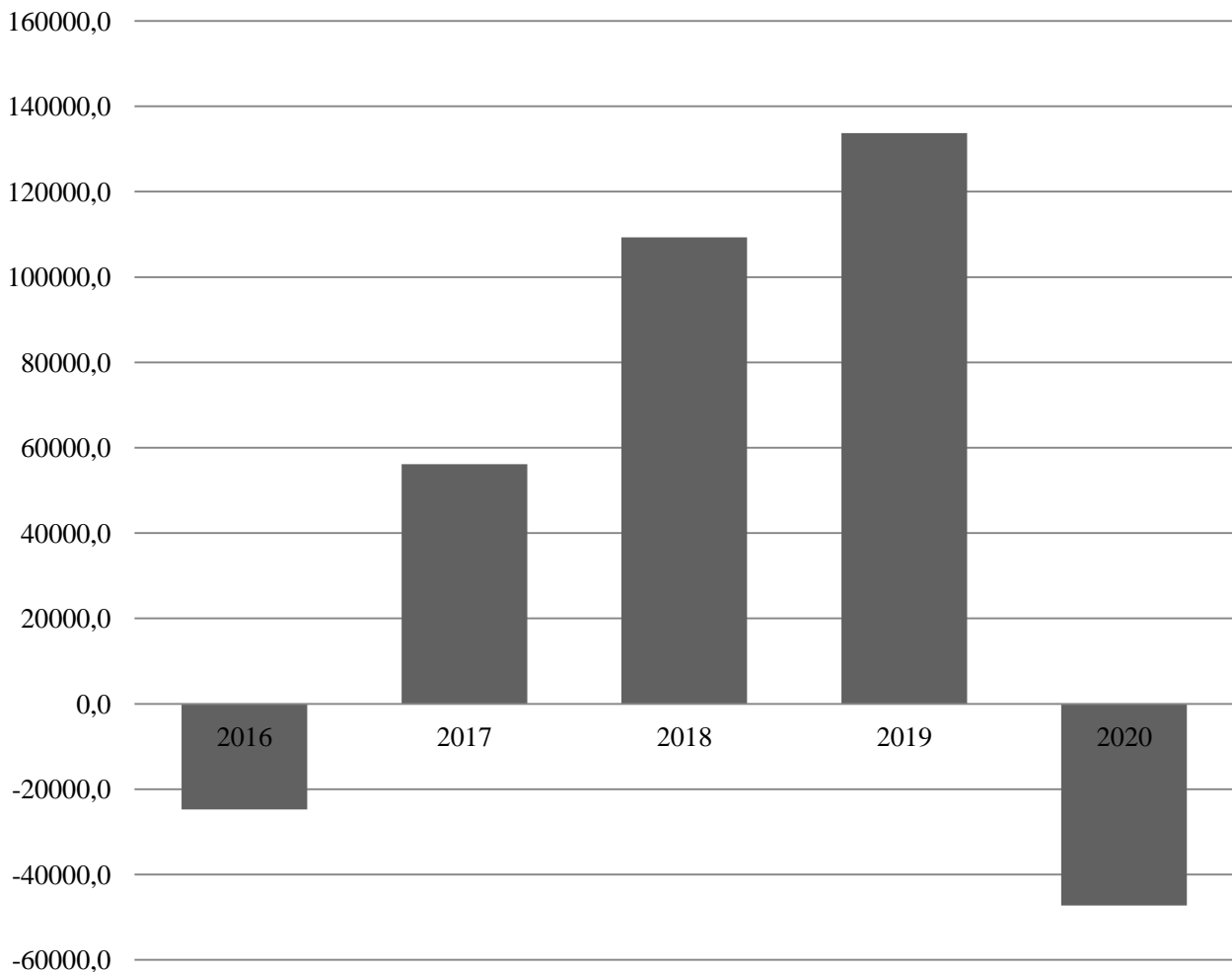
**Figure 3. Dynamics of the volume of capital investments in the industrial sector of Ukraine for 2016-2020, UAH million**

*Sources: formed by the author based on [10]*

Of course, when it comes to competitiveness, innovation activity plays an important role. Innovation creates powerful competitive advantages that allow you to occupy a high place in the market. In Ukraine, the innovative activity of industrial enterprises is low due to the lack of state support. On average, we can only talk about every 10 innovatively active companies.

Thus, based on the results of the study, we can say that there are a number of problems in the industrial sector of the economy of Ukraine and it is difficult to assert an effective security policy for domestic industrial enterprises and the correct application of security mechanisms by them for protection and effective development.

**Discussions.** Discussing the results of the study, it should be noted that today there are a number of problems associated with assessing one's own level of competitiveness in an enterprise. For the industrial sector, this is doubly important because of the sensitivity of this type of economic activity to safety aspects. The system of economic security of industrial enterprises, today, is the most sensitive to the external and internal environment. It is possible to introduce security and implement security mechanisms only with an effective response to new challenges, risks, and threats to the operating environment.



**Figure 4. Dynamics of the volume of net profit (loss) of industrial enterprises of Ukraine for 2016-2020, UAH million**

*Sources: formed by the author based on [10]*

**Conclusions.** In modern conditions of globalization and integration of entrepreneurial activity into the international market space, the most universal and at the same time critical criterion for the optimal functioning and development of an enterprise is its competitiveness. An analysis of the state of activity of industrial enterprises was carried out. The features of the competitive environment of the industrial sector in the world and Ukraine are considered. The key parameters of the environment for the functioning of industrial enterprises in Ukraine are analyzed. The main performance indicators and problems are considered.

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# INDUSTRY 4.0 DEVELOPMENT ANALYSIS IN UKRAINE: TRENDS AND ISSUES

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**Abstract.** The relevance of the study is due to the constant development of technology, which ultimately led to a new industrial revolution. Everything starts and ends with the industrial sector. It is the heart of any economy. You can talk all you want about how important each sector of the economy is, but none of them will work without industry. The fourth industrial revolution (Industry 4.0) is the transition to fully automated digital creation, controlled by intelligent systems in real-time in constant interaction with the external environment, going beyond one company, with the prospect of joining a global industrial network of things and services. Industry 4.0 characterizes the current trend in the development of automation and data exchange, which includes cyber-physical systems, the Internet of Things, and cloud computing. It represents a new level of organization of production and management of the value chain throughout the entire life cycle of manufactured products. The purpose of the article is an in-depth analysis of the state of development of industry 4.0 in Ukraine. The object of the study will be the industrial sector of Ukraine, which plays a key role in the development of Industry 4.0. To determine the features of the development of Industry 4.0, the following methods were applied: induction and deduction, comparison and systematization - when characterizing the development of Industry 4.0; synthesis and analysis - to determine the content of the essence of Industry 4.0; morphological analysis - to clarify the essence of the state of development of Industry 4.0; abstract-logical - for theoretical generalizations and conclusions of the study. As a result of the study, key aspects of the development of Industry 4.0 in Ukraine were analyzed. The main trends of its development are defined.

**Keywords:** industry, development, industrial revolution, analysis, trends

**JEL Classification:** L16, L60

**Formulas:** 0; **fig.:** 2; **tabl.:** 0; **bibl.:** 11

**Introduction.** The pace of modern life compared to the life of previous years has become incredibly high. Constant changes no longer seem to be something unusual, but have become the norm of the modern environment. Everything now has to adapt to the huge number of innovations that occur almost constantly. But at certain moments there are especially many changes and the name of such a phenomenon is the industrial revolution. The prospects for future changes certainly seem bright for Ukraine. However, the fourth industrial revolution may face some difficulties that may significantly affect its global spread in Ukraine. Thus, the problems of transition to "Industry 4.0" are lack of a serious energy base; lack of sufficient material base; lack of appropriate transport infrastructure; cultural barriers, i.e. fear of the new; security issue; a surge in unemployment.

**Literature review.** Analyzing and summarizing the scientific and practical literature, it should be noted that most scientists [1-3] argue that any revolution is the result when the old cause-and-effect relationships can no longer work following the previous algorithm. The fourth industrial revolution or industry 4.0 is no exception.

A group of scientists [4-6] notes that the efficient and well-coordinated functioning of the industrial sector leads to an improvement in the results of social labor, and creates new jobs and new sources of profit, which, in turn, is a powerful

factor in the fight against poverty and the solution of a large number of social problems such as gender inequality, employment of the younger generation and the generation of pre-retirement age.

Some scientists [7-9] note that Industry 4.0 provides for the formation of specific, innovative intellectual installations that will be endowed with consciousness, implement the processes of forecasting and interaction, as well as independently perform the processes of self-improvement and changing their own functional elements in accordance with the current state of production.

In general, given the scientific achievement of most scientists, today we are in a state where Industry 4.0 has reached Ukraine. This requires new research.

**Purposes.** The purpose of the article is an in-depth analysis of the state of development of industry 4.0 in Ukraine. The object of the study will be the industrial sector of Ukraine, which plays a key role in the development of Industry 4.0.

**Methods.** To determine the features of the development of Industry 4.0, the following methods were applied: induction and deduction, comparison and systematization - when characterizing the development of Industry 4.0; synthesis and analysis - to determine the content of the essence of Industry 4.0; morphological analysis - to clarify the essence of the state of development of Industry 4.0; abstract-logical - for theoretical generalizations and conclusions of the study.

**Results.** Almost all countries of the world have already realized the fact that sooner or later their industry will switch or have switched to the conditions for the functioning of Industry 4.0 with all its advantages and disadvantages. Already in 2011, at the Hannover Fair, most of the participants declared the particular importance of forming a clear plan for the transformation and adaptation of the existing production system following the modern trends dictated by Industry 4.0. It is clear that, compared to 2011, today the influence of Industry 4.0 has increased so much that not a single modern country with a market economy can ignore this fact and has already proven mechanisms in its arsenal that have enabled national industrial systems not only to survive in new conditions but also adapted them to a qualitatively new state with a constant trend towards improvement and development.

Back in 2013, at the aforementioned Hannover Exhibition, the creation of one of the largest projects in cooperation between the government and scientists "Platform Industry 4.0" was announced. Accordingly, this platform in Germany launched a large-scale program to support entrepreneurship, innovation-active industries and standardization. It should be noted that the main goal of the "Industry 4.0 Platform" was not the formation of new business and industry management mechanisms in the conditions of Industry 4.0, but the creation of a comprehensive policy of stimulation, support in the form of recommendations and providing greater freedom for entrepreneurship, which subsequently became a powerful factor in the development of the Industry. 4.0 in Germany.

Analyzing the German experience in adapting to the conditions of Industry 4.0, it should also be noted that within the framework of the new operating conditions, the RAMI 4.0 architecture (Reference Architectural Model for Industry 4.0 - Reference architectural model for industry 4.0) was created. By itself, RAMI 4.0 can be

imagined as a three-dimensional map, which at the structural and algorithmic level demonstrates to everyone how one way or another it is possible to solve the problems that arise in the process of transformation and adaptation of local parts of the industry of an enterprise or government structures to the conditions of Industry 4.0. Another important goal of creating RAMI 4.0 is the formation of static standards in the process of understanding the main paradigm for implementing all the features of Industry 4.0.

The example of Germany quickly began to spread to all developed countries of Europe and today most of the industry of European countries with developed economies has created powerful mechanisms for adapting to the conditions of Industry 4.0.

The beginning of adaptation of the US industry to the realities of Industry 4.0 began in 2014. As in Germany, for such a complex and complex process, it was decided to create a special Industrial Internet Consortium (IIC, Industrial Internet Consortium), in which leading positions were taken by the largest US corporations. Thus, in the beginning, when Industry 4.0 was not yet so prominent, the US government did not take such trends seriously. The goal of the Industrial Internet Consortium was to gradually and most rationally unite enterprises and technologies that are critical for the creation, accumulation, and further internal dissemination of innovations and advanced ideas.

If we consider the experience of Asian countries in adapting to the conditions of Industry 4.0, then it should be noted that the main defining step that Industry 4.0 launched is that all developed Asian countries realized the importance of forming extensive and more open cooperation with European countries and the USA. Considering that most Asian countries have a type of government that simply does not allow the full development of Industry 4.0, its most obvious manifestation is that in these countries there has been an increased digitalization of existing products, while in Western countries Europe, and the US has been focusing on the production of new, innovative types of goods and services.

Thus, the key features of the manifestation of Industry 4.0 in Asian countries include the following trends:

1. In these countries, one of the most formalized and standardized concepts of Industry 4.0 has been formed today.

2. Compared to other developed countries in the world (for example, Europe and the USA), Asian countries have the most advanced technologies and algorithms for the Internet of things.

Ukraine is suffering from military aggression from the Russian Federation, but the world does not stand still, and today Industry 4.0 is actively being introduced into the activities of many countries of the world. Industry 4.0 has a huge impact on all areas of activity. The technologies that Industry 4.0 brings are enough to have a significant impact on the current system of economic activity in the world.

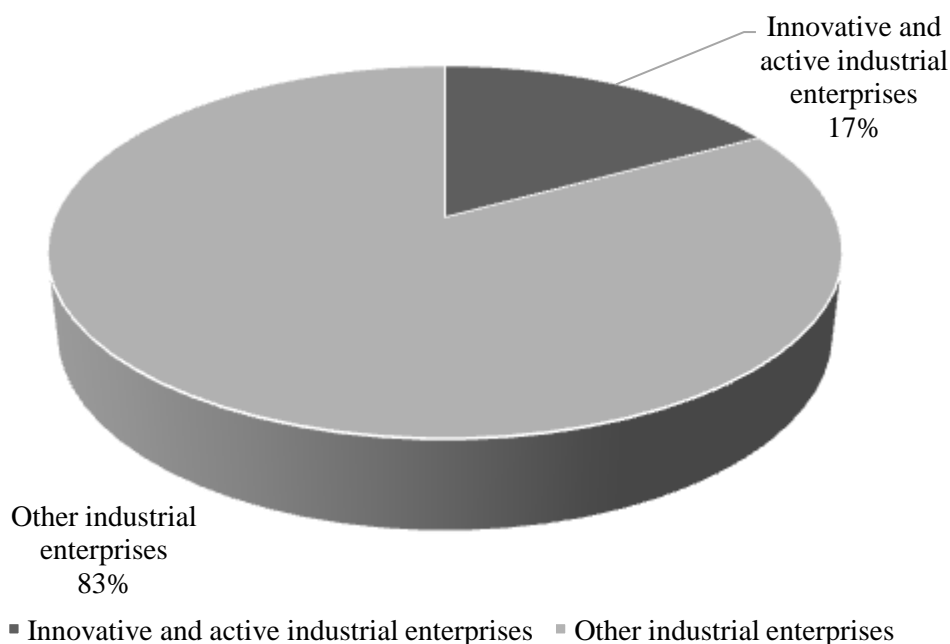
Industry 4.0 describes the organization of production processes based on technologies and devices that autonomously interact with each other along the value chain: a model of the "smart" factory of the future, in which computer-controlled

systems control physical processes, create a virtual copy of the physical world and make decentralized decisions based on mechanisms self-organization. The concept takes into account the growing digitalization of manufacturing industries, where physical objects are easily integrated into the information network, which allows decentralized production and adapt in real-time in the future.

Today, the world is in a special situation where Industry 4.0 has an extremely uncertain impact on the global economy. Discussions are still ongoing about how much Industry 4.0 will change the industrial sector and the regions of entire countries.

Speaking of Ukraine, today we can state its two estates: the first, before the war, when our economy was gradually but effectively developing; and the military, when the entire economy stopped and began to work for military purposes. Today it is difficult to analyze the second state of Ukraine, it takes time when after the end of the war it will be possible to carefully analyze what prospects are possible in our country regarding the new Industry 4.0. That is why our study will be dominated by the analysis of the economic security of the state and Industry 4.0 before the start of the war in Ukraine (it should also be taken into account that after the start of the full-scale invasion of the Russian Federation, a large number of sectors of our economy change the pace of the world and even the type of activity that does not allow, today, analyze it carefully).

Attention should be paid to the fact that in Ukraine there is a very low number of innovatively active enterprises in the total share. This suggests that the industrial sector of Ukraine itself is not interested in innovations, which, in turn, are the main ones for a smooth and direct transition to Industry 4.0 (Fig. 1).

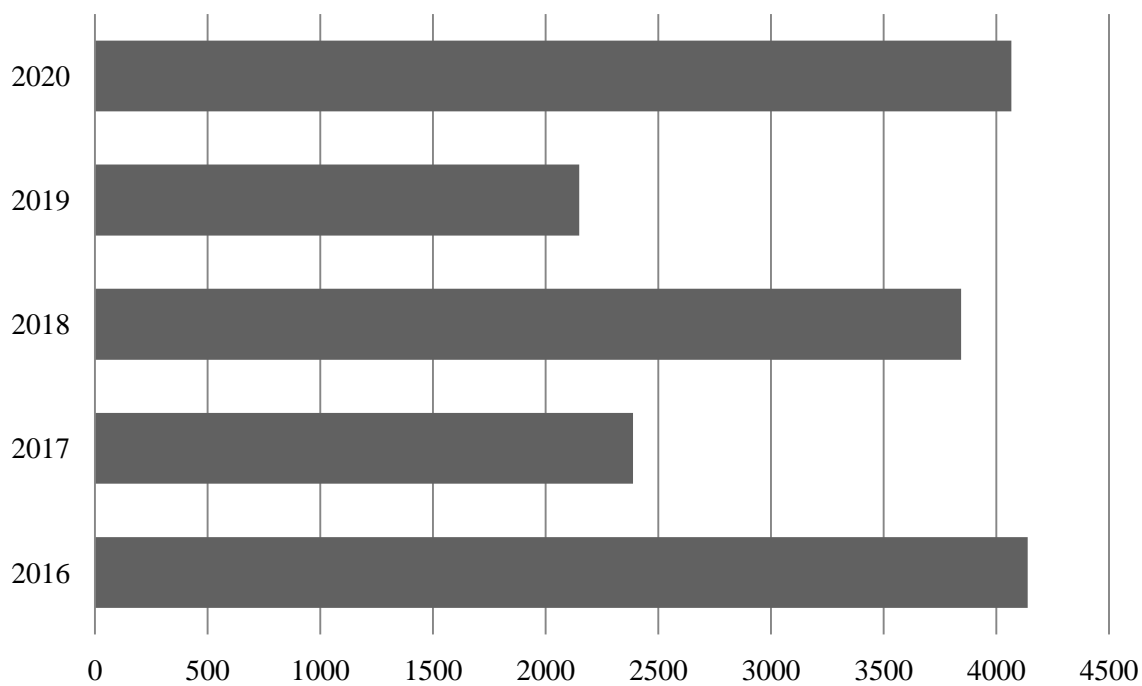


**Figure 1. The main share of innovatively active enterprises in the total volume of the industrial sector of the economy of Ukraine in 2020, %**

*Sources: formed by the author based on [10]*



As for the number of introduced innovations, there are a number of problems with them, since the introduction of innovations in products or in technological processes is a very costly idea that may not bring the desired socio-economic effect. In recent years, the number of innovations introduced into products or technological processes has been constantly changing and we cannot talk about any stable dynamics (Fig. 2).



**Figure 2. Dynamics of the number of implemented innovations in products or in technological processes of the industrial sector of Ukraine for 2016-2020, units**

*Sources: formed by the author based on [10]*

In general, when analyzing the industrial sector of the Ukrainian economy, one can see low rates of innovation activity. Such a negative trend in innovation can be seen in other sectors of the Ukrainian economy. For example, even advertising activity, which is practically built as a mandatory application of innovations, has a very low share of innovatively active companies.

It should be noted that in modern conditions of development, Industry 4.0 is a new form of manifestation of technologies. Already in the previous subsections, we noted that Industry 4.0 is not exclusively an industrial sector. This is an event covering all socio-economic systems of the country. It is in this context that we can say that each of the components of Ukraine's economic security will experience this impact, but how ready each of them is for it, this question is different and very important.

**Discussions.** Discussing the results of the study, it should be noted that today it can be argued that Industry 4.0 is not a myth or a distant future, it is here and now. Today, due to the war, Ukraine cannot afford to actively develop innovations and ensure innovation security, however, the world does not stand still and is already demonstrating what Industry 4.0 is capable of, how it will change the industrial sector and the global economy as a whole. An important step in further research should be

the analysis of the economic security of the state, without which it is impossible to achieve the effective development of Industry 4.0.

**Conclusions.** The importance of analyzing the state of development of Industry 4.0 in the world is proved. The state of development of Industry 4.0 in the leading countries of the world is analyzed. The main levels of influence of Industry 4.0 on the global industry market have been established. The main indicators of the development of the industrial sector of the economy of Ukraine as one of the main elements of the formation of Industry 4.0 are analyzed. A number of problems with innovations and technological development in the industrial sector of the Ukrainian economy have been identified.

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# FORMATION OF AN INCLUSIVE MODEL OF DEVELOPMENT OF BUSINESS STRUCTURES OF AGRIBUSINESS: THEORY, METHODOLOGY, PRACTICE

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**Abstract.** This article contains a description of the theoretical and methodological principles and scientific and practical recommendations for the formation of an inclusive model of the development of entrepreneurial structures of agribusiness. The theoretical basis of this process is the principles and rules of managing the inclusive development of agribusiness entities, which take into account the advantages of using the main consumer properties of goods (economy, quality, creative differentiation) in combination with a certain structure of production activity (economic, qualitative, differential structure), development employee and compliance with the requirements of socio-ecological and economic standards. The methodological basis of the formation of an inclusive development model is a method based on the use of an index of inclusive development of entrepreneurial structures of agribusiness with the following components: an index of sustainability of inclusive development (long-term perspective); indicator of the state of inclusive development (short-term period). A scientific and practical recommendation is a management mechanism for the formation of an inclusive model for the development of entrepreneurial structures of agribusiness, which coordinates the action of interrelated methods, each of which corresponds to the general strategy (cost savings, high quality, creative differentiation), socio-ecological and economic standards, and their the aggregate contributes to the conditions of self-development and implementation of an inclusive investment project that satisfies the interests of business, society and the state; the mechanism ensures the inclusive development of entrepreneurial structures of agribusiness through the joint action of the laws of demand, supply, increased labor productivity, standardization and evolution of life.

**Keywords:** entrepreneurial structure, agribusiness, model of inclusive development, sustainability of development, state of development, management mechanism, socio-ecological and economic standards.

**JEL Classification:** O 10, Q 10

**Formulas:** 2, **figures:** 1, **tables:** 1, **bibl.:** 5

**Introduction.** Economic, sanitary and socio-political crisis phenomena testify to the violation of the law of evolution of life in Ukraine and the world (irreversibility, acceleration of rates, unevenness, ethical attitude to the development of all living beings). For now, everything that opposes this law is stopped. The restoration and improvement of the effectiveness of economic entities in agriculture and industries that provide it with a resource, sales and spatial basis of functioning is possible through the formation of an inclusive model of the development of entrepreneurial structures of agribusiness, which harmoniously satisfies the interests of business, society and the state. The study of theoretical, methodological and practical aspects of the formation of an inclusive model of the development of entrepreneurial structures of agribusiness is relevant.

**Literature review.** Problems of ensuring inclusive business development were investigated by D. Asemoglu, Z. Bedos, I. Bobukh, K. Vegelin, Y. Vlasenko, A. Hrytsenko, D. Gupta, D. Podesta, R. Reich, E. Reinert, T. Bazylyuk and O. Zhulin,

O. Vdovichenko, K. Dzenzelyuk, L. Yemelianenko, S. Yermak, P. Yeshchenko, A. Zhukovska, T. Zinchuk, T. Zatonatska, A. Karimova, T. McKinley, H. Maxton, I. Mantsurov, O. Maslak, O. Pavlov, N. Popadynets, V. Reshetylo, D. Robinson, O. Prognimak, O. Rogovskyi, V. Samofatova, L. Fedulova, R. Hausman, etc.

Varieties of inclusive models of business development were studied by Shevchenko S. «moral capitalism», «stakeholder capitalism» [1, 10], Zaporozhets H. «model of unifying culture» [1, 31], Solopun N. «socially transformative impacts – investments», as a business for the sake of society, where the primary goal is not profit, but the improvement of environmental and social indicators, the formation of a healthy and prosperous society [1, p. 133], Mikhalskaya D. «a model of business financing through green bonds» [1, p. 149], Shyshkevich O. «creative inclusive economy model» at the level of a business entity regarding meeting the needs of business, society and the state [1, p. 45], Skorobagatova N. «crowdsourcing model» as the involvement of a wide range of specialists with various creative abilities, knowledge and experience in solving production problems", Leonova S. «inclusive personality development» [1, p. 88], E. Burak «model of sustainable development of the organization» [1, p. 92], Kyrychenko A. «creative economy model» as a component of inclusive business development [1, p. 103]; Pushkar T. «a model of inclusive business development due to the displacement of a significant part of economic processes into the digital space» [1, p. 166].

At the same time, taking into account the depth, significance, and versatility of the scientific achievements of domestic and foreign scientists, it should be noted that a certain list of tasks of a methodological, conceptual, and methodical nature needs to be supplemented, clarified, and generalized.

**Aims.** The purpose of research, the results of which are presented in the article, is the development of theoretical and methodological principles and scientific and practical recommendations for the formation of an inclusive model of the development of entrepreneurial structures of agribusiness.

**Methods.** During the research, the methods of analysis and synthesis, induction and deduction, horizontal and vertical trend analysis, systemic and financial and economic analysis of entrepreneurial structures of Ukrainian agribusiness were used.

**The results.** The theoretical basis of the formation of an inclusive model of the development of entrepreneurial structures of agribusiness is the principles and rules of management of the inclusive development of agribusiness entities, which take into account the advantages of using the main consumer properties of goods (economical, quality, creative differentiation) in combination with a certain structure of production activity (economically, qualitatively, differential-dissipative structure), employee development and compliance with the requirements of socio-ecological and economic standards.

The methodological basis of the process of forming an inclusive development model is a method based on the use of the indicator of inclusive development with components:

$$K_i = (K_{il}, K_{ish}) \quad (1)$$

where  $K_{il}$  – the indicator of sustainability (long-term perspective);  $K_{ish}$  – the indicator of the state of inclusive development (short-term period up to one year) of entrepreneurial structures of agribusiness.

The first is calculated as the regression coefficient of the dynamics of the normalized stock of inclusive development of the economic entity for 3-4 cycles of development (9-20 years). In turn, the margin of inclusive development is the normalized (divided by the maximum) value of the enterprise's net income, which is multiplied by the number of years included in the analysis.

The second indicator has components:

$$K_{ish} = K_{ip} * K_{is} * K_{in} \quad (2)$$

where  $K_{ip}$  – an indicator of the implementation of an inclusive investment project,  $K_{is}$  – an indicator of inclusive self-development,  $K_{in}$  – an indicator that assesses the compliance of management methods with the system of socio-ecological and economic standards.

Each of the three components is evaluated using Boolean variables  $\{1; 0\}$ , where 1 indicates its positive value and 0 - negative. If  $K_{il} \geq 0$ , that is, the enterprise has an integral trend of the dynamics of the reserve of sustainability of inclusive development with profitable operation and all 3 checks of the management methods of its provision gave a positive result ( $K_{ish} = 1$ ), then the development can be considered inclusive  $K_i = (\geq 0; 1)$ .

The scientific and practical recommendations include the development of a management mechanism for the formation of an inclusive model for the development of entrepreneurial structures of agribusiness, which coordinates the action of interconnected methods, each of which corresponds to the general strategy (cost savings, high quality, creative differentiation), socio-ecological and economic standards, and their totality contributes to the conditions of self-development and implementation of an inclusive investment project that satisfies the interests of business, society and the state. This mechanism ensures the inclusive development of entrepreneurial structures of agribusiness through the joint action of the laws of demand, supply, increasing labor productivity, standardization and evolution of life.

Under agribusiness in the study, its broad definition was adopted: agriculture together with the resource, sales and spatial basis of functioning. The systematization of economic entities with different models of inclusive development was carried out according to the type of product produced (economical, high-quality, creatively differentiated), as well as the basic business strategy (cost savings, high quality, innovative and creative differentiation). The results of the analysis made it possible to identify the following types of models of inclusive development of agribusiness:

- economical product and cost-saving strategy (organic production, eco-waste, fish farming, diversification, processing, transport, energy, banking, market);
- high-quality product and high-quality strategy (inclusive agricultural engineering, plant protection, education, construction, hospitality);
- creatively differentiated product and innovative creative differentiation strategy (inclusive advertising of food products, agro-eco-tourism, exhibition activity, confectionery production, restaurant business, software product).

The division of products into economical, high-quality, and creatively differentiated products is due to a change in the consumer's consciousness during the informatization of society, the dynamics of which was described by A. Maslow

through the pyramid of human needs satisfaction (physiology, safety - lower and communication, respect, self-expression or self-actualization - higher needs) [2]. If in the author's time there were only a few self-actualized people (Thatcher, Schweitzer, Einstein, etc.), then in the period of informatization of society, every person aims at self-actualization and wants to save on goods that satisfy his lower needs (physiology, security). The main consumer property of the former is economy, and the latter is quality, because quality products and services are more economical in operation and consumption. A person's main emphasis in life is on the consumption of goods that satisfy his higher need for self-development or self-actualization. Their consumer property is innovative and creative differentiation. These goods are produced by the rapidly developing branches of the creative industry [3, p. 110]. This trend was noted by the Government of Ukraine in CMU Resolution No. 265 of April 24, 2019 "List of types of economic activity that belong to creative industries."

From the set of agribusiness structures, an economical (highly standardized) product is produced by:

- agricultural enterprises, agricultural holding structures, cooperatives, private entrepreneurs, households;
- producers of seeds, energy, products with high added value (enterprises processing agricultural products);
- banking and credit institutions, transport companies, sales organizations, markets, suppliers of water, seeds, fertilizers, etc.

A directly inclusive model of business structure development is a system of methods for managing functional activities (product formation, pricing, advertising, sales, production, personnel, budgeting, investment, financing).

The agribusiness structures that produce economical goods have in common a highly standardized product, competitive prices, advertising of moderate prices and high productivity, a developed sales network, mass production, the use of the labor of «sensor speakers», investment in high-performance equipment and technology, the use of credit and financial resources [3].

The source of inclusive development is the synergistic effect of the influence of factors that meet the needs of business, society, and state development. Inclusive development occurs when such a main consumer property of goods attributes as economy coincides with the type of structure of management of production activity (economic-dissipative) and psychophysiological characteristics of employees (dynamics-sensory) while meeting the requirements of socio-ecological-economic standards.

At the same time, the business is satisfied with a high level of profitability and the fulfillment of the corporate mission (providing the population with ecologically clean food products, preserving the fertility of the soil, developing communities in rural areas, etc.), society is satisfied with preserving the health of citizens and obtaining personality-developing jobs, and the state – positive results of monitoring compliance with socio-ecological and economic standards.

Historically, the violation of the law of evolution of life in agriculture occurred as follows. Since the 20th century, farmers began to actively use deep plowing of the

land. Domestic scientists of that time (Ovsinsky, etc.) predicted its harmful effect on soil fertility and plant protection from pests, weeds, and diseases, but their views were not accepted by the scientific community and producers. Deep plowing led to the death of microorganisms, which naturally took a direct part in the formation of plant productivity and the processes of protecting them from pests. Aerobic microorganisms were deeply plowed by plows, and anaerobic ones were plowed to the surface of the earth and died. «Natural crop builders and protectors» have been replaced by inorganic fertilizers, pesticides and herbicides. The first saltpeter was brought to Europe from Canada at a high price. As a result of the above, there is now a real threat of a catastrophic decrease in the content of humus in chernozems, the cluttering of agricultural soils with the remains of inorganic elements, and the cultivation of products harmful to human health.

The high modern level of sustainability of the development of enterprises in the agricultural economy of Ukraine is a consequence of good yields and, compared to other countries of the world, a lower level of soil saturation with residues of inorganic fertilizers, pesticides and herbicides due to the preservation of humus in chernozems due to the mass introduction of organic fertilizers in the former USSR (25 -30 t/ha). During the years of independence, the content of humus in the chernozems of Ukraine decreased by 2.7 times, but it is still sufficient for growing agricultural crops, which are competitive in terms of quality and price on the world market. The sustainability of the given advantage is violated by natural (drought) and political (armed conflict, which affects the increase in prices for inorganic fertilizers due to the isolation of producers and the increase in prices for the energy resources necessary for the production of fertilizers, as well as the complication of logistics).

The lack of measures to preserve soil and other natural resources, as well as the cultivation of ecologically clean agricultural crops, including during drought, characterizes the development of Ukrainian agribusiness entities as non-inclusive (such that in the long run it will lead to a decrease in production and liquidation).

We present the results of the calculation of the index of inclusive development for the largest agricultural holding structures of Ukraine. In the scientific literature, there is an alternative approach of S. M. Didukh, according to which a comprehensive indicator of the inclusive development of Kir agricultural holdings is used to form the rating of inclusive development [4]. A comparison of the values and conclusions based on the calculation of the  $K_{cir}$  and  $K_i$  indicators is given in the table 1.

**Table 1. Comparative analysis of the state of formation of an inclusive model of development of agricultural holdings of Ukraine**

Agroholdings	Components of a complex indicator				$K_{cir}$	Components of a complex indicator				$K_i$
	$K_{ir}$	$K_i$	$K_{rlp}$	$K_{sr}$		$K_{il}$	$K_{ip}$	$K_{is}$	$K_{in}$	
Kernel	0,960	0,900	0,700	0,933	0,873	0,0498	0	1	1	(0,0498; 0)
MHP	0,800	0,650	0,900	0,933	0,794	0,0407	1	1	1	(0,0407; 1)
Nibulon	0,840	0,700	0,750	0,800	0,760	0,0514	1	1	1	(0, 0514; 1)
Agroton	0,600	0,500	0,550	0,667	0,565	0,0415	0	1	1	(0,0415; 0)

Sources: developed by the author based on [4]

Agroholding structures in the table. 1 is located by the complex indicator. Kernel Holding ranks first in terms of growth and development (Kir), inclusiveness of the business model (Ki), and sustainability of development (Ksr).

The table contains representatives of three groups of Ukrainian holdings according to the presence or absence of: 1) sustainable or inclusive development strategies (Kernel – developed, MHP – developed), 2) corporate social responsibility programs (Nibulon – developed), 3) lack of formalized inclusive and social development strategies (Agroton).

According to the indicator of inclusive development, the rating of agricultural holdings is different:

1. Nibulon ( $P_i = (0, 0514; 1)$ );
2. MHP ( $0.0407; 1$ );
3. Kernel ( $0.0498; 0$ );
4. Agroton ( $0.0415; 0$ ).

The first two lead the rating of inclusive development in crop production (Nibulon) and livestock production (MHP), and the development of the latter cannot be classified as inclusive due to the lack of implemented investment projects that satisfy the interests of society, business and the state. If MHP implemented a biogas plant for processing poultry products into ecologically clean organic fertilizers, and Nibulon cleaned reservoirs, then Kernel limited itself to developing a strategy, and Agroton did not do this.

According to the «organic production» model, 294 economic entities are developing in Ukraine. We will cite the peculiarity of the development of the medium-sized (8 thousand hectares) enterprise of Agroekologiya. Percentage of operating expenses per UAH 1. net income is distributed as follows: material costs - 55%; wages with deductions for social activities - 19%; administrative costs – 11%; depreciation – 3.6%; sales - 2.7%. The average level of profitability of the enterprise for the last development cycle was  $P_p = (27,9 + 35,4 + 18,3 + 9,6) / 4 = 22,8\%$ . Agroecology actively works with scientific and educational institutions of Ukraine and the world: innovative developments in the field of organic production are patented, graduates of educational institutions find employment and gain experience during production practices, where they are taught to earn profits from the sale of organic products, to develop both crop production and animal husbandry, as well as to preserve the fertility of agricultural soils.

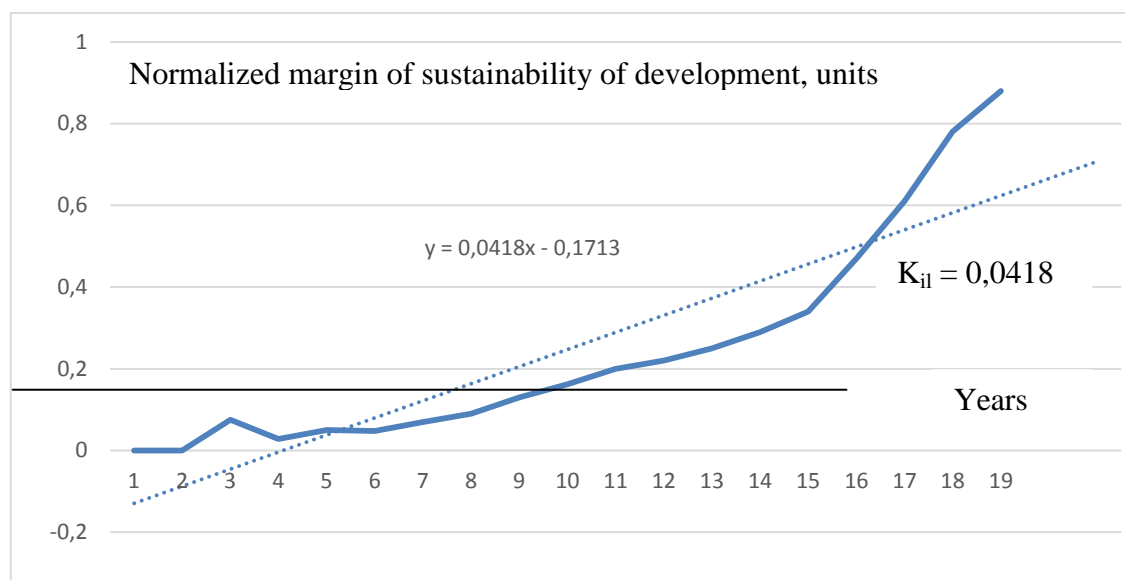
The calculation of the sustainability indicator of the enterprise is shown in fig. 1.

Data analysis of fig. 1 indicates an increase in the rate of development in the period of the last development cycle. This cycle covers the period between two crises (political - 2014 and sanitary - 2019), which indicates an increase in demand for organic agricultural products during crisis events.

From the set of agribusiness structures, quality (serial production) products are produced by: manufacturers of agricultural machinery, enterprises producing plant protection products; agricultural companies specializing in maintenance and repair of agricultural machinery; insurance companies working in the agricultural sector;



private veterinary enterprises; private educational institutions for training specialists for the agricultural sector; agro-industrial and civil construction, etc.



**Figure 1. Calculation of the index of sustainability of inclusive development of Agroecology (2001-2019)**

*Sources: Calculated by the author based on the company's financial statements*

The common characteristic of the inclusive development model of the listed enterprises is: high-quality serial product; a price that is proportional to the level of quality and reliability of products or services; advertising of high quality and performance under load; sales with an emphasis on high quality in conditions of demonstration of quality and comfort; mass production; personnel "statisticians-rationalizers in the field of quality"; elimination of unproductive costs and implementation of costs related to improving the quality of the final product; investment of funds in equipment and technology that contribute to the improvement of product quality; use of own financial resources to finance production processes [3].

The following advertising companies are involved in the production of a creatively differentiated product: exhibition centers that regularly hold fairs and exhibitions of agricultural products; agritourism companies; agricultural exhibition companies; manufacturers of confectionery, cosmetics, perfumes, jewelry, souvenirs from raw materials of plant and animal origin; restaurants, bars, houses of tea traditions; software manufacturers, etc.

Common to the listed enterprises are: a creative and differentiated product; advertisement of its innovative and creative properties; a price proportional to the level of creative differentiation; sales with an emphasis on creative properties in the setting of a demonstration of possible diversity; individual production by special order; staff "creative intuitives"; implementation of costs aimed at product differentiation; purchase of equipment and technologies that contribute to the creative differentiation of products and services; own financial resources [3].

The characteristics of the process of inclusive development of entrepreneurial structures of agribusiness depending on the production of three types of goods

(economical, high-quality, creatively differentiated) are: powerful and productive development; one that frees participants from dangers and hard work; informationally virtuous and aesthetically attractive development, respectively.

**Discussions.** The history of the development of agriculture in Ukraine shows repeated attempts to organize agrarian associations of enterprises: forms (artils - agricultural and agricultural, communities - agricultural, associations - consumer and savings and loan); types (credit, consumer, agricultural cooperatives) [97]. At the same time, the massive development of the cooperative movement in the rural sector of Ukraine's economy did not occur due to the non-inclusive model of development of commodity producers. Each business entity tried to gain competitive advantages and was not interested in the development of others. Under such conditions, effective equal cooperation had no basis for development. Currently, the situation has changed radically. A business entity that grossly violates ethical standards in relation to nature and society does not receive development. Honesty, truthfulness, mutual assistance and a trusting relationship with other subjects of the Ukrainian agro-food market quickly became part of business practice.

We will present the results of the study of the inclusive association of entrepreneurial structures of agribusiness of the Bilhorod-Dnistrovsky district of the Odesa region, which are developing according to the models of «organic production» and "inclusive transshipment, storage and sale of organic agricultural products". The unification took place in 2014 with the aim of joint use of financial and production resources of agricultural enterprises (Nova Tsarichanka-1, Svitanok-Agro, TOB named after Michurin) and agrotrader (Akkerman Zernoprom) to increase the pace of inclusive development. Trust in partners is important in the period of economic, sanitary and socio-political crisis phenomena. Agricultural firms entrusted the agrotrader with financial resources for modernization and received during the armed conflict «Ukraine-Russia»: finishing, quality control and storage of the harvest of the 2020-2021 agricultural year; financial resources for agricultural work in the 2021-2022 agricultural year; sales of products in conditions of blockade of Ukrainian seaports.

In 2022, the Inclusive Association of Entrepreneurial Structures of Agribusiness (IAESAB) managed to establish a logistics chain of grain, leguminous and oil crops transportation by grain trucks and barges along the Danube to EU countries (Romania, Bulgaria, Switzerland, Turkey, etc.). Tariff for road transport to the EU increased from 30 to 200-300 dollars. US per ton (6.5-10 times). To solve problems with the price of logistics, IAESAB used its own transport fleet (9 grain trucks) and railway transport. The main advantage of the union was the possibility of selling organic agricultural products (sunflower, wheat, etc.) at export prices that were 3-5 times higher than prices on national markets (the price of sunflower in Ukraine is \$300, ordinary sunflower in the EU - 600 dollars, organic sunflower in the EU - 1400 dollars per ton).

In the critical period of lack of sales (May-June), the financial capabilities of IAESAB were supported due to transshipment and transportation services of grain from Ukraine to EU countries by an agro-trader, which made it possible to receive a

net income of UAH 35.5 million in 8 months of 2022. In the fall of 2022, enterprises will operate at full production capacity around the clock.

According to the recommendation of the Odesa National University of Technology, in order to fulfill the strict production norms at IAESAB enterprises, the selection of personnel with certain psycho-physiological characteristics (TART methodology) was carried out: agricultural enterprises (dynamics - tractor drivers, combine harvesters, accountants, financiers, statics - locksmiths-repairers of agricultural machinery, intuitives - agronomists and managers who possess the skills of organic production and ethical business management); agrotrader (dynamics - loading and unloading service operators, grain truck drivers, logisticians, financiers, statics - locksmiths-mechanics, employees of the grain quality control laboratory, intuitives - head of the department of foreign economic activity, advertising and contracts, manager). Therefore, personnel management of entrepreneurial structures of agribusiness is an important element of the model of their inclusive development.

**Conclusions.** The main conclusions of article are:

1. The theoretical basis of the formation of an inclusive model of the development of the entrepreneurial structure of agribusiness is the principles and rules of managing the inclusive development of agribusiness entities, which take into account the advantages of using the main consumer properties of goods in combination with a certain structure of production activity, employee development and compliance with the requirements of the system of socio-ecological and economic regulations. The methodological basis of the work is the method based on the use of the indicator of inclusive development of entrepreneurial structures of agribusiness with components: the indicator of sustainability and the state of inclusive development. The expediency of taking into account the forms of manifestation of specific economic laws and the law of life evolution is substantiated.

2. According to the results of the study, an approach to the selection of a source of financing for the inclusive development of agribusiness structures was determined, which, unlike the existing one, differs in the recommendation for economic entities regarding the use of resources from the implementation of their own inclusive investment project.

3. The use of a theoretical approach to determining synergy from the influence of factors that increase demand and its stimulation by supply is substantiated (the increase in demand occurs when the main consumer property of the attributes of goods coincides with the type of dissipative structure of management of production activities and psychophysiological characteristics of employees), which differs in that the process takes place provided that the entrepreneurial structures of agribusiness comply with socio-ecological and economic standards.

4. A systematic approach to the formation of a dissipative (highly organized) structure of business structures has been improved, which differs in terms of personnel requirements (mastery of knowledge and skills in the protection of agricultural soils, the use of biological means of plant protection, production of organic products, ethical methods and methods of conducting business).

5. A mechanism for transferring entrepreneurial structures of agribusiness to a state of inclusive development is proposed, which is based on the coordination of the market signal (about the vector of the main consumer property of the product) with a certain trajectory (attractor) of the inclusive development of the business entity: the signal "economy" of the product (through a system of methods) transforms the entrepreneurial structure of agribusiness into an attractor of inclusive development «organic production, eco-waste, fish farming, diversification, processing, transport, energy, banking, market», the signal «quality» - into «inclusive agro-engineering, plant protection, education, construction, hospitality», the signal «inclusive innovative and creative differentiation» - into «inclusive advertising of food products, agro-eco-tourism, exhibition activity, confectionery production, restaurant business, software product».

6. The scientific research made it possible to determine the algorithm for using methods and techniques for adjusting the methods of managing agribusiness business structures, which involves comparing the results with the system of inclusive development goals and socio-ecological-economic standards for each type of functional activity.

7. The development model «inclusive association of entrepreneurial structures of agribusiness» underwent further development, which, in contrast to the well-known one (agrarian cooperative, cooperative association), is created with the aim of satisfying the interests of society (consumers and employees with personality-developing attributes of economical, high-quality, creatively differentiated products), business - through the development of economic, qualitative, differential and dissipative production structures, the state - in compliance with the requirements of socio-ecological and economic standards.

8. According to the research results, a management mechanism for the formation of an inclusive model of the development of entrepreneurial structures of agribusiness was developed, which coordinates the action of interrelated methods, each of which corresponds to the general strategy (cost savings, high quality, creative differentiation), socio-ecological and economic standards, and their totality contributes to the conditions of self-development and implementation of an inclusive investment project that satisfies the interests of business, society and the state.

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# CONSTANT DEVELOPMENT OF THE SOCIETY: IMPROVED METHODOLOGICAL APPROACH TO THE MANAGEMENT OF THE INVESTMENT ATTRACTIVENESS OF UKRAINIAN REGIONS IN THE POST-WAR PERIOD

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**Abstract.** Implementation of the balanced adequate investment policies of the nation and its regions in the post-war period with the consideration of their investment attractiveness helps in the achievement of the constant development of the society. The goal of this article is to develop the improved methodological approach to the management of the investment attractiveness of the regions in the conditions of the nation's and its region's transition to the constant development in the post-war period. The methodological basis of this article lies in the application of general scientific methods that serve as a proof of certainty of the obtained results and their conclusions: monographic, comparative, logical, statistical and economical analysis (factor analysis with the principal component method), synthesis, generalizing, graphical, golden section search method, etc. The developed improved methodological approach to the management of the investment attractiveness of the regions in the conditions of the nation's and its region's transition to the constant development in the post-war period is the essence, the instrumental basis of the model of its assessment and is based on: the usage of the specific list of indicators of assessment of the investment attractiveness of the regions depending on the peculiarities of their functioning, and the presence of competitive advantages; the proposed usage of individual methods of the formation of the corresponding indicator systems. The implementation of the assessment of the investment attractiveness developed improved methodological approach in practice and its application as threshold values for its proposed levels at specified intervals allows for economical interpretation of defined integral indicator and for comparison of the results in the dynamics for the sake of rebuilding the country in the post-war period with the consideration of the possibility of its transition to the constant development.

**Keywords:** investments; regions; investment policy, investment attractiveness; development; improved methodological approach; management model.

**JEL Classification:** A11, O10, E22, G11

**Formulas:** 2; **fig.:** 1; **tabl.:** 1; **bibl.:** 14

**Introduction.** In the conditions of the Russian-Ukrainian war, during which the destruction of both military and civil infrastructure occurred, which caused mass regional losses, the main priority capable to provide the investment attractiveness of the regions is innovation, which allows to increase the level of effective activity and their competitiveness on both national and international scales. The achievement of the constant development of the society significantly depends on the amount of investments and on adequate policies of the nation and its regions considering their investment attractiveness. The strategic target aimed towards long-term perspective forms the ability to implement scientific and technological achievements into the activity on all management levels [1] and causes the creation favorable investment climate for the realization of innovational projects of the main priority [2-3].

**Literature review.** The economical literature lacks the generally accepted definition of the investment attractiveness as a category. Considering the characteristic of the scientific concept of “constant development” as an uninterrupted process, which is characterized by the constancy [4] and the versatility in forming the definition of “investment attractiveness”, it is noted that in the context of reviewing the investment attractiveness on regional levels under the condition of providing the constant societal development it is majorly characterized by Kozachenko H. V., Antipov O. M., Liashenko, O. M., and Dibnis, H. I. as a set of objective and subjective conditions, which facilitate or hinder the process of investment into the national economy on macro, meso and micro levels. [5, p. 9; 6, p. 143].

**Aims.** The goal of this article lies in developing an improved methodical approach to the management of the investment attractiveness of the regions in the conditions of the nation’s and its region’s transition to the constant development in a post-war period.

**Methods.** The methodological basis of this article is the usage of general scientific methods, which proves the certainty of obtained results and their conclusions: monographic, comparative, logical, statistical and economical analysis (factor analysis with the principal component method), synthesis, generalizing, graphical, golden section search method, etc.

**Results.** The research of the processes, which are observed in the Ukrainian economy in the modern conditions of management, contribute to the formation of the search for factors influencing the competitiveness of the nation, which along with available tendencies and regularities provides for the establishment of connections between quantitative and qualitative indicators and an optimal direction of their development with the usage the economical and mathematical modeling. The motivating factor to ensure a rising trend of economical rise of the country in the conditions of the nation’s and its region’s transition to the constant development in a post-war period lies in the ability to search for the ways of self-competitiveness (which majorly determines the investment attractiveness of the regions through their ability to generate innovations, in particular due to the implementation and realization so called smart-projects, established on the knowledge within the (smart) concept of the national industrial policy during the renovation process of an economy as a whole and bioeconomy in particular as one of its promising directions) due to the usage of relevant factors (which determines the expediency of the formation of a set of their specific list based on the characteristics of said regions’ existence, and also visible competitive advantages) and the usage of the methods of an assessment of the investment attractiveness of a region (currently a universal methodical basis is absent – the methods include the usage of a list of indicators, which by themselves are recursive, and cannot be formed based on a common array of data, which allows for adjustments depending on specificity of the region’s functioning).

In the context of regional development from the perspective of investment attractiveness the research and realization of their competitive advantages in relations with investment attractiveness becomes important, the main characteristics of which are listed in Table 1. It should be noted that the sets of groups of indicators are not

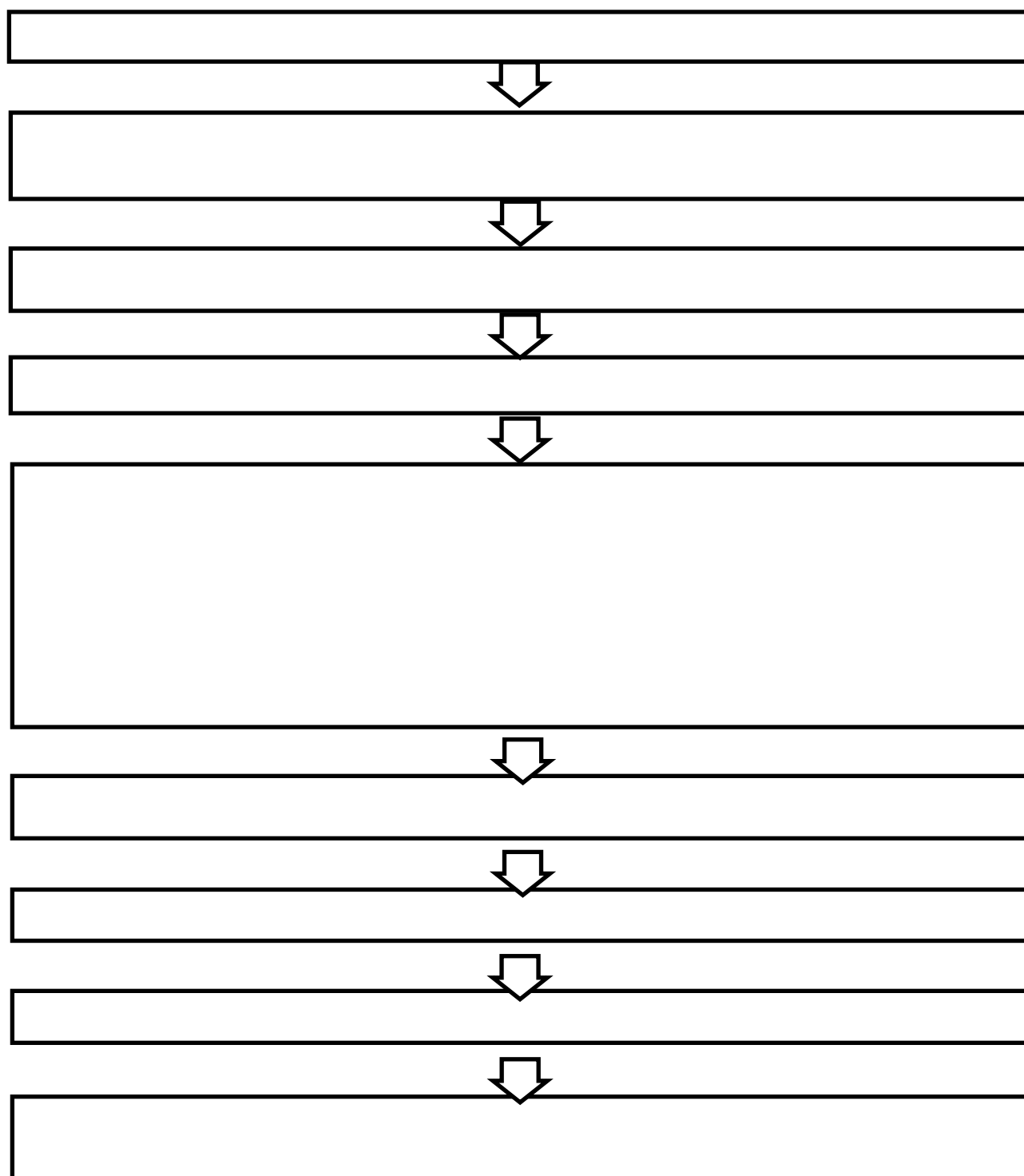
universal, they must take the specific of region's functioning into account considering its strategic mission.

**Table 1. The characteristics of the competitive advantages of the regions in the relation with their correlations with their investment attractiveness**

Competitive advantages	Characteristics	Groups of indicators of the investment attractiveness of regions
Presence and development level of infrastructure	Basic	1. Development level of the transport infrastructure. 2. Economical and geographical advantages. 3. Development level of the social sector, national and regional governance and regulation.
	Technological	1. Internet coverage. 2. Mobile network coverage. 3. Level of investment activity.
	Education	1. Level and quality of education, especially university. 2. Optimization of human resources usage. 3. Demographical characteristics.
	Market	1. Level of general economic development. 2. Financial results of development of entities. 3. Significance in nation's import and export.
Efficiency of implementation of an investment policy	Absolute and relative	1. Definition and comparison of indicators of functioning of the region inside a country (as macro economical) in the context of providing for constant development in statics and dynamics. 2. Definition and comparison of indicators of functioning of the region, similar in main characteristics with foreign countries. 3. Rate of investment potential of the region and an approximate index of a risk.
Presence of infrastructure objects, natural resources and possibilities of their targeted usage and their reproduction, attractive for investment	Significance and orientation	1. Development level of business. 2. Amount and fraction of foreign investments in gross regional product. 3. Criminogenic, technogenic, ecological and other risks.

Source: formed using own research and [5, p. 10; 7, p. 514]

Proposed methodical approach is by itself an improved methodical approach to the procession of the investment attractiveness of regions not only Ukrainian, but also European and the world community's (its stages of formation are stated on Figure 1) and is the instrumental basis of its assessment model.



**Figure 1. Stages of formation of an improved methodical approach to assessing the investment attractiveness of regions**

*Source: Developed on the basis of [8; 12-13], the calculation of the weight of the indicators in the groups was carried out taking into account the data [9-11]*

It is based on the proposed binary usage of profile methods and rates, provides the usage of individual methods: comparative, statistical and economical and mathematical analysis (factorial analysis using the method of main components) with



the formation of appropriate system of indicators by adapting for the control of the investment attractiveness of the regions of the Balanced Scorecard (BSC [8]), considering main approaches to its development, which formed the basis for choosing the assessment indicators for defining integral indicators by groups and investment attractiveness of regions as a whole.

For evaluation of investment attractiveness of a region, justified by the experimental row of balanced indicators, their normalization and rates grouped by results of incorporation to its form in formula 1-2 and including data [9-11] it is suggested to perform the formation of grouped integral indicators and investment attractiveness of the regions as a whole during the years.

$$I_m = \sum_{i=1}^n d_i \times y_i, \quad (1)$$

where  $I_m$  – integral indicator by the group of indicators,  $m = (1, 2, 3, 4)$ ;  $d_i$  – weight of the indicator, which determines the degree of contribution of the  $i$ -th indicator in an integral indicator component (groups of indicators) of the investment attractiveness of the region;  $y_i$  – normalized value of the  $i$ -th indicator;  $n$  – number of indicators used to evaluate the  $i$ -th indicator in the integrated indicator by indicator group;  $\sum d_i = 1$ ;  $0 \leq d_i$ ;  $y_i \leq 1$ .

$$\Pi_{IA} = \sum_m d_m \times I_m, \quad (2)$$

where  $\Pi_{IA}$  – integral indicator of investment attractiveness of regions;  $d_m$  – weight of the indicator, which determines the degree of contribution of the indicator to the integrated indicator of investment attractiveness of regions;  $I_m$  – integral indicator,  $m = (1, 2, 3, 4)$ ;  $\sum d_m = 1$ ;  $0 \leq d_m$ ;  $y_m \leq 1$ .

At the same time, the levels of investment attractiveness of regions are proposed to be determined using the golden section search method (the *proportion* of such a ratio is 1.618) for 5 intervals of values of the integral indicator according to the following scale of its levels:

- 0.855-1 – high level of investment attractiveness;
- 0.619-0.854 – average level of investment attractiveness;
- 0.383-0.618 – low level of investment attractiveness;
- 0.147-0.382 – crisis level of investment attractiveness;
- 0-0.146 – critical level of investment attractiveness.

**Discussions.** In general, it should be noted that the introduction of an improved methodical approach into the practice of assessing investment attractiveness and the use of its proposed levels as threshold values at specified intervals will contribute to the improvement of the economic interpretation of the determined integral indicator and the comparison of results in dynamics and can serve as a reference point for:

- further forecasting of the indicators that are the basis of the calculation;
- formation of a real goal in the field of managing the investment attractiveness of regions;
- an in-depth analysis of the processes of managing the investment attractiveness of regions and comparing the obtained results with the best global practices and using them as benchmarks for the implementation of measures to improve the efficiency of state and regional administration.

**Conclusion.** In general, it should be noted that the practical use of such an improved methodological approach to assessing the investment attractiveness of regions provides grounds for conducting thorough research and developing theoretical and practical recommendations on increasing the level of investment attractiveness of regions for the purpose of rebuilding the state in the post-war period and ensuring the upward trend of the state's economic growth, taking into account possibilities of its and the regions transition to sustainable development.

**Author contributions.** The authors contributed equally.

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## CHAPTER 2

# DEVELOPMENT OF FINANCE, ACCOUNTING AND AUDITING

## LINKAGES BETWEEN CRUDE OIL FUTURES AND SELECTED SECTORAL INDICES: EVIDENCE FROM CAUSALITY APPROACH

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**Abstract.** The aim of this study is to empirically show the dynamic causal relationship between crude oil future prices and sectoral indices of India using daily data from November 30<sup>th</sup>, 2011 to November 18<sup>th</sup>, 2021 and its subsets. First, we apply ADF, P-P and KPSS unit root tests and then Johansen tests for estimating the cointegration. We use Granger Causality to find linkages and further VAR and VECM as per cointegration. VAR results are supported by Impulse Response whereas Wald tests ascertain the shortterm relationship for insignificant coefficients. The study found that crude oil futures and sectoral indices are integrated of order one in subset 2 whereas subset 1 and full data period doesn't show cointegration. The overall result for the full data period shows the metal sector and crude oil futures have bidirectional causality with significant impact on the metal sector. The Metal Index also has symmetric results on different time horizons. Subdata 2 shows long term relations between crude oil futures and all the sectors except FMCG and Health. Subdata 1 shows the lag of crude oil futures influences the metal sector only in the short term. The study is conducted for a period of ten years and based in India, which is an oil importing country. The availability of commodity derivatives data is also limited in India, hence the study cannot be generalized for all the countries. No study has been done considering crude oil futures and sectoral indices of India, hence providing the gap for the study.

**Keywords:** Crude Oil Futures, Sector Index, Granger Causality, Vector Autoregression, VECM.

**JEL Classification:** C39, C58, F41, G11

**Formulas:** 10; **fig.:** 3; **tabl.:** 9; **bibl.:** 41

**Introduction.** Crude oil is extensively used in production and is the most traded commodity in the world. India's consumption of crude oil and its products grew four and half percent in Financial Year 2020 and retained third spot in consumer oil in the world in 2019 (IBEF report, November 2021\*). Further, oil usage in India is projected to register a two times to eleven million barrel growth in next twenty three years whereas diesel demand is expected to double to one hundred sixty three metric ton by 2029-2030.

The dependence on imported crude has increased from 82.9 percent (Financial Year 2018) to 83.7 percent (Financial Year 2019) and crude production has stagnated around thirty five metric ton in the past decade. This will have a negative impact on the fiscal deficit which in turn influences the economy and touches every sector of the country (Economic Times, 2020<sup>1</sup>).

Since, WTI crude is considered as the world benchmark for crude oil futures, therefore, a number of studies are there showing the market efficiency of WTI crude with its spot price (Bekiros & Diks, 2008). Further, there is an existence of information flow and a long-term relationship exists between Indian and US crude oil futures (Sharma, 2017). Moreover, the volume of crude oil granger causes the prices or absolute returns in India (Biswas, S. and Rajib, 2011) and there is a lack of cointegration relationship between crude oil futures and the stock market in India (Bakshi et al., 2021). Crude oil shocks have a significant negative impact on economic development in India (Sreenu, 2018) and a fall in crude oil price gives positive signs to FMCG sector<sup>2</sup> (Business Standard, 2020) whereas rise in crude oil would have a negative impact on Auto sector<sup>3</sup> (Business Standard, 2021). In the Indian metal sector industrial metal shows weak correlation with crude oil whereas precious metals do not show any trend (Kaushik, 2018). Later, the financialization of commodity futures also serves as the mechanism of price discovery and risk management; the presence of financialization is also found in Indian commodity futures (Shamsher, 2021). Crude oil futures are the derivative instruments which not only help the market participants to manage risk but are also considered as a part of investment portfolios by financial market participants. Some of the studies like (Lu *et al.*, 2021; see also LI *et al.*, 2021) evidenced that in the Chinese derivative market, crude oil futures are good hedging tools.

Crude oil in itself is very vital from an economic point of view and a small variation can affect the whole economy which in turn impacts the stock market and hence every sector will get affected. Any change in crude oil prices can be reflected in its futures market as both the markets are efficient (Bekiros & Diks, 2008). Therefore, to see the direction of impact between crude oil futures and sectoral indices, VAR-VECM-Granger Causality is applied, also the movement of crude oil futures on sectoral indices can be seen in different time frames i.e long run and short run which can be confirmed initially using cointegration and further wald test is applied (Sharma, 2017).

This paper mainly contributes to the research related to Crude oil futures' impact on sectoral indices and as far as we have studied, there is only one study considering crude oil spot prices and Indian sectoral indices (Tiwari *et al.*, 2018) and till now no study exists considering the futures prices. In addition to this, the study period is also divided into two sub-period which give us the evidence of long and short term relationships in comparison to full data and all three sets of data are further tested for relationships of different time frames which will provide the robust results. These results are important for trading strategies and can be used by active market players.

**Literature Review.** Crude oil is considered as a leading factor in today's oil intensive economy, that is why there are many studies that have focused on showing the evidence of oil impact on the economy (Berument *et al.*, 2010) as well as on the stock market (Alamgir *et al.*, 2021). We can see the negative impact of oil price change on the stock market in (Apergis & Miller, 2009; see also Al-hajj *et al.*, 2018) whereas (Arouri & Rault, 2012) explained that the oil price change has a significant positive relationship with the stock market. However, some researchers also found no

significant influence (Apergis *et al.*, 2009; see also Aloui *et al.*, 2012) found no significant repercussions for oil importing countries like India. All this is due to different scenarios of different countries i.e. countries importing oil have different impacts than the countries with oil export.

There are many studies explaining the lead & lag relationship of spot and future prices of crude oil like in (Bekiros & Diks, 2008) shows the bidirectional causal linkage of WTI crude oil and (Wang & Wu, 2013) also found that the long term relationship exists between futures and spot prices of WTI Crude Oil but in regime only and the price differentials are greater than the threshold value. Looking at the relationship of futures prices of crude oil and stock index futures, we found that in (Lu *et al.*, 2021) stock index futures of US shows causality with WTI Crude oil futures having weak significance as compared to china. Also, the short term fluctuations of WTI futures have less influence on Chinese index futures than US. The researchers also found that that the returns and volatility returns of stock index futures lead the stock market index (Liu & Dong, 2011) and in general stock index futures lead the stock index (Antoniou & Garrett, 1993).

Sector specific study is important for investment purposes and further helps in diversification. There are few studies that focus on oil's impact on industry level. Also, there is a correlation between changing oil prices and the industrial sector (Degiannakis *et al.*, 2013). The impact of oil price volatility varies from sector to sector (Arouri & Nguyen, 2010; see also Fang & Egan, 2018; Faff & Brailsford, 1999). The impact of oil is negative where oil is an input and positive where oil is an output (Ramos & Veiga, 2011). All these studies consider the spot price of oil and not the future price, therefore, this study considers the future prices of oil and sectoral indices of India.

There are numerous studies between oil prices and the stock market showing the causality approach. Sometimes, it is unidirectional causality and sometimes bidirectional and also there is evidence of no causality (Table-1). Different models are used in the previous literature according to the data and the relationship can be found between oil prices and stock market, oil prices and sectoral indices and oil futures and stock index futures (Table 1).

**Methods.** The sample used in the study is daily Crude Oil Futures (close prices) and Sectoral Indices (daily) of India. The period of study is based on the availability of data from November 30th, 2011 to November 18th, 2021; 2467 observations. Further, the data has been divided into two sub-data (approx. equally) to get the more reliable results:

- Sub-data 1 from November 30th, 2011 to December 30th, 2016; 1262 observations,
- Sub-data 2 from January 2nd, 2017 to November 18th, 2021; 1205 observations.

The selection of the sector is based on the sectoral indices provided by NSE India but the data is collected from S&P Global whereas the future prices of crude oil are retrieved from MCX India. All the sectoral indices data are not available from 2011 but S&P Global provides data with the use of a backtesting approach. The

unmatched data of crude oil futures and sectoral indices has been eliminated from the time series for analysis.

**Table 1. Studies Analyzing the relationship between prices of oil and stock market/sectoral indices and oil futures and stock index/stock index futures**

Authors	Countries	Data	Methodology	Empirical Findings
Tiwari et al., (2018)	India	BSE Sectoral Indices, BSE Sensex and Brent Crude oil prices	Quantile Regression, VAR Granger Causality & Frequency Domain Granger Causality	Banks, energy and capital goods are interdependent with oil , other sectors' impacts are mixed. Carbon resistant to oil shocks.
Ciner, (2001)	USA	NYMEX Crude oil Futures, S&P 500 Stock Index	VAR Model, Nonlinear Granger Causality	Causality test suggests a nonlinear causal relationship between oil and stock index.
Lu et al. (2021)	USA & China	Futures prices of WTI crude oil, S&P 500 Index and CSI 300 Index	Granger Causality, VAR, MIC, DCC-GARCH	US and Chinese stock futures granger-cause of WTI futures, VAR shows weak significance for US but strong for china.
Yadav et al. (2021)	India	Crude oil price, BSE Sensex	VAR, Granger Causality	Causal relationships exist between oil and sensex.
Shabbir et al. (2020)	Pakistan	Gold Price, Crude oil Price and stock market	ARDL Model	Prices of Oil and Gold have a significant impact on the stock market.
Arouri & Nguyen, (2010)	Europe	Stock Index and Sectoral Indices	VAR - GARCH Model	Significant transmission between oil and stock market with spillover from oil prices to stock market
Lee et al. (2012)	G7	Oil prices and Stock Index	Unrestricted VAR	There is no impact of fluctuations in oil prices on G7 stock indexes, however it influences some sectors of some countries.
Mensi et al. (2022)	Europe	Gold Price, Crude oil Price and Equity Sectoral Indices	VAR Model	Gold is a weak recipient of the spillover effect from all sectors and crude oil is weakly connected to few sectors.
Aydogan & İstemi, (2014)	Turkey	Brent crude oil price, ISE 100	VAR Model	Global liquidity has a more significant impact on the Turkish stock market than the oil price variations
Bouri et al. (2017)	India	Volatility Index of Gold, Crude oil and Nifty	ARDL Model, Causality Test	Causality from volatility of Gold price and Oil price to volatility in the Indian stock market.
Huang et al. (1996)	USA	Crude oil futures, Interest rate, S&P 500, Oil equities.	VAR Model	Crude oil future returns are not related to the stock market except oil companies and the volatility relationship for both is not clear.
Sharma, (2017)	India & USA	Crude oil futures of India and USA.	VECM and Wald test	Bidirectional information flows in the long term but in the short term it flows only from US crude oil to India. The US market is more efficient.

Source: developed by authors

Also, there are three future prices on a given date but we have selected that close price which is closer to the expiry date. All the data in this paper is used in



logarithmic form as it reduces the problem of heteroscedasticity by compressing the scale of variables (Gujarati, D.N., 1995).

Literature shows the evidence of a relationship between prices of crude oil and stock market index but the relationship is found to be complex. The models used in the literature are very useful for finding the causal relationship, therefore, we have used VAR (Sims, C. A., 1980) or VECM as per the cointegration relationship and Granger Causality approach (Granger, C. W. J., 1969) in our study.

The relationship between crude oil futures and sectoral indices of India can be written as:

$$CF_t = \alpha + \beta_1 A_t + \beta_2 B_t + \beta_3 C_t + \beta_4 F_t + \beta_5 H_t + \beta_6 I_t + \beta_7 M_t + \beta_8 O_t + \beta_9 R_t + \varepsilon_t \quad (1)$$

Here,  $\varepsilon_t$  = white noise. Logarithmic form of the above equation is as follows:

$$LCF_t = a_0 + a_1 t + \beta_1 LA_t + \beta_2 LB_t + \beta_3 LC_t + \beta_4 LF_t + \beta_5 LH_t + \beta_6 LI_t + \beta_7 LM_t + \beta_8 LO_t + \beta_9 LR_t + \varepsilon_t \quad (2)$$

Here,  $t$  = trend variable, LCF = Log of Crude oil Futures, LA = Log of Auto, LB = Log of Bank, LC = Log of Consumer Durables, LF = Log of FMCG, LH = Log of Healthcare, LI = Log of IT, LM = Log of Metal, LO = Log of Oil and Gas, LR = Log of Realty.

Modern society is an energy intensive society and the major player of the energy sector is Crude Oil, hence, every sector has direct or indirect impact on crude oil price or vice-versa. After solving the above equation every  $\beta$  represents how impactful the relationship it holds with crude oil futures. The sign of  $\beta$  also shows whether it leads to an increase or decrease in the prices of crude oil futures. Some of the variables in our equation suffer from the problem of multicollinearity which we test by coefficient diagnostics considering all dependent and independent variables. Since we are also considering two sub-data in our study, therefore, we eliminated different independent variables in different data sets based on Variance Inflation Factors (only variables with VIF value less than 10 are included). Following independent variables are considered for further study in all the data sets:

Sub-Data 1 variables

Bank Index  
FMCG Index  
Metal Index  
Oil and Gas Index  
Realty Index

Sub-Data 2 variables

Auto Index  
Bank Index  
FMCG Index  
Health Index  
Metal Index  
Oil and Gas Index  
Realty Index

Full-Data

Auto Index  
Bank Index  
Health Index  
Metal Index  
Realty Index

Since we have already eliminated some of the variables, therefore, new equations can be written as follows:

For sub-data 1 (2011-2016):

$$CF_t = \alpha + \beta_1 B_t + \beta_2 F_t + \beta_3 M_t + \beta_4 O_t + \beta_5 R_t + \varepsilon_t \quad (3)$$

Here,  $\varepsilon_t$  = white noise. Logarithmic form of the above equation is as follows:

$$LCF_t = a_0 + a_1 + \beta_1 LB_t + \beta_2 LF_t + \beta_3 LCM + \beta_4 LO_t + \beta_5 LR_t + \varepsilon_t \quad (4)$$

Here,  $t$  = trend variable, LCF = Log of Crude oil Futures, LB = Log of Bank, LF = Log of FMCG, LM = Log of Metal, LO = Log of Oil and Gas, LR = Log of Realty.

For sub-data 2 (2017-2021):

$$CF_t = \alpha + \beta_1 A_t + \beta_2 B_t + \beta_4 F_t + \beta_5 H_t + \beta_7 M_t + \beta_8 O_t + \beta_9 R_t + \varepsilon_t \quad (5)$$

Here,  $\varepsilon_t$  = white noise. Logarithmic form of the above equation is as follows:

$$LCF_t = a_0 + a_1 + \beta_1 LA_t + \beta_2 LB_t + \beta_4 LF_t + \beta_5 LH_t + \beta_7 LM_t + \beta_8 LO_t + \beta_9 LR_t + \varepsilon_t \quad (6)$$

Here,  $t$  = trend variable, LCF = Log of Crude oil Futures, LA = Log of Auto, LB = Log of Bank, LF = Log of FMCG, LH = Log of Healthcare, LM = Log of Metal, LO = Log of Oil and Gas, LR = Log of Realty.

For Full-Data (2011-2021):

$$CF_t = \alpha + \beta_1 A_t + \beta_2 B_t + \beta_3 H_t + \beta_4 M_t + \beta_5 R_t + \varepsilon_t \quad (7)$$

Here,  $\varepsilon_t$  = white noise. Logarithmic form of the above equation is as follows:

$$LCF_t = a_0 + a_1 + \beta_1 LA_t + \beta_2 LB_t + \beta_3 LH_t + \beta_4 LM_t + \beta_5 LR_t + \varepsilon_t \quad (8)$$

Here,  $t$  = trend variable, LCF = Log of Crude oil Futures, LA = Log of Auto, LB = Log of Bank, LH = Log of Healthcare, LM = Log of Metal, LR = Log of Realty.

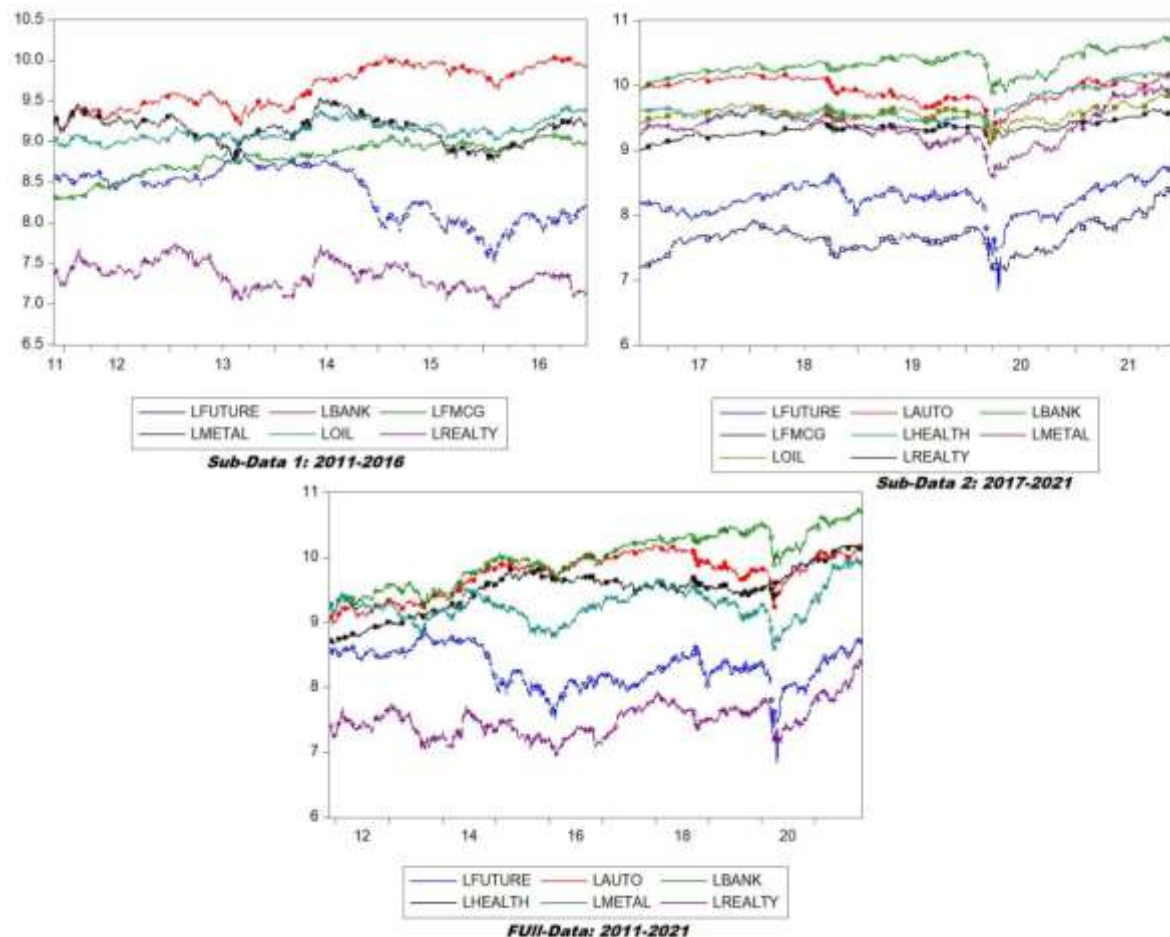
We can further study the relationship of dependent and independent variables by looking at their time series properties and testing the order of integration. We would be using the Granger Causality approach to check the line of causality among the variables. This paper would estimate the impact of crude oil futures on different sectoral indices of India using the Johansen cointegration approach on the basis of stationarity results and testing the long-term relationship between them. Our approach to this paper includes the following steps:

1) We need to check for stationarity of the series mentioned in (4) (6) (8). We are using ADF (Augmented Dickey Fuller, 1979; 1981), PP (Philips-Perron, 1988) and KPSS (Kwiatkowski-Phillips-Schmidt-Shin, 1992) unit root tests. In any variable case, if the results of any two unit root tests contradict each other then the third one will break the tie (as used by Pandey, V., & Vipul., 2017).



2) If all the variables are either I (0) or I (1) but show no cointegration, we can run them in VAR (Vector Auto Regressive).

3) If variables are I (1) and show cointegration then they have a long-term relationship and VAR is not appropriate, hence, we use VECM (Vector Error Correction Model).



**Figure 1. Graphical form of data sets for India**

*Source: Author's Calculation*

Fig. 1 shows all the series in logarithmic form. The movement of variables overtime shows a trend in LFUTURES stand for Log of Crude oil Futures; LAUTO stands for Log of Auto Index; LBANK stand for Log of Bank Index; LFMCG stands for Log of FMCG Index; LHEALTH stands for Log of Health Sector Index; LMETAL stands for Log of Metal Index; LOIL stands for Log of Oil and Gas Index; LREALTY stands for Log of Realty sector Index.

To get a better understanding of the relationship between the futures prices of crude oil and sectoral indices of India, a descriptive analysis of data is first carried out. Table 2 presents the descriptive results of Log of Crude oil futures and Log of sectoral indices of India. It shows the results in three categories: For Sub-data1, Sub-data2 and Full-Data.

**Table 2. Summary of Descriptive Statistics for all the data sets used in study**

				Sub-Data 1							
	Mean	Median	Max	Min	Std. Dev.	Skewness	Kurtosis	J-B	Prob.	Obs	C with LCF
LFUTURE	8.368	8.495	8.923	7.519	0.321021	-0.473212	1.991649	100.57	0	1262	1
LBANK	9.671	9.722	10.065	9.102	0.252913	-0.151456	1.622109	104.66	0	1262	-0.7046
LFMCG	8.808	8.847	9.108	8.284	0.206126	-0.956475	3.037487	192.5	0	1262	-0.5415
LMETAL	9.159	9.192	9.545	8.753	0.169074	-0.2843	2.518067	29.21	0	1262	0.4694
LOIL	9.132	9.11	9.428	8.907	0.117148	0.581686	2.547816	81.92	0	1262	-0.2538
LREALTY	7.345	7.344	7.745	6.94	0.167002	0.148657	2.313515	29.43	0	1262	0.3504
				Sub-Data 2							
	Mean	Median	Max	Min	Std. Dev.	Skewness	Kurtosis	J-B	Prob.	Obs	C with LCF
LFUTURE	8.245	8.266	8.757	6.842	0.249184	-1.17633	6.774938	992.556	0	1204	1
LAUTO	9.936	9.989	10.207	9.236	0.186792	-0.970589	3.665849	211.2783	0	1204	0.576
LBANK	10.328	10.308	10.763	9.87	0.180284	0.076789	2.452801	16.20448	0.000303	1204	0.7024
LFMCG	9.332	9.336	9.636	9.004	0.115706	0.006789	3.496257	12.36384	0.002066	1204	0.5754
LHEALTH	9.68	9.578	10.199	9.306	0.226938	1.033895	2.709737	218.727	0	1204	0.3436
LMETAL	9.376	9.369	10.017	8.594	0.286907	-0.101762	3.02994	2.122974	0.345941	1204	0.7577
LOIL	9.569	9.581	9.872	9.098	0.111206	-0.409745	4.664474	172.6756	0	1204	0.7325
LREALTY	7.656	7.653	8.395	7.145	0.236964	0.491529	3.749168	76.63731	0	1204	0.6689
				Full-Data							
	Mean	Median	Max	Min	Std. Dev.	Skewness	Kurtosis	J-B	Prob.	Obs	C with LCF
LFUTURE	8.308	8.312	8.923	6.842	0.294627	-0.513064	3.417106	126.0654	0	2466	1
LAUTO	9.741	9.821	10.207	8.977	0.314397	-0.64096	2.224311	230.675	0	2466	-0.3539
LBANK	9.992	10.001	10.763	9.102	0.395331	-0.240336	2.01032	124.3801	0	2466	-0.2923
LMETAL	9.265	9.251	10.017	8.594	0.258026	0.403189	3.37188	81.02238	0	2466	0.4314
LHEALTH	9.499	9.56	10.199	8.661	0.346693	-0.444216	2.86001	83.11542	0	2466	-0.423
LREALTY	7.497	7.48	8.395	6.94	0.256558	0.610237	3.513411	180.136	0	2466	0.2557

Note: LCF = Log of Crude oil Futures, LA = Log of Auto, LB = Log of Bank, LF = Log of FMCG, LH = Log of Healthcare, LM = Log of Metal, LO = Log of Oil and Gas, LR = Log of Realty, C with LCF = Correlation with Log of Crude Futures.

Source: Author's Calculation

Descriptive Statistics of daily futures prices and all selected sectors shows that the average mean value of all the variables are increased in the period 2017-2021 as compared to the previous period and an overall increase can be seen in full data as compared to sub data 1. The reason could be covid crisis because of which the values of skewness and kurtosis also show high values in the period covering 2019-2020, hence the distribution is not skewed and leptokurtic except one variable in sub data 1 and three variables in sub data 2 and three variables in full data. Crude oil futures show a slightly high negative correlation with sectoral indices in sub data 1 but it changed to slightly high positive correlation with different sectors but full data shows a weak negative correlation. A positive correlation signifies that an increase in crude oil futures prices results in positive growth in the sectoral index and negative correlation means increase in crude oil futures prices results in a decline of that sector Index.

**Results.** To see the relationship between the futures prices of crude oil and sectoral indices, first we should examine the stochastic properties of the series chosen for the study and analyze their order of integration on the basis of their stationarity.

**Stationarity (Unit Root) Tests.** Tabulated reports in Table 3 shows the results for stationarity of the series and we have applied three tests i.e. ADF (Augmented Dickey Fuller), P-P (Phillips-Perron) and KPSS (Kwiatkowski–Phillips–Schmidt–Shin) to determine the stationarity of crude oil futures and sectoral indices of India. The results are determined by considering the linear trend (MacKinnon, 1991) and indicate that all the series are stationary at first difference series i.e. I (1) for all the variables allowing us to model VAR or VECM based on their cointegration relationship.

**Table 3. Stationarity (Unit Root) Tests results of Augmented Dickey Fuller (ADF), Phillips-Perron (P-P), Kwiatkowski-Phillips-Schmidt-Shin (KPSS).**

Sub-Data 1	ADF		P-P		KPSS	
Variables	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
LFUTURE	-1.603(0.7916)	-35.454(0.000)***	-1.673(0.7628)	-35.451(0.000)***	0.582	0.1198***
LBANK	-2.319 (0.4225)	-32.251(0.000)***	-2.248(0.4615)	-32.202(0.000)***	0.272	0.0481***
LFMCG	-2.367(0.3967)	-33.845(0.000)***	-2.445(0.3554)	-33.830(0.000)***	0.725	0.0217***
LMETAL	-1.712(0.7455)	-34.495(0.000)***	-1.7943(0.7072)	-34.494(0.000)***	0.223	0.0816***
LOIL	-2.463(0.3466)	-34.260(0.000)***	-2.501(0.3272)	-34.271(0.000)***	0.235	0.0536***
LREALTY	-2.803(0.1963)	-32.726(0.000)***	-2.848(0.1802)	-32.707(0.000)***	0.115***	0.0358***
<b>Sub-Data 2</b>						
LFUTURE	-2.376(0.3916)	-39.050(0.000)***	-2.513(0.3213)	-38.560(0.000)***	0.3595	0.0479***
LAUTO	-0.868(0.9576)	-35.031(0.000)***	-0.868(0.9576)	-35.031(0.000)***	0.684	0.1511**
LBANK	-2.126(0.5301)	-33.907(0.000)***	-2.137(0.5237)	-33.907(0.000)***	0.2857	0.0953***
LFMCG	-3.440(0.0466)**	-11.624(0.000)***	-3.088(0.1094)	-36.692(0.000)***	0.4136	0.0750***
LHEALTH	-1.417(0.8556)	-32.778(0.000)***	-1.581(0.7999)	-32.945(0.000)***	0.9816	0.0408***
LMETAL	-0.653(0.9753)	-35.897(0.000)***	-0.741(0.9690)	-35.933(0.000)***	0.6683	0.1843**
LOIL	-2.029(0.5843)	-12.234(0.000)***	-2.017(0.5907)	-35.138(0.000)***	0.4014	0.0787***
LREALTY	-0.978(0.9451)	-32.319(0.000)***	-1.236(0.9017)	-32.419(0.000)***	0.4520	0.1732**
<b>Full-Data</b>						
LFUTURE	-2.201(0.4877)	-53.893(0.000)***	-2.360(0.4003)	-53.645(0.000)***	0.5516	0.0414***
LAUTO	-0.868(0.9576)	-35.031(0.000)***	-0.868(0.9576)	-35.031(0.000)***	0.6843	0.1511*
LBANK	-2.833(0.1852)	-46.952(0.000)***	-3.079(0.1115)	-46.985(0.000)***	0.3445	0.0318***
LHEALTH	-1.752(0.7275)	-46.006(0.000)***	-1.784(0.7120)	-46.199(0.000)***	0.8344	0.1468***
LMETAL	-1.378(0.8673)	-50.009(0.000)***	-1.574(0.8030)	-50.163(0.000)***	0.2163	0.0776***
LREALTY	-1.800(0.7046)	-45.985(0.000)***	-1.895(0.6564)	-46.075(0.000)***	0.3910	0.0496***

Note: \*\*\* represents significance at 1% level, \*\* at 5% and \* at 10%. Probability values are shown in ( ). Lag selection is based on SIC.

Source: Author's calculation

All the tests consider the Schwarz Information Criteria with automatic selection as it gives the most consistent results. All the variables are considered as the I(1) stationary in the similar way as by Aydogan & İstemi (2014). Thus we can now proceed to testing the Johansen Cointegration.

**Johansen Cointegration.** Table 3 presents the Johansen Cointegration tests with crude oil futures prices and sectoral indices of India. The results are presented in trace statistics and Max Eigen values as per (Johansen, S., 1995). The number of variables are different in different samples and the null hypothesis in both trace and eigen statistics is that, there are  $r$  cointegrating vectors but alternative is opposite saying more than  $r$ , therefore, we have to test sequentially, starting with  $r=0$  and if we find trace or max value smaller than the critical value, then we can not reject the null

and if trace or max value is greater than the critical value and p value is less than five percent then we have to reject the null and there is at most one cointegrating vector. For the eigenvalue test the alternative is  $r+1$  and we have to go sequentially again.

**Table 4. Johansen Cointegration Tests Results**

	Trace Statistics			Max-Eigen Statistics		
Subdata 1	Trace Value	Critical Value	p-Value	Max	Critical Value	p-Value
Ho: $r=0$	74.33852	83.93712	0.2025	31.11357	36.63019	0.1913
Ho: $r=1$	43.22495	60.06141	0.5567	17.48284	30.43961	0.7388
Ho: $r=2$	25.74212	40.17493	0.602	11.71912	24.15921	0.8027
Ho: $r=3$	14.02299	24.27596	0.5352	8.158732	17.7973	0.6886
Ho: $r=4$	5.864262	12.3209	0.4527	5.861689	11.2248	0.3657
Ho: $r=5$	0.002573	4.129906	0.9653	0.002573	4.129906	0.9653
Subdata 2						
Ho: $r=0$	188.0831	169.5991	<b>0.0036**</b>	67.6975	53.18784	<b>0.0009**</b>
Ho: $r=1$	120.3856	134.678	0.2525	35.52656	47.07897	0.4792
Ho: $r=2$	84.85901	103.8473	0.4494	34.16691	40.9568	0.2371
Ho: $r=3$	50.6921	76.97277	0.8338	20.15624	34.80587	0.8035
Ho: $r=4$	30.53586	54.07904	0.8956	13.67789	28.58808	0.8965
Ho: $r=5$	16.85797	35.19275	0.8921	9.711471	22.29962	0.8569
Fulldata						
Ho: $r=0$	111.4965	117.7082	0.1158	42.33713	44.4972	0.0843
Ho: $r=1$	69.15941	88.8038	0.54	26.75832	38.33101	0.5439
Ho: $r=2$	42.40109	63.8761	0.7608	20.20121	32.11832	0.6361
Ho: $r=3$	22.19989	42.91525	0.9058	11.39052	25.82321	0.9074
Ho: $r=4$	10.80937	25.87211	0.8858	5.722762	19.38704	0.9665
Ho: $r=5$	5.086606	12.51798	0.584	5.086606	12.51798	0.584

Note: \*\*\* represents significance at 1% level, \*\* at 5% and \* at 10%. Lag selection is based on SIC

Source: Author's calculation

In Johansen cointegration tests optimal lag length is determined by VAR model and in this study we have followed SIC criteria because of its consistency and it selected relatively low lag values as compared to AIC (Akaike Information Criterion). Also, SIC is preferred to AIC on the basis of Monte Carlo evidence (Pesaran et al., 1998). (MacKinnon et al., 1999) is being followed for the p values reported in Table 3 and the results are consistent, showing the one cointegrating relationship between variables in sub data-2 at five percent significance level. This result shows that there is a long-term relationship between the variables in sub-data 2 only, meaning that we have to check for short-term relationships in all the data samples now.

**Granger Causality.** We can find the causal relationship between two variables by using the Granger Causality approach where the previous information must have some impact on the current values or prices. Here the log of crude oil futures and log of sectoral indices are used to construct this approach and significant F values mean a significant causal relationship. Example: if Y causes X and individually both series are I(1) and cointegrated then causal relationship is in atleast one direction. It also determines if X can be explained using current values or past values and if adding lagged values can forecast better or not. Table-5 shows the results for Granger Causality with significant F-values.

**Table 5. Granger Causality Test results**

Sub-Data 1					
Causality from Oil Futures to Sectors	F-statistics	P-value	Causality from Sectors to Oil Futures	F-statistics	P-value
Crude oil Futures => Bank	0.85962	0.4236	Bank => Crude oil Futures	3.0611	<b>0.0472**</b>
Crude oil Futures => FMCG	0.14636	0.8639	FMCG => Crude oil Futures	1.05029	0.3501
Crude oil Futures => Metal	4.51775	<b>0.0111**</b>	Metal => Crude oil Futures	0.39218	6.76E-01
Crude oil Futures => Oil	1.58101	0.2062	Oil => Crude oil Futures	1.41276	2.44E-01
Crude oil Futures => Realty	0.65721	0.5185	Realty => Crude oil Futures	0.18084	0.8346
Sub-Data 2					
Causality from Oil Futures to Sectors	F-statistics	P-value	Causality from Oil Futures to Sectors	F-statistics	P-value
Crude oil Futures => Auto	1.58196	0.206	Auto => Crude oil Futures	3.8771	<b>0.021**</b>
Crude oil Futures => Bank	2.55434	0.0782	Bank => Crude oil Futures	4.42637	<b>0.0122**</b>
Crude oil Futures => FMCG	0.60342	0.5471	FMCG => Crude oil Futures	11.614	1.00E-05
Crude oil Futures => Health	2.46674	0.0853	Health => Crude oil Futures	12.1746	6.00E-06
Crude oil Futures => Metal	4.33783	<b>0.0133**</b>	Metal => Crude oil Futures	7.42125	<b>0.0006**</b>
Crude oil Futures => Oil	3.70534	<b>0.0249**</b>	Oil => Crude oil Futures	11.1125	2.00E-05
Crude oil Futures => Realty	1.53841	0.2151	Realty => Crude oil Futures	4.32053	<b>0.0135**</b>
Full-Data					
Causality from Oil Futures to Sectors	F-statistics	P-value	Causality from Oil Futures to Sectors	F-statistics	P-value
Crude oil Futures => Auto	1.89555	0.1505	Auto => Crude oil Futures	2.32213	0.0983
Crude oil Futures => Bank	0.86839	0.4198	Bank => Crude oil Futures	1.4103	0.2443
Crude oil Futures => Health	1.68739	0.1852	Health => Crude oil Futures	4.66635	<b>0.0095**</b>
Crude oil Futures => Metal	7.44602	<b>0.0006**</b>	Metal => Crude oil Futures	1.07686	0.3408
Crude oil Futures => Realty	0.54845	0.5779	Realty => Crude oil Futures	0.68762	0.5029

Note: \*\*\* represents significance at 1% level, \*\* at 5% and \* at 10%

Source: Author's calculation

For Sub-Data 1 only two cases show the probability values of F-statistics smaller than 0.05 or five percent. Therefore, only in these two cases we can not accept the null hypothesis i.e. Bank sector Index granger-cause crude oil futures and crude oil futures granger-cause metal index i.e. unidirectional causality only. Rest of the null hypothesis is accepted. Similarly, in Sub-Data 2 Crude oil futures causes oil sector index and auto, bank and oil sectoral indices causes crude oil futures showing unidirectional causality but crude oil futures and metal sector shows a bidirectional causality.

**Vector Autoregressive.** If we want to capture transmission accurately between different variables, then we can use the VAR Model. In our study we did not find cointegrating relationships in Sub-Data 1 and Full-Data, therefore, we will be using VAR in both of these cases. The lag selection criteria is followed by considering AIC, SIC and HQC but the more reliable value is chosen on the basis of least change in value by a particular criterion. Here in Table 6, and Table 8 we can see that the results are slightly different from Granger Causality and are more accurate. As per granger causality test banking sector granger causes crude oil futures but no such evidence exists in the VAR model. Instead, the banking sector has more impact of its lagged values but the metal sector results are similar and shows the evidence of the impact on the metal sector is from the lagged value of crude oil futures. Additionally, VAR shows the impact from the lag of the Bank Index. Full-Data results also show that crude oil futures have a significant impact of lagged value of crude oil futures as well as lag of health index which coincides with granger causality results.

**Table 6. Vector Autoregressive (Sub-Sample 1)**

	D1FUTURE	D1BANK	D1FMC	D1METAL	D1OIL	D1REALTY
D1FUTURE(-1)	0.000558	-0.024022	-0.005161	<b>0.062343**</b>	0.034089	-0.007953
	(-0.02829)	(-0.02061)	(-0.01445)	(-0.0227)	(-0.0179)	(-0.02925)
	[ 0.01974]	[-1.16567]	[-0.35705]	[ 2.74690]	[ 1.90420]	[-0.27190]
D1BANK(-1)	-0.04906	<b>0.182533**</b>	<b>0.063618**</b>	<b>0.165448**</b>	<b>0.13142**</b>	<b>0.19066**</b>
	(-0.06019)	(-0.04385)	(-0.03075)	(-0.04829)	(-0.03809)	(-0.06224)
	[-0.81510]	[ 4.16274]	[ 2.06859]	[ 3.42604]	[ 3.45012]	[ 3.06346]
D1FMC(-1)	0.000563	-0.019601	<b>0.068125**</b>	-0.053043	0.005973	0.003391
	(-0.06165)	(-0.04491)	(-0.0315)	(-0.04946)	(-0.03902)	(-0.06375)
	[ 0.00914]	[-0.43641]	[ 2.16265]	[-1.07237]	[ 0.15308]	[ 0.05320]
D1METAL(-1)	-2.94E-05	-0.038115	-0.042573	-0.060556	-0.05459	-0.061825
	(-0.05077)	(-0.03699)	(-0.02594)	(-0.04073)	(-0.03213)	(-0.0525)
	[-0.00058]	[-1.03052]	[-1.64118]	[-1.48667]	[-1.69909]	[-1.17773]
D1OIL(-1)	0.019594	-0.039019	-0.03168	-0.018863	-0.038802	0.013987
	(-0.06355)	(-0.0463)	(-0.03247)	(-0.05099)	(-0.04022)	(-0.06571)
	[ 0.30831]	[-0.84275]	[-0.97560]	[-0.36993]	[-0.96475]	[ 0.21285]
D1REALTY(-1)	0.032539	-0.030982	-0.024705	0.013779	0.015084	0.01328
	(-0.04068)	(-0.02964)	(-0.02079)	(-0.03264)	(-0.02575)	(-0.04207)
	[ 0.79981]	[-1.04532]	[-1.18841]	[ 0.42212]	[ 0.58584]	[ 0.31568]
C	-0.000239	0.000465	0.00048	-8.40E-05	0.000248	-0.000318
	(-0.00058)	(-0.00042)	(-0.00029)	(-0.00046)	(-0.00036)	(-0.0006)
	[-0.41530]	[ 1.10813]	[ 1.62771]	[-0.18155]	[ 0.67929]	[-0.53393]

Note: \*\*\* represents significance at 1% level, \*\* at 5% and \* at 10%. Standard Errors in ( ) and t-statistics in [ ]. Lag selection is based on SIC.

Source: Author's calculation

**Table 7. Vector Autoregressive Tests results (Full-Sample)**

	D1FUTURE	D1AUTO	D1BANK	D1HEALTH	D1METAL	D1REALTY
D1FUTURE(-1)	<b>-0.042351**</b>	<b>0.020728**</b>	-0.009108	0.016025	<b>0.054269**</b>	-0.015375
	(-0.01961)	(-0.01044)	(-0.01196)	(-0.00848)	(-0.01367)	(-0.01553)
	[-2.15989]	[ 1.98619]	[-0.76148]	[ 1.89076]	[ 3.97008]	[-0.99009]
D1AUTO(-1)	-0.033742	0.009938	0.014422	0.008205	-0.057661	-0.026854
	(-0.05943)	(-0.03163)	(-0.03625)	(-0.02569)	(-0.04143)	(-0.04707)
	[-0.56775]	[ 0.31420]	[ 0.39781]	[ 0.31938]	[-1.39173]	[-0.57056]
D1BANK(-1)	-0.054566	<b>0.060619**</b>	<b>0.111207**</b>	-0.013757	<b>0.079424**</b>	<b>0.100488**</b>
	(-0.05116)	(-0.02723)	(-0.03121)	(-0.02211)	(-0.03566)	(-0.04052)
	[-1.06661]	[ 2.22634]	[ 3.56351]	[-0.62213]	[ 2.22700]	[ 2.48025]
D1HEALTH(-1)	<b>-0.15602**</b>	0.012998	<b>-0.081013**</b>	<b>0.072894**</b>	<b>-0.085212**</b>	-0.017782
	(-0.05611)	(-0.02986)	(-0.03423)	(-0.02425)	(-0.03912)	(-0.04444)
	[-2.78064]	[ 0.43524]	[-2.36689]	[ 3.00550]	[-2.17845]	[-0.40018]
D1METAL(-1)	0.01646	<b>-0.055387**</b>	<b>-0.068827**</b>	-0.022257	-0.036049	-0.019551
	(-0.04164)	(-0.02216)	(-0.0254)	(-0.018)	(-0.02903)	(-0.03298)
	[ 0.39530]	[-2.49928]	[-2.70975]	[-1.23666]	[-1.24189]	[-0.59288]
D1REALTY(-1)	0.070565	0.015857	0.01669	0.022432	0.042636	0.053321
	(-0.03632)	(-0.01933)	(-0.02216)	(-0.0157)	(-0.02532)	(-0.02876)
	[ 1.94287]	[ 0.82031]	[ 0.75330]	[ 1.42883]	[ 1.68389]	[ 1.85373]
C	0.000341	0.000431	0.000596	<b>0.000532**</b>	0.000288	0.000336
	(-0.00052)	(-0.00027)	(-0.00031)	(-0.00022)	(-0.00036)	(-0.00041)
	[ 0.66190]	[ 1.57062]	[ 1.89585]	[ 2.38799]	[ 0.80253]	[ 0.82272]

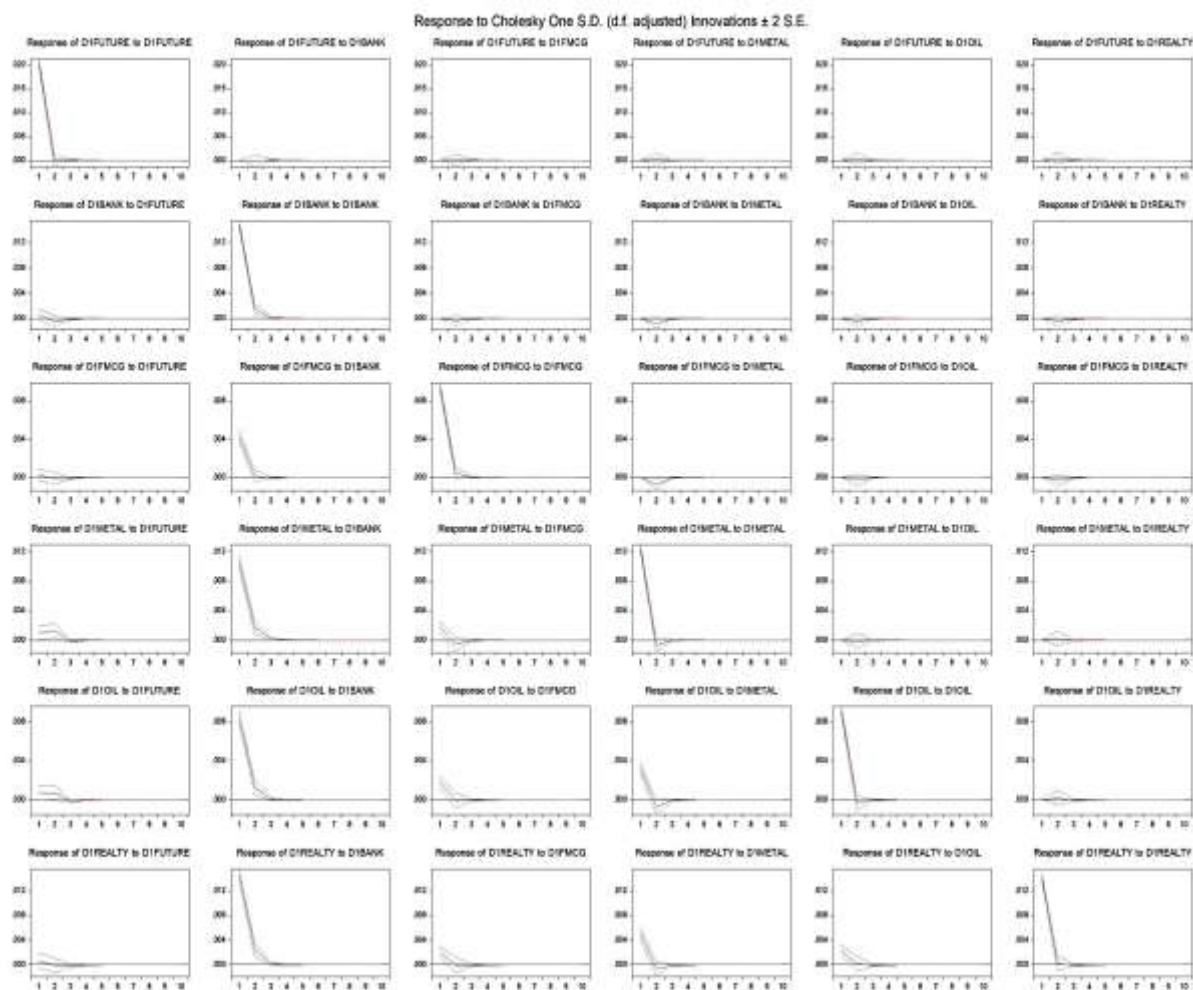
Note: \*\*\* represents significance at 1% level, \*\* at 5% and \* at 10%. Standard Errors in ( ) and t-statistics in [ ]. Lag selection is based on SIC.

Source: Author's calculation



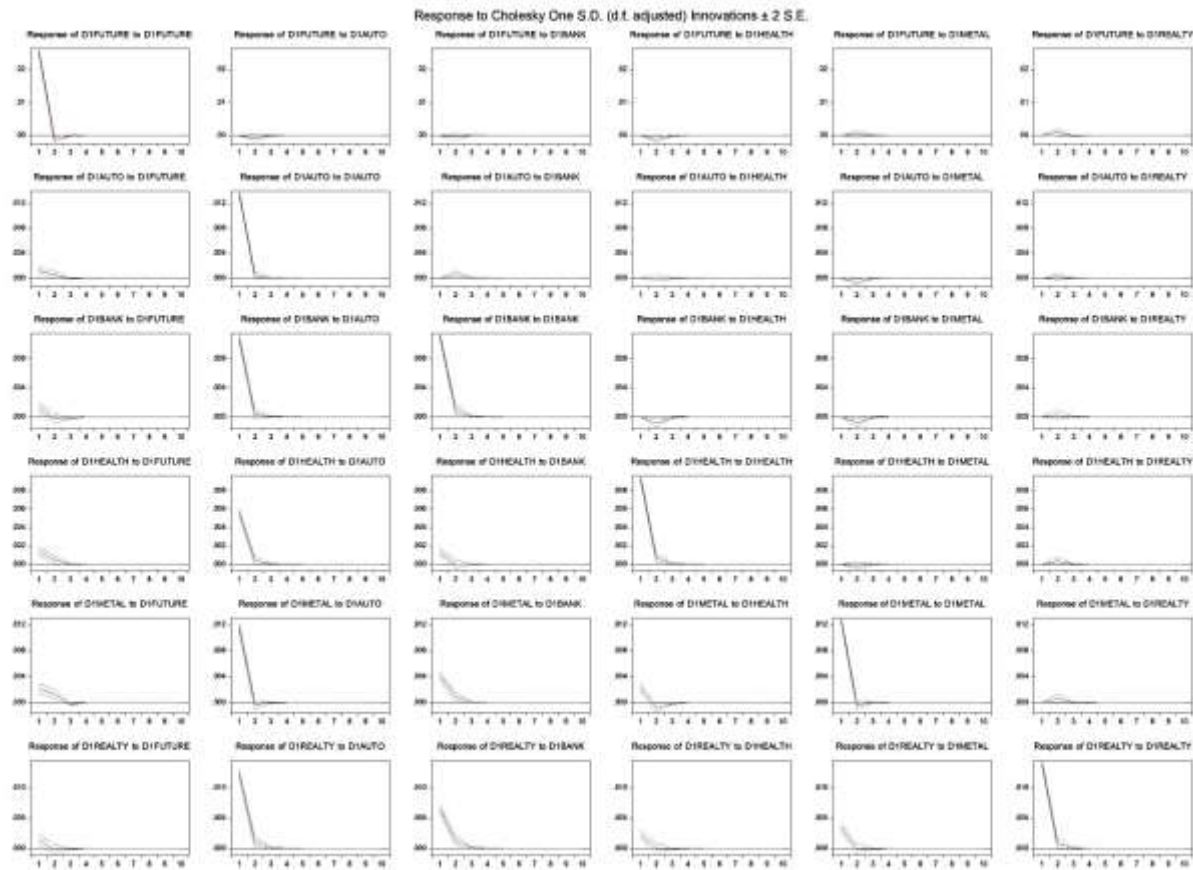
Health index also has a significant impact on its lag and constant term, meaning some other variables are also affecting this sector but we have not considered those factors. Also, the metal index has a significant impact from the lag of crude oil futures and additionally, lag of the bank and health sector shows the significant impact.

**Impulse Response Function (IRF).** We complement VAR (in sub-data1 and full-data samples) using the Impulse response function by plotting the multiple graphs with monte carlo applying one million simulations. We have considered 10 lags to show the data of ten year meaning that we are assuming each lag as each year. IRF is basically a response to a shock or change in the system caused by some external event. It not only provides dynamic behavior but also traces the transmission of shock within the whole system.



**Figure 2. Impulse Response of log of crude oil futures and sectoral indices in sub-sample 1**

*Source: Author's calculation*



**Figure 3. Impulse Response of log of crude oil futures and sectoral indices in full-sample**

*Source: Author's calculation*

For sub-data1, we can see that the crude oil futures and all the sectoral indices react in a positive way to their own past innovation in the first year but only the metal and oil sector becomes negative in the second year and the rest remains positive. In the third year, the response of all the variables dies out to their own past innovation. Additionally, shocks in crude oil futures have no significant impact on any sector and vice-versa.

For a full-data sample, all the sector and crude oil oil futures react in a positive way to their own past innovation in the first year but only metal and crude oil futures become negative in the second year while others remain positive but in the third year all the responses die out. In addition to this, shocks on crude oil futures show a slight significance but shocks on sectoral indices show no significance at all.

**Vector Error Correction Model.** For long run cointegrating vectors, VECM is used for causal relationship and error correction term is also used to test the stationarity. If error estimates are stationary at level, then the model is correct and we can see the relationship between log of variables.



**Table 8. Vector Error Correction Model Tests results (Sub-Sample 2)**

Cointegrating Eq:	CointEq1
D1FUTURE(-1)	1
D1AUTO(-1)	0.652131 (-0.13758) [ 4.74009]
D1BANK(-1)	0.468169 (-0.11449) [ 4.08901]
D1FMCG(-1)	1.379576 (-0.15576) [ 8.85717]
D1HEALTH(-1)	-0.166071 (-0.13174) [-1.26065]
D1METAL(-1)	-1.253953 (-0.09533) [-13.1534]
D1OIL(-1)	-0.542237 (-0.12125) [-4.47188]
D1REALTY(-1)	-0.284608 (-0.08963) [-3.17554]
C	-0.000367 (-0.00087) [-0.42091]

Error Correction:	D(D1FUTURE)	D(D1AUTO)	D(D1BANK)	D(D1FMCG)	D(D1HEALTH)	D(D1METAL)	D(D1OIL)	D(D1REALTY)
CointEq1	<b>-0.726406**</b> (-0.03625) [-20.0364]	-0.018924 (-0.02132) [-0.88765]	-0.028073 (-0.02354) [-1.19237]	<b>-0.068092**</b> (-0.01541) [-4.41798]	0.031002 (-0.0168) [ 1.84554]	<b>0.18948**</b> (-0.02701) [ 7.01533]	<b>0.062198**</b> (-0.02119) [ 2.93535]	0.054758 (-0.02736) [ 2.00143]
D (D1FUTURE (-1))	<b>-0.067784**</b> (-0.02647) [-2.56096]	<b>0.034986**</b> (-0.01556) [ 2.24775]	0.02227 (-0.01719) [ 1.29566]	<b>0.045354**</b> (-0.01125) [ 4.03064]	-0.000838 (-0.01226) [-0.06831]	-0.035537 (-0.01972) [-1.80220]	<b>0.007669**</b> (-0.01547) [ 0.49577]	-0.043895 (-0.01997) [-2.19755]
D(D1AUTO(-1))	<b>0.272224**</b> (-0.07144) [ 3.81051]	<b>-0.529727*</b> (-0.04201) [-12.6093]	-0.006764 (-0.04639) [-0.14580]	-0.023345 (-0.03037) [-0.76867]	-0.017018 (-0.0331) [-0.51412]	<b>-0.156227**</b> (-0.05322) [-2.93533]	-0.059863 (-0.04175) [-1.43371]	-0.0464 (-0.05391) [-0.86064]
D(D1BANK(-1))	<b>0.191833*</b> (-0.06292) [ 3.04874]	0.052006 (-0.037) [ 1.40552]	<b>-0.403322**</b> (-0.04086) [-9.87044]	0.008442 (-0.02675) [ 0.31558]	-0.024095 (-0.02915) [-0.82647]	-0.043322 (-0.04688) [-0.92417]	0.040533 (-0.03678) [ 1.10217]	-0.011957 (-0.04748) [-0.25181]
D(D1FMCG(-1))	<b>0.261776**</b> (-0.08182) [ 3.19928]	0.050032 (-0.04812) [ 1.03982]	0.056325 (-0.05314) [ 1.06001]	<b>-0.428647**</b> (-0.03479) [-12.3228]	-0.063601 (-0.03791) [-1.67759]	-0.070363 (-0.06096) [-1.15429]	-0.036946 (-0.04782) [-0.77257]	-0.035138 (-0.06175) [-0.56905]
D(D1HEALTH(-1))	<b>-0.225524**</b> (-0.07258) [-3.10713]	0.040535 (-0.04268) [ 0.94968]	-0.03941 (-0.04714) [-0.83610]	0.02372 (-0.03086) [ 0.76870]	<b>-0.460781**</b> (-0.03363) [-13.7012]	-0.039365 (-0.05407) [-0.72797]	0.032053 (-0.04242) [ 0.75558]	0.068471 (-0.05478) [ 1.25003]
D(D1METAL(-1))	<b>-0.570012**</b> (-0.05359) [-10.6358]	-0.034213 (-0.03152) [-1.08557]	-0.049331 (-0.0348) [-1.41740]	<b>-0.069063**</b> (-0.02278) [-3.03122]	0.011721 (-0.02483) [ 0.47200]	<b>-0.40039**</b> (-0.03993) [-10.0280]	0.001921 (-0.03132) [ 0.06134]	0.031677 (-0.04044) [ 0.78320]
D(D1OIL(-1))	<b>-0.131288**</b> (-0.06288) [-2.08799]	-0.063058 (-0.03698) [-1.70542]	<b>-0.129266**</b> (-0.04083) [-3.16576]	-0.037892 (-0.02673) [-1.41753]	-0.023216 (-0.02913) [-0.79686]	0.021532 (-0.04684) [ 0.45965]	-0.511384 (-0.03675) [-13.9155]	-0.018771 (-0.04745) [-0.39559]
D(D1REALTY(-1))	-0.061494 (-0.0475) [-1.29464]	-0.024975 (-0.02793) [-0.89413]	0.034879 (-0.03085) [ 1.13075]	-0.010881 (-0.02019) [-0.53884]	0.025464 (-0.02201) [ 1.15701]	0.060693 (-0.03539) [ 1.71513]	0.010752 (-0.02776) [ 0.38731]	<b>-0.459877**</b> (-0.03585) [-12.8294]

Note: \*\*\* represents significance at 1% level, \*\* at 5% and \* at 10%. Standard Errors in ( ) and t-statistics in [ ]. Lag selection is based on SIC.

Source: Author's calculation

Here, Error Correction Term can be written as:

$$ECT_{t-1} = D1 FUTURE_{t-1} + 0.652D1 AUTO_{t-1} + 0.468D1 BANK_{t-1} + 1.379D1 FMCG_{t-1} - 0.166D1 HEALTH_{t-1} - 1.253D1 METAL_{t-1} - 0.542D1 OIL_{t-1} - 0.284D1 REALTY_{t-1} - 0.000367C_{t-1} \quad (9)$$

Here, D1 means the first difference series of all the variables considered for the VEC Model. Since we are considering the crude oil futures as the target variable, therefore, the equation can be written as:

$$D1\text{ FUTURES}_t = -0.726ECT_{t-1} - 0.067D1\text{ FUTURES}_{t-1} + 0.272D1\text{ AUTO}_{t-1} + 0.1918D1\text{ BANK}_{t-1} + 0.261D1\text{ FMCG}_{t-1} - 0.225D1\text{ HEALTH}_{t-1} - 0.57D1\text{ METAL}_{t-1} - 0.131D1\text{ OIL}_{t-1} - 0.061D1\text{ REALTY}_{t-1} \quad (10)$$

The significant and negative value of error correction estimates shows a significant long-term equilibrium, i.e., expected long-term convergence. The previous period deviation from long-run equilibrium is corrected at a speed of about seventy-two percent each period, Also the explanatory variables granger causes the crude oil futures. Equation 10 represents the *ceteris paribus* effect of the variables and the error correction term shows the longterm relation whereas the other variables show a short run relationship.

**Wald Test.** Wald test is used in case of short-term causality examination. It works considering the set of variables that are insignificant and tested for combined effect by equalizing them to zero. This is the null hypothesis for this test and if it is rejected then it means there is a short-run causality whereas the alternative of that can not confirm the short-run causality. Sub-Data 2 already has all the variables significant resulting in the long-term as well as the short-run causality running from sectoral indices to crude oil futures except the realty index. But from crude oil futures to sectors, the lag of futures, fmcg, metal, oil and realty sectors are caused by future prices.

**Table 9. Wald Test for Short-run Causality**

Sub-data 1			
Test Statistic	Value	df	Probability
Null Hypothesis: C(1) = C(2) = C(3) = C(4) = C(5) = C(6) = 0			
Chi-square	1.064317	6	0.9831
Full-data			
Test Statistic	Value	df	Probability
Null Hypothesis: C(2) = C(3) = C(5) = C(6) = 0			
Chi-square	4.606871	4	0.3301

Source: Author's calculation

Here in Table 9, only Sub-Data 1 and Full-Data are considered for short-term causality and as per the result in Wald statistics, all the variables in both the data sets for different periods did not confirm the short-run causality because the null hypothesis can not be rejected. Hence, for sub-data 1 no sectoral index granger causes crude oil futures prices in the short run model, instead of lag of crude oil futures only granger causes the metal sector in the short run model. In the full data sample only lag of future prices and the health sector causes crude oil futures prices but also future prices causes lag of futures, auto sector and metal sector in the short run.

**Conclusion.** Being an oil importing nation, the Indian economy and its financial sector are exposed to oil price risk and crude oil futures market being an investment opportunity serves as a hot plate to investors and risk managers. We put crude oil futures and sectoral indices of India to the test of the causal relationship between them. Combined with impulse response function, the wald test, VAR-VECM model and Granger Causality approach, this paper examines the transmission between crude oil futures and sectoral indices. Also, all this is done by dividing full data into two sub samples to get more robust and reliable results.

For sub-data1, bank granger causes oil futures but is not confirmed by VAR; instead, the bank has more impact on its lagged value. Also, crude futures cause the metal sector. For sub-data 2, the granger causality approach shows the metal sector provides a bidirectional causality result supported by VECM. A negative and significant error correction term shows long term relationship and significant values of other variables coefficient also shows a short term relationship for all sectors except the realty sector.

In full sample data, only oil futures granger causes metal and the health sector causes oil futures with the significant values of coefficients. The remaining insignificant values are tested for significance in the wald test for short run relationship but the null hypothesis can not be accepted which results in non confirmation of a short term relationship. IRF results also show very weak significant responses of sectoral indices to the crude oil futures shock and no significance in response of oil to sectoral shocks but only significant responses from their own past innovation. The FMCG and Health sectors are independent of oil futures but the Metal index is most resistant to it. There are few policy implications of the study:

Cointegration between oil futures and the metal, oil, bank and realty sector (different relationship in different data sets) indicates that holders or traders need to be aware of different behavior of the stock prices of sectors towards the prices of futures. Investors and policy makers should also consider the change in the benchmark information to maintain their decisions for different performing sectors. The bidirectional relationship of oil futures and the metal sector may help the investor to utilize the information of one variable to speculate the other market.

The future direction of research may include the findings from other oil importing countries, also, the relationship between oil futures and sectoral indices may lead to predictability in both the markets. Some of the studies can also focus on the market efficiency of any sector with oil futures like efficiency of crude oil futures and the metal sector.

### Notes:

*\*IBEF is a trust established by the Department of Commerce, Ministry of Commerce and Industry, Government of India.*

*1. crude oil price: India's oil import bill may halve if current crude price holds - The Economic Times (indiatimes.com)*

*2. Falling crude oil price brings good tidings for India's FMCG sector | Business Standard News (business-standard.com)*

*3. Rising fuel prices to have negative impact on automobile industry: SIAM | Business Standard News (business-standard.com)*

**Author contributions.** The authors contributed equally.

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## SOCIAL INSURANCE: A SECURITY FACTOR IN THE CONTEXT OF MODERN CHALLENGES

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**Abstract.** The article reveals the meaning and relationship between the concepts of "social protection", "social insurance" and "sustainable development". It was determined that the main goals of implementing the concept of sustainable development in the social sphere are to improve the social well-being of citizens, ensure social justice and increase social security. It was established that the basic component of the social policy of the state is social protection and social security of the population, which on the one hand acts as a right of citizens, and on the other - as a socio-economic necessity. This dual nature of social protection is determined by socio-economic risks that continuously accompany the life activities of a person and society. The role of social insurance as an organizational and legal form of social security of the population, which creates conditions for the reproduction of the workforce and the protection of citizens in the event of certain insurance cases, is justified. working capacity; social insurance in connection with accidents at work and occupational diseases; social insurance in case of unemployment; pension insurance. It is substantiated that all types of social insurance have an impact on the quality of life of citizens and public welfare. The general directions and principles of the modernization of the social insurance system in Ukraine, taking into account the priorities of sustainable development, have been determined. The main problems on the way to improving the effectiveness of the functioning of the social insurance system of the population, such as the crisis of the pension system and the underdevelopment of medical insurance, are considered. It is substantiated that the solution of the mentioned problems lies in the plane of the economic and social policy of Ukraine and requires a comprehensive approach.

**Keywords:** sustainable development, social protection, social insurance, pension insurance, medical insurance, social welfare.

**JEL Classification:** J32, J53

**Formulas:** 0, **figures:** 3, **tables:** 1, **bibl.:** 14

**Introduction.** The modern socio-economic development of European states is based on maintaining a balance of economic and social interests of society, combining the policy of economic reforms with an active social policy and finding new reserves to ensure public welfare, technological progress and economic growth, taking into account the impact on the ecology of the planet. It is these principles that underlie the concept of sustainable development, which in modern conditions has turned into a guide to action.

The term "sustainable development" was first presented in the report of the UN International Commission on Environment and Development "Our Common Future" in 1987. in which the concept was defined as the development of society, which makes it possible to meet the needs of the present without endangering the ability of future generations to meet their own needs [10, p. 17]. This concept includes three

components that form a system of economic, social and environmental priorities of human activity, organizations, and the state, as it is a complex and multi-level category.

Improving the social well-being of citizens, ensuring social justice and increasing social security are the main goals of implementing the concept of sustainable development in the social sphere. Especially under conditions when political turbulence and the growth of crisis phenomena in the country's economy affect the emergence of social risks and the deepening of social problems, which make the issues of social protection of the population and social security especially urgent. The organizational and legal form of social security in the state is social insurance, thanks to which the principle of social justice is implemented in the distribution of financial funds.

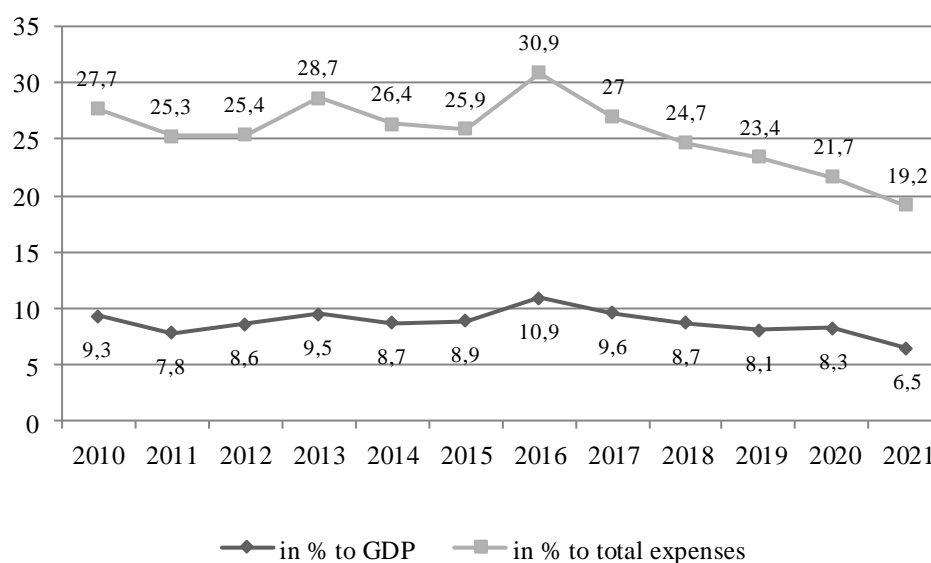
**Literature review.** The works of such Ukrainian scientists as V. Bezugla, O. Koval, O. Moskalenko, E. Libanova, H. Nazarova, N. Tkachenko and others are devoted to the theoretical and practical aspects of the functioning and improvement of the social insurance system. The essence of social insurance, its financial support, influence on the economic development of the country was theoretically substantiated by such domestic scientists as: O. Antonenko, V. Bazilevich, K. Dubych, O. Palii. Scientists O. Kyrylenko and V. Tolubiyak study the functions of social insurance in the conditions of the welfare state and promising directions for their improvement. It should be noted that V. Andriiv, N. Bolotina, S. Sivak, I. Syrota, and B. Stashkiv also analyze the modern problems of social insurance in their works.

The scientific works of M. Krupka and I. Pryimak are also devoted to the disclosure of the role of social and personal insurance in ensuring public welfare in Ukraine. Scientists such as E. Libanova, B. Nadtochii, V. Novikov, O. Shaliy, V. Skuratskyi, P. Shevchuk, V. Yatsenko and others devoted their works to the study of the theoretical foundations of pension insurance and pension reform. At the same time, it should be noted that the need for further transformation of the pension system, introduction of health insurance and improvement of financial support of the health care sector in Ukraine indicates the relevance of further research into the role of social insurance in the system of implementing sustainable development priorities.

**Aims.** The purpose of the article is to study the role of social insurance in the system of implementing the priorities of sustainable development, to identify the modern challenges of functioning and reforming the social insurance system, and to outline the priorities of its development.

**Methods.** The methodological basis of writing the article was made up of the following methods: systematization and generalization (when formulating the key concepts of the article); structural-functional approach (to determine the structure of the social security system and functions of the social insurance system); systemic approach (when considering directions for modernization of the social insurance system); statistical economic analysis (for evaluating objective indicators of the development of the social security and social insurance system); graphical method (for presenting research results).

**Results.** The main component of the social policy of the state is the social protection of the population, which on the one hand acts as a human right, and on the other - as a socio-economic necessity. This dual nature of social protection is determined by socio-economic risks that continuously accompany the life activities of a person and society. At the same time, in our country, there is a reduction in the amount of state spending on social protection. Thus, in 2021, according to preliminary data, these expenses as a percentage of GDP amounted to 6.5%, which is 1.5 points less than the level of 2020 [9, p. 13] (Fig. 1). At the same time, it should be noted that in European countries this indicator was: in France – 31.02% of GDP, Finland – 29.1%, Poland – 21.3%, the Czech Republic – 19.2% (2019 data) [12].



**Figure 1. State expenditures on social protection and social security of the population in Ukraine**

Source: [9, p. 13]

At the same time, the right of citizens to social protection is fixed by relevant legislative documents. Yes, Art. 46 of the Constitution of Ukraine enshrines the right to support citizens in case of total, partial or temporary loss of working capacity, loss of breadwinner, unemployment due to circumstances beyond their control, as well as in old age and in other cases provided for by law. This right is guaranteed by mandatory state social insurance at the expense of insurance contributions of citizens, enterprises, institutions and organizations, as well as budgetary and other sources of social security; creation of a network of state, communal, private institutions for the care of the disabled.

In the system of implementing the priorities of sustainable development, all social policy actors must do everything possible to preserve this right for future generations, ensuring the effective formation and use of appropriate funds for financing social protection measures. A fundamental role in this direction is played by social insurance in all its variety of forms and types of social benefits.

Social insurance is also a socio-economic necessity, as it creates conditions for the reproduction of the labor force and protection of citizens in the event of the



occurrence of certain insured events: loss of working capacity, including in connection with child care, pregnancy and childbirth; loss of breadwinner, unemployment; accident at work, etc. At the same time, the activity of social insurance funds should take place in two directions:

- security (material provision of temporarily disabled or disabled persons);
- social development (provision of prevention, restoration and preservation of working capacity of employees, including health measures and retraining of personnel) (Table 1) [8, c. 29].

Article 4 of the Law of Ukraine "Basics of Ukrainian Legislation on Mandatory State Social Insurance" defines the following types of social insurance in the system of social protection of the population of Ukraine: pension insurance; insurance in connection with temporary disability; Medical Insurance; insurance against an accident at work and an occupational disease that caused the loss of working capacity; unemployment insurance; other types of insurance provided by the laws of Ukraine [5].

**Table 1. Areas of activity of state mandatory social insurance funds**

Social Insurance	Security	Social development
Mandatory state social insurance against temporary disability	<ul style="list-style-type: none"> <li>–avoiding deterioration of the employee's health and possible complications;</li> <li>–preventing the spread of infectious diseases in the organization;</li> <li>–prevention of a decrease in the standard of living of a person and his family members</li> </ul>	–payment of treatment or rehabilitation assistance in the departments of the sanatorium and resort after illnesses and injuries
Mandatory state social insurance in connection with accidents at work and occupational diseases	<ul style="list-style-type: none"> <li>–prevention of industrial accidents and occupational diseases;</li> <li>–provision of insurance payments for the purpose of restoring working capacity;</li> <li>–temporary transfer to an easier job while maintaining the average monthly earnings</li> </ul>	–vocational training or retraining under a rehabilitation program with payment of average monthly earnings
Mandatory state social insurance in case of unemployment	<ul style="list-style-type: none"> <li>–reducing the duration of unemployment;</li> <li>–reduction of the share of youth in the total number of unemployed;</li> <li>–prevention of a decrease in the standard of living of a person and his family members.</li> </ul>	<ul style="list-style-type: none"> <li>–training, retraining, advanced training of unemployed persons;</li> <li>–provision of one-time financial assistance for the organization of business activities.</li> </ul>
Mandatory state pension insurance	<ul style="list-style-type: none"> <li>–provision of an appropriate level of cash payments and material support;</li> <li>–provision of additional pension</li> </ul>	–extension of the period of labor activity in connection with the pension reform.

	payments.	
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*Source: compiled by the authors*

Therefore, social insurance as an organizational and legal form of social protection of the population should perform two important functions:

- 1) prevention of socio-economic risks, preservation and restoration of working capacity of employees;
- 2) provision of insurance payments to citizens to ensure a decent standard of living.

Currently, research results and statistical indicators show that social insurance in Ukraine has a significant gap in the direction of preventive activities and prevention of insurance incidents. Thus, in the budget of the Social Insurance Fund of Ukraine for 2021, no funds were allocated for the prevention of insurance cases at all, and in 2020 the specific weight of these expenses was 0.04% [6]. That is why the issue of modernization of the social insurance system of Ukraine does not lose its relevance and importance.

The modernization of the social insurance system in Ukraine should take place in three directions:

- 1) further, as complete as possible implementation of the insurance principle in the social insurance system;
- 2) improvement of the administration of the current system of mandatory state social insurance;
- 3) introduction of new institutions in the field of social insurance, which are provided for by the current legislation, tested by the best world practice, but currently absent in Ukraine [3, p. 3-4].

The foundations of the legislation of Ukraine on mandatory state social insurance establish the principles on which the system functions and which require further implementation:

- legislative determination of the conditions and procedure for implementing mandatory state social insurance;
- mandatory insurance of persons who work under the terms of an employment contract and persons who provide themselves with work independently, citizens - subjects of entrepreneurial activity;
- granting the right to receive payments under mandatory state social insurance to persons engaged in entrepreneurial, creative activities, etc.;
- mandatory financing by insurance funds of expenses related to the provision of material security and social services, in the amounts stipulated by laws on mandatory state social insurance;
- solidarity and subsidies;
- state guarantees of realization of their rights by insured citizens;
- ensuring a standard of living not lower than the subsistence minimum established by law, by providing pensions, other types of social benefits and assistance, which are the main source of livelihood;
- targeted use of mandatory state social insurance funds;

- parity of representatives of all subjects of mandatory state social insurance in the management of mandatory state social insurance [5].

Thus, social insurance in the system of implementation of sustainable development priorities is intended to ensure, first of all:

1. Social solidarity, which finds its expression in two important areas. On the one hand, social solidarity manifests itself in intergenerational relationships, because the social insurance system requires working members of society to provide financial support to those who have lost their ability to work or who did not have it. For example, pension payments to senior citizens are funded by working members of society, i.e. younger generations. On the other hand, social solidarity is based on the joint responsibility of employers and employees and is implemented through insurance contributions by both of these entities.

2. Management of social funds on a parity basis - by state authorities, employers, employees. The principle of subsidization provides for the mandatory financial participation of insured persons in the formation of insurance funds, which is a mandatory condition for obtaining the right to insurance payments.

3. Social justice, which is ensured through the redistribution of funds of social insurance funds between different social groups, directly between insured entities and is manifested in equality and inequality in the distribution of material and spiritual goods in society.

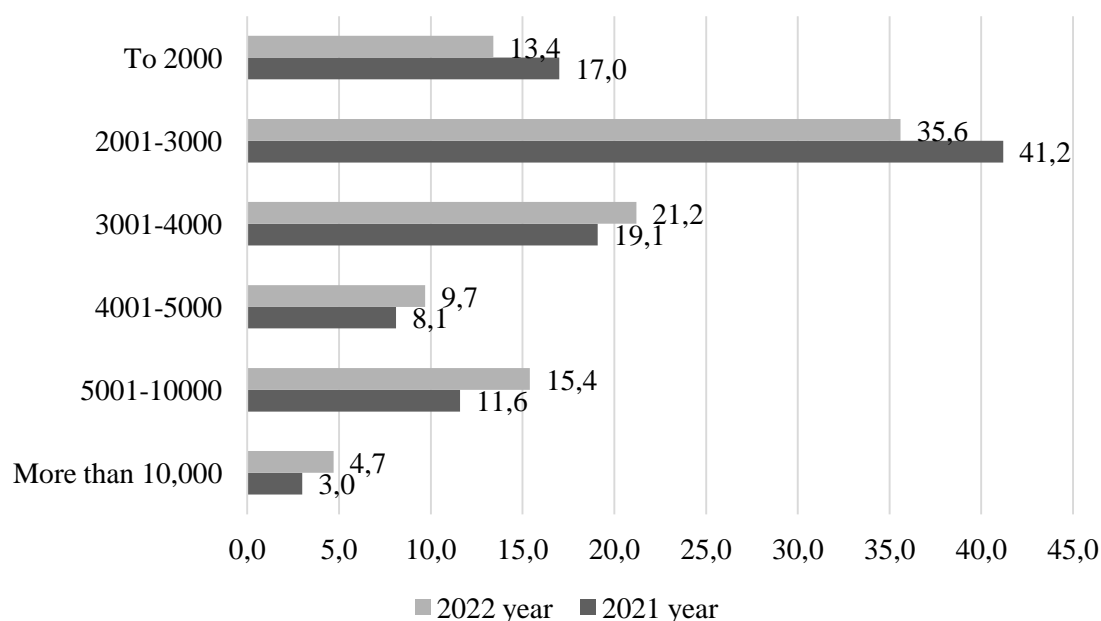
4. Social security, which is a guarantee of the protection of the social interests of individuals, economic entities, society and the state against internal and external threats. It is implemented through the functioning of an effective pension system, availability of quality medical services, material support of citizens in difficult life situations. However, often the resources of the state and local budgets are not enough to finance the social protection system of the population, so there is a need to use insurance tools to neutralize the effect of the main social risks.

5. Social well-being, which characterizes the complete provision of the country's population with material, spiritual, social and environmental benefits. Achieving social well-being is possible only through state regulation of the use of resources, redistribution of income and creation of conditions for stimulating the development of activities of all members of society [4, p. 55].

Reduction in the number, aging of the population, a high level of burden on the Pension Fund and a low level of pension provision actualize the need for deep transformation of the pension insurance system. These issues are also aggravated by the incompleteness of the pension reform, as a result of which it was not possible to build a system of accumulative pension insurance, and non-state pension insurance did not become widespread.

According to the data of the Pension Fund on the specific weight of pensioners by the amount of the assigned monthly premiums, as of January 1, 2021, 13.4% received pensions of up to UAH 2,000, and more than a third of all pensioners in Ukraine received pension payments in the amount of UAH 2,000 to UAH 3,000. (Fig. 2) [1].

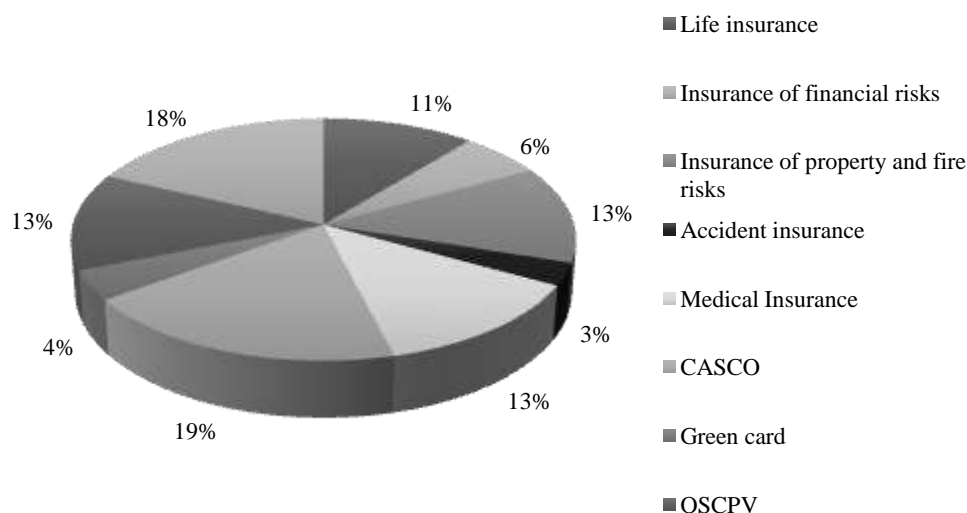
The average amount of the pension was UAH 3,991.53, and the replacement rate by the average wage was at the level of 27.4%, with the International Labor Organization standard of 40%.



**Figure 2. Distribution of pensioners according to the amounts of the assigned monthly premiums as of January 1, 2021 and 2022**

Source: [1]

The solution of the mentioned problems lies in the sphere of economic and social policy of Ukraine and requires a comprehensive approach to reducing the level of unemployment and social burden, implementation of measures to reduce wages, development of a three-level pension system and improvement of pension insurance. The social sphere, which determines the quality of society's life and the level of its social well-being, is the sphere of health care, an important stage of reforming which is the further development of the mandatory health insurance system. It should be noted that personal types of insurance (voluntary health insurance, accident insurance, life insurance) in the total insurance portfolio in 2021 accounted for 31% (Fig. 3).



**Figure 3. Insurance portfolio for 2021 by types of insurance**

Source: [2]

The incentives for the growth of the voluntary health insurance market in 2018-2021 were the relative macroeconomic stabilization in the country; the beginning of the medical reform, which created competition between medical and preventive institutions; establishment of tariffs for medical services for the secondary and tertiary links of the health care system; growing demand and expectations of insurers regarding the introduction of mandatory health insurance. At the same time, the question of the readiness and ability of Ukrainian insurers to properly organize mandatory medical insurance and cover the entire working population with insurance coverage remains relevant [4, p. 62].

**Conclusions.** Thus, social insurance is an important component of the system of social protection of the population of Ukraine, which is based on the principles of solidarity and subsidization. It is in the social insurance system that funds for the material support of citizens who have lost their ability to work are formed at the expense of contributions from working members of society, the so-called contract of generations is in effect. And management of social funds should be carried out by state authorities, employers, and employees on a parity basis.

Social insurance as an organizational and legal form of social protection of the population performs two important functions: 1) prevention of social and economic risks; 2) provision of insurance payments to eliminate the consequences of an insurance event and ensure the appropriate quality of life of citizens. At the same time, the results of the study prove that the preventive direction of activity is almost not implemented in Ukraine. Against this background, the pension crisis, the imperfection of health insurance and the limited financing possibilities of social insurance funds actualize the need for further research into the role of social insurance in the system of implementing sustainable development priorities.

**Author contributions.** The authors contributed equally.

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## CHAPTER 3

### MODERN MANAGEMENT TECHNOLOGIES

#### LOGISTICS ENSURING THE PERFORMANCE OF SECURITY AND DEFENSE TASKS IN CONDITIONS OF HYBRID WARFARE

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**Abstract.** In this article, modern theoretical and methodological principles have been formed regarding the essence, place and role of logistical support in the sphere of security and defense of the state in the conditions of a hybrid war in the field of regional tourism. The current state of the normative legal framework of state regulation and the state of scientific research regarding the purpose, principles of formation and approaches to the systematization and structuring of the components of logistics support and the assessment of its quality and effectiveness are determined. It was established that certain provisions of regulatory documents regulating these processes are outdated and do not meet the requirements of the times. The authors of the work identified the main alternative approaches to the formation of the basic principles of the formation of logistical support for the purposes of national security of the state and its regions. The composition of the specified principles was clarified based on the specific conditions for the implementation of logistical tasks both in the field of military logistics and the logistics of crisis situations typical for the conditions of conducting a hybrid war. As a result of the analysis of the mentioned approaches, it is proposed to supplement the existing complex with such macroeconomic principles as: the principle of partnership and multilateral cooperation, the anticipatory principle of collective defense, and at the level of individual tasks, the list of existing principles is supplemented with the principle of logistics optimization and outsourcing. The modern understanding of the "logistics support" category based on a systemic approach has been clarified. It was established that logistics support is, firstly, a complex of multifunctional means and tools, secondly, it is hierarchical in its structure, thirdly, the set of its components is determined by a list of specific tasks both within individual functions and in the whole set of tasks of complex (force and other) operations. An analysis of existing approaches to the systematization and structuring of logistics support components was carried out. Deficiencies in the structuring of the components of the logistics environment in the professional publications of individual scientists have been identified. On the basis of a critical analysis of current publications, an author's decomposition of the components of logistical support for solving security and defense tasks in the conditions of hybrid warfare was formed and their content was revealed. It was established that within the framework of the system approach, logistics support is a complex of interconnected links and components connected to each other in a single process of implementing tasks aimed at achieving internal and external security and defense goals. It is substantiated that the main components of this system are normative-legal, informational, organizational-economic, infrastructural, production-technological and medical. It has been proven that logistics support formed on the basis of analysis and consideration of environmental factors enables the realization of security and defense goals by integrating functional, management and support functions, and within them, processes and operations.

**Keywords:** hybrid war, security, defense, system, logistical support, purpose of logistical support, principles of logistical support, systematization of types of logistical support, structuring of components of logistical support.

**JEL Classification:** D74, D86, H56

**Formulas:** 0, **figure:** 1, **table:** 0, **bibl.:** 34

**Introduction.** After the Revolution of Dignity in 2014, a military conflict between the Russian Federation and Ukraine began with the seizure of Crimea and part of the eastern territories of Ukraine by the Russian Federation. In early 2022, this conflict escalated into a full-scale undeclared war between the two countries. On the morning of February 24, 2022, Russian military formations invaded the territory of Ukraine and occupied part of its southern and northern territories. The analysis of this war shows that it belongs to the category of hybrid wars, which are characterized by the following series of features [1-2]. This armed conflict combines traditional (combat) and non-traditional (mainly informational) methods of influence. Combat actions are aimed not only at the destruction of military infrastructure, armed forces and means, but also at the destruction of the population throughout the country and the destruction of civil (housing and communal, energy and other service) infrastructure. In the temporarily occupied territories, the aggressor creates a humanitarian catastrophe and implements a policy of genocide of the local population.

The enemy constantly uses political, military-political and diplomatic factors to carry out regional and global food, energy and nuclear blackmail operations. It continuously conducts information warfare and tries to resolve situations of internal political instability and initiates interregional conflicts within the country. Systematically violates existing norms and rules of warfare. At the current stage, scientists are investigating Russian armed aggression against Ukraine in various dimensions: military, diplomatic, political, economic, social, humanitarian, informational, etc. For this study, the theoretical and applied aspect of logistical support for the effective operation of the Armed Forces of Ukraine in the process of liberating its territory from the occupation armed forces of the Russian Federation is important.

The issue of logistical support became relevant at the beginning of the 21st century when developing the military doctrines of the leading Western countries. In Ukraine, in the process of European integration and implementation of advanced practices for resolving military conflicts with the involvement of a contingent of NATO countries, as well as the experience gained in the process of the Anti-Terrorist Operation, the main provisions of the logistical support of the Armed Forces of Ukraine were developed and approved [3-9]. The problem is that science currently lacks a comprehensive analysis of logistical support for the conditions of providing resources to solve the tasks of the Armed Forces related to armed conflict, crisis situations and humanitarian disasters caused by it, as well as the simultaneous solution of issues of protection and recovery economy and peaceful life in the liberated territories. This work examines the issues of rear support of military units in more detail.

**Literature review.** The study of the genesis of various aspects of logistical support for the organization of complex operations in various spheres of activity is devoted to the work of the following domestic and foreign scientists: V. Alkema [13], D. Bowersox [14], V. Voinov [11], D. Wardlow [17], J.J. Wood [17], F. Donald



[17], M. Christopher [15], D. Kloss [14], E. Krykavskyi [10], D. Lambert [18], L. Murphy Jr. [17], J. Stock [18], O. Sumets [11], D. Waters [19], R. Paul [17] and others.

The work is devoted directly to the problems of logistical support in solving problems of crisis situations and various aspects of logistical support in solving security and defense tasks: O. Bondarenko [26-27], S. Belai [27], V. Vasylevsky [33], E. Horokhovskiy [30], A. Dimich [25], I. Drabik [24,34], S. Zaderienko [32], Ch. Donelli [16], V. Kyvliuk [5], M. Klontsak [5], V. Loza [5], O. Maslii [20], I. Morozov [34], O. Minenko [34], O. Nakonechny [28], O. Nesterenko [9], P. Onofriychuk [29], V. Sagan [33], I. Sapiga [4], V. Servatyuk [8], O. Stupnytsky [23], O. Sumets [12], A. Tarasenko [21], I. Rolin [34], R. Romanchenko [6-7], S. Tregubenko [7], O. Uhrynovych [8], V. Shevchenko [5], V. Shuenkin [6], O. Khazanovich [7], V. Kharchenko [31], O. Cherkashin [27], Yu. Chirva [9] and others.

The analysis of foreign and domestic professional sources shows that the essence of logistics support in modern scientific and applied professional sources is considered from the standpoint of functional tasks that should be implemented, processes for achieving goals and systems that ensure the organization and implementation of complex operations. According to Nukov residents, logistics support in various spheres and types of activity is a unique, multifunctional, hierarchical, complexly structured complex of means, methods, technologies, processes and resources that allow to achieve certain goals in specific conditions. Western scientists believe that "the main task of logistics support is the material support of economic and other activities, its planning, finding the optimal set of sources of means and quality resources and ensuring their availability for the subjects of activity" [14, 17-19].

Domestic scientists at the formal level perceive logistics support "as a set of spatially coordinated and time-synchronized means, resources and processes that generate them, which are integrated into a system aimed at the implementation of a set of activity tasks" [10-11,13]. Within this system, a service subsystem is distinguished, which ensures the proper functioning of its links and elements. material, informational, service, financial and other flows of appropriate quality. Specialists in the field of military logistics and logistics of crisis situations and scientists who study the structure and content of logistics support for solving security and defense tasks "consider in more detail both the essence and functions and the structure and composition of logistics support depending on the level of logistics activity and the purpose and tasks, which are defined for the relevant subjects" [5-6, 9, 23, 33]. Accordingly, for the practice of military units, the NATO alliance has defined a basic normative framework for the structure and composition of logistical support for their activities during the implementation of military and peacekeeping operations [22, 33]. Domestic military science and practice also developed the basic principles of logistical support of the Armed Forces and other power structures of the state [3-9, 26-32].

The bibliographic analysis of sources regarding legal, organizational, economic and other aspects of logistics support indicates the presence of a situational and mostly fragmentary approach to understanding its essence, place, role and assessment of quality and efficiency relative to the defined goals.

In the analyzed professional sources, logistical support is considered mainly at one level of activity, namely at the level of the state, region or specialized service or division. Only in some works, such support is considered within the framework of a system approach [4, 16, 25]. When considering the logistical support for the implementation of military operations, the peculiarities of the logistical environment characteristic of conducting modern hybrid wars are not always taken into account.

**Aims.** The purpose of the study is the formation of theoretical and methodological principles regarding the essence, place and role of logistical support for solving complex tasks of security and defense in the conditions of martial law, hostilities and crisis situations.

**Methods.** In the process of research, contextual and comparative analysis was used to clarify existing approaches to understanding logistics support, the decomposition of support components was studied using system and structural-functional analysis, individual components of logistics support were studied using methods of detailing and formalization. Methods of analogy, interpretation, analysis and synthesis were used to describe the decomposition of the specific structure of logistics support.

**Results.** At the first stage of the research, the existing normative-legal definition of the essence of logistics support was analyzed in the context of solving national security tasks. According to the Basic Provisions on Logistics Support of the Armed Forces of Ukraine, "logistics support is a complex of interrelated measures that ensures the activities of the Armed Forces in peacetime and wartime"[3]. A. Dimich, in her research, on the basis of current domestic legislation, revealed the essence of the powers of administration subjects in the field of logistical support of national security in Ukraine [25]. A detailed analysis of this source shows that the logistical support of state security in Ukraine is entrusted to a wide range of entities that are endowed with a special status. Based on the analysis of regulatory acts, A. Dymych systematizes the main principles of logistical support of national security, namely: "rule of law, legality, equality of participants, priority of humanism; sufficiency; efficiency; flexibility; transparency; coordination; responsibility; cooperation; functional compatibility; stability; compliance with the non-blocking policy; scale; planning; differentiation" [25]. In our opinion, most of these principles are really basic rules that contribute to the organization of effective logistical support of security and defense issues at the state level. However, as evidenced by the experience of the war of the Russian Federation against Ukraine, instead of the principle of non-alignment, it is necessary to add the principle of partnership and multilateral cooperation with international actors, and in the future also the principle of collective defense.

O. Stupnytsky's vision [23] is interesting for understanding the principles of the formation of logistics support, which highlights both "general principles

(individuality, completeness, reliability) and additional principles (sustainability, information security, economy, hierarchy, integrity, system approach, universality)". The principle of integrity provides for the functional interconnection of the elements of the civil logistics system and the material and technical support of the troops. Skillful use of this principle allows you to optimize the interconnected resources of the system and ensure the change of individual elements without disrupting its structure as a whole. The principle of the system approach provides for a comprehensive analysis of the issues of providing the armed forces as a component of the national economic potential, and its use will allow to objectively determine the scope and effectiveness of the planned measures. The principle of universality involves the development and use of uniform approaches to the organization of material and technical support of the armed forces. In this regard, it is important to find alternative sources of reliable supplies according to specific conditions.

Based on this, in our opinion, the principles of optimization and logistics outsourcing should also be added to the additional principles. It should be recognized that the goal of logistics support at the state level defined by current regulations does not fully correspond to the current strategic task. From our point of view, the main goal of logistical support at the state level in specific conditions is to provide military units with the means and resources to create conditions for the liberation of all temporarily occupied territories and to make it impossible for the Russian state to implement its intentions regarding armed aggression against Ukraine in the future. A related goal is the restoration of the economy and peaceful life in the liberated from the enemy and other territories of the country.

The second stage of the research was devoted to the issues of systematization and structuring of logistical support. From this point of view, logistical support according to O. Bondarenko "a wide range of interrelated activities related to the planning, control and management of supply, transportation, storage and other material and immaterial operations, including the transfer, storage and processing of relevant information, which are carried out in the process of ensuring the activities of any the formation of the country's security and defense services in peacetime and wartime, as well as when responding to crisis situations that threaten state security" [26-27]. In turn, the scientist singles out the following "main components of logistical support: medical support as a type of logistical support, the purpose of which is medical care for personnel and personnel of power units and the civilian population when performing tasks related to responding to crisis situations. Financial support is a type of logistical support, the purpose of which is to provide financial support in the interests of all other types of logistical support when performing tasks related to responding to crisis situations. Material support, as a type of logistical support, the purpose of which is the timely and complete supply to the security forces of all necessary material means (including fuel and lubricant materials and fuel and energy resources, as well as, if necessary, weapons and ammunition), the organization of high-quality food for personnel and personnel, ensuring proper living conditions for the performance of tasks related to responding to crisis situations. This type of provision includes property and apartment maintenance, food provision and provision

of fuel and lubricants. Technical support as a type of logistical support, the purpose of which is the transportation and transportation of people and material means by all types of transport, preparation, maintenance and repair of weapons, military and special equipment, deployment and maintenance of transport communications, etc. for the performance of tasks related to response to crisis situations. It is conditionally divided into transport and technical support and technical support of weapons and special means" [26-27].

O. Bondarenko singles out the main functions of logistics support [27]: "forecasting and planning of the logistics situation; determination of resource and personnel needs of management bodies for types and subtypes of logistics support; planning, organization, coordination and regulation of joint actions regarding logistical support with other structures, services, suppliers, volunteer and public organizations when solving crisis situations; accounting, analysis, evaluation and control of the activities of management bodies for logistical support of joint actions of security services in response to crisis situations". It should be noted that O. Bondarenko carries out a sufficiently generalized systematization of types of logistical support for crisis situations. There is practically no informational component important for the conditions of hybrid warfare and modern armed conflicts, without which effective management of logistics support is impossible.

Generalizing the subject structuring of military logistics, R. Sapiga [4] presents the following structuring of logistical support, taking into account the existing NATO doctrine. He singles out: "material support as a set of actions of the material subsystem, the purpose of which is to provide the needs of the troops with an assortment of necessary quantities of supplies (weapons and military equipment, combat equipment, propellant materials and lubricants, food, uniforms, medical and sanitary materials, quartering equipment, operational materials and liquids, technical gases, as well as water for technical and consumer purposes), as well as specialized material services.

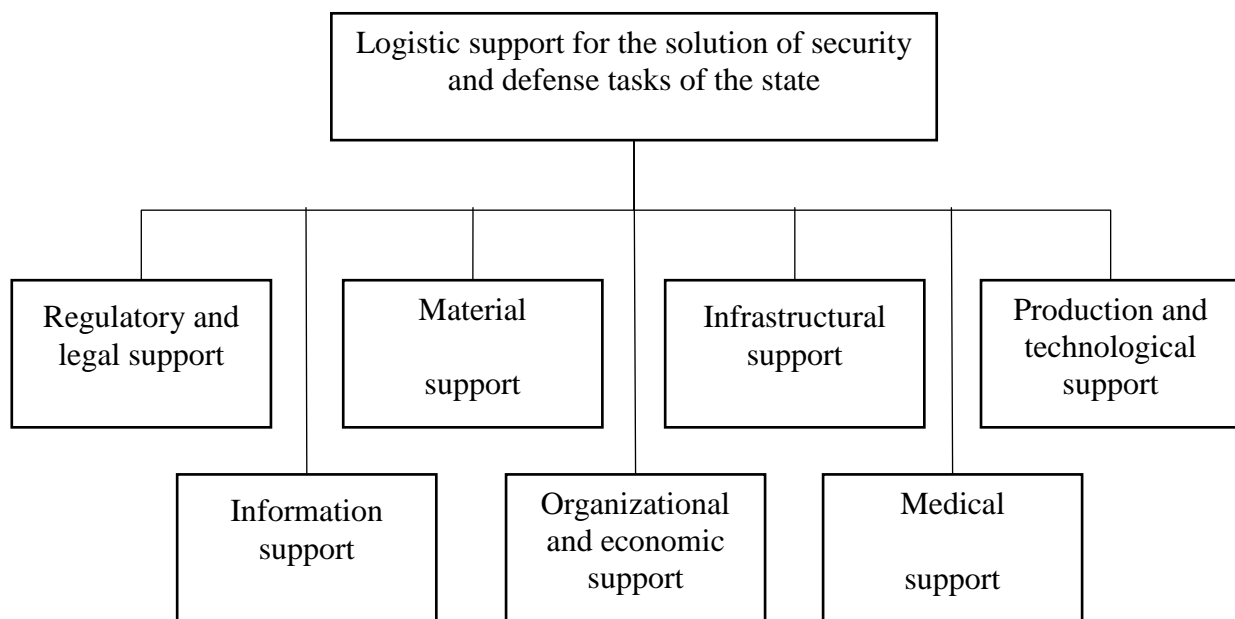
Technical support is the measures implemented by logistic maintenance and repair bodies that enable the use of military equipment, as well as ensure its constant readiness for the implementation of tasks. It covers: maintenance, repair, technical recognition, technical evacuation, metrological services, supply of aggregates, blocks, sub-blocks, technical materials, as well as training of technical personnel. Medical support includes measures that are implemented with the aim of maintaining a high state of health of the personnel, proper provision of medical care to the wounded and sick, as well as ensuring appropriate sanitary and anti-epidemic conditions in the quartering areas. Medical support covers medical and evacuation, sanitary and hygienic and anti-epidemic measures, as well as medical protection against the consequences of weapons of mass destruction. Medical support is integrated with logistics as part of the functional support of military operations.

In the Armed Forces, the medical support system may not be a logistics subsystem, and medical support itself may constitute a separate function. However, there are connections that indicate the need for coordination and cooperation between the logistics and medical spheres. Transport support is a set of organizational and

technical measures related to the implementation of military transports, cargo operations that accompany them, as well as measures to prepare and maintain the transport network and control the movement of troops" [4].

First of all, we are talking about measures related to the implementation of military transports, with the planning of transport services with the integrated use of various types of own transport, as well as other carriers and their implementation.

In his research, R. Sapiga [4], first of all, focuses only on logistical support for solving military tasks and does not take into account the need to simultaneously solve tasks related to solving crisis situations in the state economy and individual de-occupied territories. Secondly, it does not identify and separate infrastructure and information support, which are extremely important. In his research, the scientist defines only one of the functions of infrastructural support, namely, the operation of military infrastructure as a set of tasks of maintaining the operational condition of construction objects provided for use, managing mobile infrastructure, as well as ensuring the quartering of the armed forces in the country and abroad. On the basis of a systematic analysis of sources, the author's vision of the specific structure of the logistic support system for solving security and defense tasks was proposed, presented in the figure 1. In comparison with the existing approaches, infrastructural support was added to the system, which includes the following components: transport, energy, warehouse, and customs.



**Figure 1. Complex of components of logistical support for the solution of security and defense tasks of the state**

*Source: compiled on the basis of [4-7,9, 20, 24-27,30, 33-34]*

Information support, which allows the implementation of logistics operations by designing and organizing a complex of information systems of military logistics and

logistics of crisis situations. Organizational and economic support is connected, first of all, with the formation of personnel potential for the performance of logistic functions and the economic evaluation of processes, resources and operations. An important part of it is the organization of supply on the basis of outsourcing. Production and technological support is represented in practice by productions and technologies aimed at maintaining the appropriate level of resource stocks in the system of logistical support for solving security and defense issues.

**Discussions.** Thus, the analysis of sources regarding the essence of the concept of logistical support and existing approaches to its understanding and analysis of its components indicates the absence of a unified vision of this phenomenon. On the other hand, the ideas of scientists about the essence and structure and composition of logistics support have been significantly transformed in recent years. The modern vision of this phenomenon and its components is based mainly on the normative documents of the NATO Alliance and examples of the successful practice of conducting combat operations and peacekeeping missions, as well as the practice of the Armed Forces of Ukraine and other power structures involved in solving issues of security and defense of the state.

The analysis of the existing principles of formation and implementation of logistic support indicates the need to revise them in the legal framework regulating this activity at the state level. In our opinion, the following should be added to the existing principles at the macro level: the principle of partnership and multilateral cooperation with international actors, and in the future also the principle of collective defense, and at the level of process organization: the principle of systematicity, logistical optimization and outsourcing. The identification of the components of the logistics support system, which was carried out by various scientists, shows the fragmentation and lack of complexity when it is decomposed in relation to the goals. The main existing problem is a view of logistical support either from the point of view of solving the tasks of military logistics, or from the point of view of a certain crisis situation. Thus, during the conduct of a hybrid war, all phenomena of a humanitarian, social, economic, epidemiological and other nature can take place simultaneously. This requires a more diversified view on the formation of a logistics support system to solve the specified tasks.

The author's proposed approach to the formation of a logistics support system determines the composition of the main types of such support. In comparison with the existing approaches, the actual system should additionally contain infrastructural support, which includes the following components: transport, energy, storage, operational and customs. Information support, which covers the entire complex of operations necessary for the preparation and making of management decisions - forecasting and planning of means, processes and actions, their coordination and regulation between individual subjects. This component is important in the aspect of ensuring the implementation of logistics operations using a complex of information systems of military logistics and logistics of crisis situations. Organizational and economic support is connected, first of all, with the formation of personnel potential for the performance of logistical support functions, the organization of processes,

means and resources and their economic evaluation. An important element of this component is the organization of supply on the basis of integration and outsourcing.

As part of logistical support, production and technological support is provided, which is represented in practice by productions and technologies aimed at maintaining the appropriate level of restoration of resource stocks when solving security and defense issues. The composition of each type of support and its component structure in a specific situation will depend, first of all, on a complex of factors of the external environment, among which the dynamics of changes and the complexity of decisions are the most important.

**Conclusions.** Thus, the article reveals the content of the "logistics support" category in the aspect of solving security and defense tasks at the national level in the conditions of a hybrid war. The conducted analysis shows that the following are generalizing postulates regarding the modern understanding of the essence of logistics support for these purposes. Logistics support is, firstly, a complex of multifunctional means and tools, secondly, it is hierarchical in its structure, thirdly, the set of its components is determined by a list of specific tasks both within individual functions and in the whole set of tasks of complex (power and other) operations. An analysis of existing approaches to the basic principles of forming logistical support for these purposes was carried out. The composition of the specified principles was clarified based on the specific conditions of the implementation of logistical tasks both in the field of military logistics and logistics of crisis situations. An analysis of existing approaches to the systematization and structuring of logistics support components has been carried out. The author's decomposition of the components of logistic support was formed and their content was disclosed. Within the framework of the system approach, logistics support is a complex of interconnected links and components, combined in a single process of implementing tasks aimed at achieving internal and external security and defense goals.

The main components of this system are normative-legal, informational, organizational-economic, infrastructural, production-technological and medical. Logistics support enables the realization of security and defense goals by integrating functional, management and support functions, and within them, processes and operations.

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## PERSONNEL MANAGEMENT OF BUSINESS IN CONDITIONS OF CHANGE

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**Abstract.** The article delves into an important problem known as personnel management of business in conditions of change. The purpose of the article is to study of issues of personnel management in the business environment, features of selection and recruitment in order to increase the involvement of personnel and economic efficiency of business in conditions of change.

During the scientific research, the methods of synthesis and analysis has been used (in the study of indicative topics for interviewing candidates in companies); systematization (to understand the stages of personnel selection in organizations, to systematize the reasons for staff turnover, which are related to organizational influence in conditions of change); logical and structural (to build a simplified system of hiring personnel in the company); induction synthesis, (to solve the problem of the formation of Ukrainian space of job-sites, platforms, personnel portals, social networks and own websites of companies); schematic, graphic images for a better visual display the results of the scientific research. The stages of the personnel selection process which depend on the size and type of the organization, recruitment goals and many other factors have been highlighted.

In the study indicative topics for interviewing candidates in companies were identified by the authors. A simplified system of hiring personnel in the company was carried out. It's included the technology in candidate evaluation, application of methods of questioning, interview, data about each candidate for the vacant position. The reasons for staff turnover, which are related to organizational influence in conditions of change were highlighted. Features of the formation of Ukrainian space of job sites, platforms, personnel portals, social networks and own websites of companies was opened.

**Keywords:** personnel management, business, change, staff, selection, recruitment.

**JEL Classification:** M 12, R 11, L 21

**Formulas:** 0; **fig.:** 2; **tabl.:** 0; **bibl.:** 10

**Introduction.** In the conditions of constant changes, the importance of business is growing. Every organization has resources that are needed for effective functioning and development. These are the following resources: physical (raw materials, equipment), informational, financial and human. It is generally accepted that the most important and valuable is the human capital of a business [9].

Human resources make it possible to achieve strategic goals of business development in conditions of change. The effective functioning of organizations depends on the human resources management and system of personnel recruitment [10].

Competently formed personnel management processes provide a business advantage in the market and have a significant impact on business efficiency. At the same time, personnel management processes require increased constant attention from managers.

Human capital is the most valuable asset of any organization. But obtaining this valuable asset is largely underestimated. The primary stage of the complex

mechanism of business personnel management is the process of personnel recruitment.

Recruitment is the process of search and hire of personnel in the company or according to the client's order (in the case of a recruiting agency) [7, p. 65]. Officials are responsible for hiring new employees in organizations. It depends on the field of activity, size of the company, financial situation, availability of personnel services, urgency and many other factors. The employers are beginning to realize how valuable recruitment and managing talented employees is. Within the framework of human resource planning, there is a need for personnel, which leads to the preparation of recruitment and selection procedures and the subsequent hiring of relevant candidates for the position.

**Literature review.** Problems of personnel management, improvement of approaches that could reveal this process in the company, are devoted to scientific work of both foreign and domestic researchers: L.V. Balabanova, O.I. Donetska, G.O. Vakhitova, V.V. Vashchenko, V.A. Willow, O.A. Grishnova, K.P. Kachana, O.V. Kaspruk, O.V. Kiriyanova, A.M. Kolota, T.G. Logutova, K.O. Lytvynenko, I.S. Marchenko, K. G. Naumik, A.L. Nikishina, G.I. Pisarevskaya, J.S. Siemeynyak, E.T. Stolichuk, V.O. Shipulina, T.S. Shulgina, S.O. Tsymbalyuk etc.

The question of activation of human capital in conditions of change was considered in the works of V.O. Shipulina, O.V. Kaspruk (2012) [6]. These scientists focused on the study of the issue of activation and involvement of personnel as a strategic guideline for the preservation of national wealth, the process of employee development, mechanisms for the effective use of human potential, and the introduction of factors that contribute to the formation of a comfortable business environment. A.L. Nikishina (2016) [2] examines the main methods of personnel selection in the organization.

K.O. Lytvynenko, O.I. Donetska (2019) [1] put a special emphasis on the study of business recruitment. Recruitment has a powerful impact on the development of business and human capital, especially in conditions of change. S. O. Tsymbalyuk (2019) [7] studied the reasons for staff turnover, which are related to organizational influence.

**Aims.** The purpose of the article is to study of issues of personnel management in the business environment, features of selection and recruitment in order to increase the involvement of personnel and economic efficiency of business in conditions of change.

**Methods.** During the scientific research, the methods of synthesis and analysis has been used (in the study of indicative topics for interviewing candidates in companies); systematization (to understand the stages of personnel selection in organizations, to systematize the reasons for staff turnover, which are related to organizational influence *in conditions of change*); logical and structural (to build a *simplified system of hiring personnel in the company*); induction synthesis, (to solve the problem of the formation of Ukrainian space of job-sites, platforms, personnel portals, social networks and own websites of companies); schematic, graphic images for a better visual display the results of the scientific research.

**Results.** The personnel selection process in companies of the Western region of Ukraine depends on the source of recruitment.

Companies in order identified staff competencies regularly conduct various surveys and questionnaires regarding job satisfaction. Therefore, managers take into account the employee's desire to change duties. The employee undergoes a rotation or moves to a higher rung of the career ladder. In this context, the selection procedure is purely formal in nature and does not involve multi-stage checks.

Attracting applicants from internal sources takes place according to a different scheme [1].

The selection process includes the following stages, which depend on the size and type of organization, recruiting goals, and many other factors:

1. Determination of personnel needs in accordance with development goals and business requests.
2. Detailed analysis of the hiring request (formation of a competency map, qualification map and position profile) and clarification of details.
3. Drawing up and coordinating with the responsible persons the description of the vacant position and forming the strategy of the recruitment procedure.
4. Posting resumes and using various methods of attracting potential candidates in accordance with the previously formed recruitment strategy.
5. Creation of a personnel reserve of job applicants.
6. Resume analysis and candidate data verification and selection process.
7. Coordination of details and requirements.
8. Admission of the most relevant candidate for work and closing of vacancies.

Candidates from internal sources go through several stages of selection depending on the type of position.

Recruiters schedule an initial interview with candidates after reviewing resumes and letters of recommendation. Interviews at companies are mostly conducted offline. During the initial interview, recruiters assess basic communication skills, motivation and overall personality profile [2].

Figure 1 shows indicative topics that are discussed in company interviews. This stage includes the verification of documentation, the collection and verification of applicants' recommendations, and the preliminary agreement of salaries.

Candidates who have passed the initial screening move on to a secondary screening with the supervisors they will potentially work for.

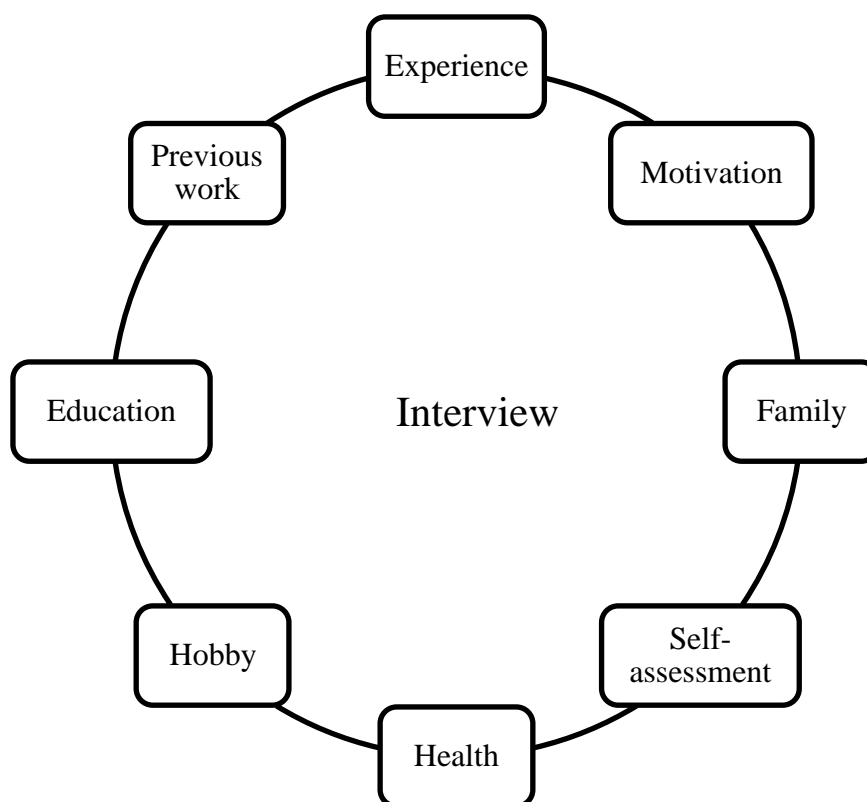
Accountants undergo a secondary (technical) interview with the chief accountant and other persons who have relevant assignments [8, p. 45].

System administrators undergo a secondary (technical) interview with the main specialists of the IT department.

In turn, specialists check the suitability of candidates' skills to the job requirements using the following methods [6]:

- survey;
- testing;
- qualification checks with test tasks.

At this stage, first of all, the manager must determine the favorite who will be hired [7]. However, there are cases when there are two or more worthy candidates. In this case, final interviews are held or candidates are offered other positions in order to retain a worthy candidate.



**Figure 1. Indicative topics for interviewing candidates in companies**

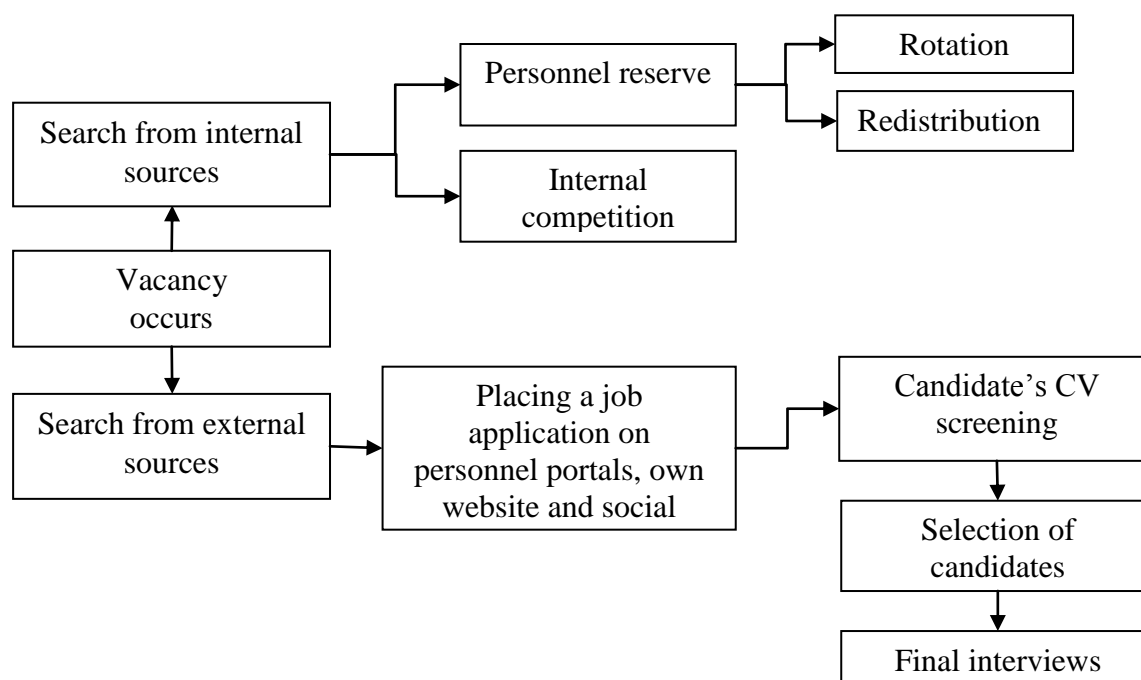
*Source: developed by authors*

After the assessment process and final interviews, the applicant may undergo a medical examination. The purpose of the medical examination is to establish the health of a potential employee. This is necessary in order to reveal the ability to perform certain types of work, to find a predisposition to acute or chronic occupational diseases in a timely manner, to identify medical contraindications, to prevent the occurrence and spread of infectious diseases.

Of course, only some employees have to undergo a medical examination. The legislation of Ukraine clearly defines the categories of employees, lists the professions and types of activities, the employees of which are subject to mandatory medical examinations. And the employer is obliged to monitor the medical examinations and pay for them.

If the applicant's health does not meet the requirements of the job, he is offered another vacancy or placed in the reserve. If the employee's physical condition corresponds to the position, the employee is registered for the workplace and familiarized with the workplace. Then the onboarding procedures are carried out. If the employee has an internship, the employee's desire to prove himself is encouraged as much as possible.

Figure 2 shows a simplified system of hiring personnel in the company.



**Figure 2. A simplified system of hiring personnel in the company**

*Source: developed by authors*

As we see, recruiting procedure allows to attract the best specialists to vacant positions. Also, the recruiting procedure promotes the maximum manifestation of existing skills and the development of new skills and abilities of all company employees.

It is worth highlighting the following reasons for staff turnover, which are related to organizational influence in conditions of change:

- ineffective recruiting,
- inconsistency of the employee's values and goals with the company's values and goals,
- ineffective onboarding,
- low level of wages or its slow growth,
- dissatisfaction with working conditions,
- unfavorable microclimate in the team,
- conflicts with management or within the team,
- lack of career growth and development,
- low motivation.

**Discussions.** So, recruiting is the main cause of unsatisfactory turnover processes. In the context of ineffective recruiting, the main reasons for staff turnover can be: unsatisfactory onboarding, an imperfect career development plan and low employee motivation.

The reasons for ineffective recruiting are different. If obstacles are removed at the initial stage, it is possible to reduce the level of personnel turnover and solve the

problems of forming a personnel management system. This will make it possible to avoid failures in the future, which would be the consequences of ineffective components of the recruitment and selection system.

The Ukrainian space of job sites is a fairly wide. The most famous among them are WORK.ua, Robota.ua, Jobs.ua, GRC.ua.

WORK.ua is the famous platform where people have the opportunity to look for a job, and which includes more than 100 thousand employees. The site has a stylish blue interface and is well-recognized due to large-scale marketing activities. The site is visited on average 450 thousand people every day [5].

Robota.ua is a job site which has functioned since 2000. The site has undergone a lot of transformations and rebranding since its creation. However, the site has not lost popularity. 700 thousand vacancies were placed on Robota.ua for 2019 [4].

Jobs.ua – All-Ukrainian portal of unlimited job search and personnel selection. Started in 1996. Since then, nearly 15 million professionals have been employed [3].

In Europe and the United States, recruiters often using the LinkedIn social network. This trend has moved into the Ukrainian labor market. A LinkedIn profile often replaces a full resume. However, not all specialists provide full information about themselves and their experience. This makes it difficult to identify potential specialists.

A tendency for the UPwork platform has moved from the West to Ukraine. UPwork is a powerful hub that connects employers from around the world and candidates (usually freelancers). It is worth noting that on the UPwork platform can find specialists for short-term and long-term projects. Most often in Ukraine on the UPwork platform find work as task-specialists, SEO-specialists, copywriters, rewriters, translators, IT specialists, video editors, and others.

It is good that the freelance platforms obtain more and more popularity (Freelance.ua, Freelancehunt.ua, Freelancer.com.ua). These platforms employ personnel to create short-term projects (contracts) or search for seasonal work or perform one-time tasks and receive for this a predetermined amount of cash.

Specialized thematic sites and forums for HR specialists take a significant place in online recruitment. Networking is a virtual version of recommendation recruiting, which has become extremely popular lately.

Recruitment of human resources from external sources should not be limited to announcements on personnel portals (WORK.ua, Robota.ua, Jobs.ua, HeadHunter.ua, Trud.ua, Indeed.ua, Jooble.ua), social networks and own websites of companies.

Companies should use outsourcing and personnel leasing. Outsourcing and personnel leasing has a high cost in comparison with the cost of placing information about the vacant position on sites for search of work. It is most appropriate to hire seasonal workers on such conditions. This kind of employment creates the effect of economy.

**Conclusions.** The changes in the external business environment are taking place at an accelerated pace in the last decades. The rapid development of the recruitment and selection system is one of the most important factors that influenced the development of the personnel management system.

The effectiveness of the entire organization depends on effective staff selection. This is especially considerable for highly qualified personnel and managers of the enterprise. Effective recruitment process is ponderable for business. Efficiency, competitiveness and profitability of business depend on the rational staffing of the company and its quality characteristics. Recruitment is a more in-depth way of staff selection. In addition to formal characteristics, personal and business qualities, flexible skills of the applicant are taken into account.

Recruitment and personnel development are important processes that contribute to business development. Business should be given a lot attention to the formation of a simplified system of hiring personnel in the company. This includes the technology of candidate evaluation, application of methods of questioning, interview, data about each candidate for the vacant position. Information communications, Internet, platforms have a significant impact on effective recruitment.

At the same time, it is necessary to pay special attention to the process of personnel selection, taking into account modern trends in the labor market, the increase in external migration and trends in the development of enterprises in the conditions of change.

**Author contributions.** The authors contributed equally.

**Disclosure statement.** The authors do not have any conflict of interest.

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## BUSINESS REPUTATION OF ENTERPRISES: DEFINITIONS, STRUCTURE AND REPUTATION RISK MANAGEMENT

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**Abstract.** The article is devoted to the study of the essence of the scientific category "business reputation", as well as its structure and components. The purpose of the article is to establish the impact of business reputation on the economic security of enterprises based on the study of the main definitions and structure of business reputation. The main methods of research are the methods of analysis and synthesis, the method of comparative analysis, the method of systematization, and the graphic method, which contributed to the achievement of the set purpose. The main results of the article are the author's interpretation of the concept of "company's business reputation". The article also summarizes the main components of the company's business reputation, namely: image; reputation of the manager; information transparency; transparent organizational culture; financial stability of the company; goodwill social adaptability of the company; product quality; compliance. As a result of the research carried out by the author, the definitions of the scientific phenomenon of business reputation were systematized according to the multi-level principle in terms of different approaches; legal; marketing; marketing and accounting; marketing process; accounting; accounting and legal. According to the results of the scientific work on reputational risks, we systematized the main types of such risks: direct actions of your company and company practices; actions of employees, leaders, investors, or anyone that directly represents your business or has a relationship with your business; direct actions by partners or suppliers; as a result of external factors, like customers. Effectively managing reputational risk involves five steps systematized, namely: assessing company's reputation among stakeholders; evaluating company's real character; closing reputation-reality gaps; monitoring changing beliefs and expectations; putting a senior executive below the CEO in charge. Therefore, taking into account the above, the main measures for effective management of reputational risk are proposed, which can become the basis of further research.

**Keywords:** business reputation; reputational risk; company's business reputation; image; information transparency; security; compliance.

**JEL Classification:** K10, M14, M40, O34

**Formulas:** 0; **fig.:** 1; **tabl.:** 1; **bibl.:** 14

**Introduction.** The business reputation of enterprises directly affects their development, allowing them to attract more investments, better customers and increasing their market value. Furthermore, in an economy where 70% to 80% of market value is accounted for by hard-to-measure intangible assets such as brand equity, intellectual capital and goodwill, businesses are particularly vulnerable to anything that damages their reputation. Most companies, however, do not effectively manage their reputation in general and the risks to their reputation in particular. They tend to focus their energies on overcoming threats to their reputation that have already occurred, which negatively affects their economic security.

**Literature review.** While interest in the concept of corporate reputation has gained momentum in the last few years, a precise and commonly agreed upon

definition is still lacking. The article “Corporate Reputation: The Definitional Landscape” (Barnett, M., Jermier, J. & Lafferty, B., 2006) reviews the many definitions of corporate reputation present in the recent literature and categorizes these definitions based on their similarities and differences. The analysis led them to conclude that the cluster of meaning that looks most promising for future definitional work uses the language of assessment and specific terms such as judgment, estimation, evaluation or gauge.

The article “The Building Blocks of Corporate Reputation: Definitions, Antecedents, Consequences” (Fombrun, Charles J., 2012) explores seven principal reference frames that have guided theorising about corporate reputations. The seven conceptual frameworks, namely institutional theory, agenda-setting theory, stakeholder theory, signaling/impression theory, identity theory, resource-based theory and social construction theory, have had a disproportionate influence on theorising about corporate reputations. These theoretical frameworks influenced the conceptual thinking that has taken place in the reputation literature.

The article “Corporate reputation: seeking a definition” (Gotsi, M. and Wilson, A.M., 2001) reviews different viewpoints in the marketing literature in an attempt to clearly define the concept of corporate reputation and identify its relationship with corporate image. Definitions offered for the term corporate reputation by marketing academics and practitioners are therefore merged into two dominant schools of thought. These include the analogous school of thought, which views corporate reputation as synonymous with corporate image, and the differentiated school of thought, which considers the terms to be different and, according to the majority of the authors, interrelated. This article argues that on balance, the weight of literature suggests that there is a dynamic, bilateral relationship between a firm’s corporate reputations and its projected corporate images.

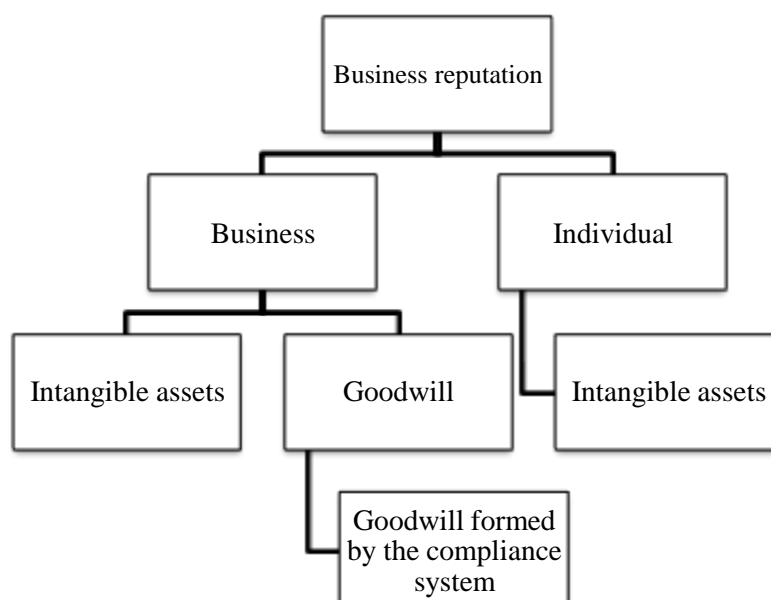
By examining existing definitions and data sets, the article “Measuring Corporate Reputation: Definition and Data” (Wartick, S. L., 2002) explores the current state of efforts intended to measure corporate reputation.

The corporate reputation of a firm and reputation risk is becoming increasingly important because of the rise of social media and the ongoing globalization. While defining and measuring corporate reputation and reputation risk represent the first steps in corporate reputation (risk) management, there is no general agreement in defining and measuring these two terms. Based on an overview of the literature regarding definitions and measurement methods of corporate reputation and reputation risk, the authors in “Corporate reputation and reputation risk: Definition and measurement from a (risk) management perspective” present a holistic and consistent approach to define and measure corporate reputation and reputation risk (Eckert, C., 2017).

**Aims.** The purpose of the article is to establish the impact of business reputation on the economic security of enterprises based on the study of the main definitions and structure of business reputation.

**Methods.** The main methods of research are the methods of analysis and synthesis, the method of comparative analysis, the method of systematization, and the graphic method, which contributed to the achievement of the set purpose.

**Results.** As a result of the analysis of scientific works, it was determined that the content of business reputation can belong to both an individual and a business structure, and being an intangible asset, it can be transformed into a tangible asset - goodwill - in a business structure. The structure of business reputation is shown in Figure 1.



**Figure 1. Structure of business reputation**

Source: systematized by the author based on [1-7]

After analyzing the scientific works, it was determined that the content of the bank's business reputation has certain components that affect the development of its activities. An analysis of the components of business reputation and their meaning is given in Table 1.

**Table 1. Components of the company's business reputation**

№	Constituents	Impact analysis
1	Image	Emotional appeal of the company
2	Reputation of the manager	It is an indicator of the level of business reputation of the head of the company and cannot be higher than the reputation of the company he heads
3	Information transparency	Anti-corruption element of the company
4	Transparent organizational culture	An internal source of business reputation formation
5	Financial stability of the company	One of the factors of the company's competitiveness
6	Goodwill	Economic reflection of business reputation, an element of the compliance system
7	Social adaptability of the company	The company's customer-oriented development strategy and personnel policy form a certain level of trust in it
8	Product quality	In market conditions, a manufacturer of low-quality products cannot have a positive business reputation
9	Compliance	Compliance with regulations and the use of optimal international experience of the company's activities

Source: systematized by the author based on [1-7]

It is important not only to understand the components of business reputation, but also their systematization, which is presented in table 2.

**Table 2. Classification of components of the company's business reputation**

№	Classification sign	Characteristic
1	According to the method of formation	- primary (establishment documents; name; location; competitiveness); - acquired (reputation of management personnel; solvency; creditworthiness; goodwill)
2	By property	- related to property (location; competitiveness; solvency; creditworthiness; goodwill); - not related to property (constitutional documents; name; reputation of management; intellectual property rights; goodwill of contracts; trade secrets)
3	By the form of attachment	- documented (incorporation documents; name; location; solvency; creditworthiness; goodwill of intellectual property rights; goodwill of contracts; trade secrets); - undocumented (reputation of management; competitiveness; compliance with the law)

*Source: systematized by the author based on [1-7]*

The business reputation of an individual is an intangible asset, while the business reputation of a business structure is an intangible asset that has value - the financial equivalent - goodwill. The business reputation of the enterprise is a full-fledged intangible asset that has a material expression - reputation capital, which only recently received a value expression: scientifically - through the economic category and practically - through the accounting item "goodwill", and therefore the formation and management of reputation and its use as a tool in tough conditions of competition and European integration is becoming more and more relevant.

The business reputation of the enterprise, as an element of the compliance system, in a practical sense largely determines its economic security, namely the enterprise's ability to attract funds, search for strategic investors and partners, operational efficiency of management, which can ensure the building of relations with the authorities, the formation of demand and consumer loyalty. A positive business reputation has long been a mechanism of competitiveness and is currently an especially important component of success, which helps to protect the enterprise and increase its value. Today, business reputation is one of the tools of strategic protection of an enterprise against competitors in the market in conditions of instability and uncertainty.

As a result of the research carried out by the author, the definitions of the scientific phenomenon of business reputation were systematized according to the multi-level principle in terms of different approaches, which are listed in the table. 3.

The following author's definition of the scientific category "business reputation" is proposed - it is a subjective rational judgment (consideration) of the state and relations of the subject of economic activity for making communicative (management) decisions about it [8].

Note that consumers evaluate business reputation using qualitative indicators, while goodwill can be a quantitative economic expression.

In view of the author's analysis of scientific works by scientists regarding the economic essence and significance of business reputation as an indicator of the economic security system, we note that reputational risks have an important impact on the economic security of enterprises and their development strategy.

**Table 3. Systematized definitions of the scientific category "business reputation" according to various scientific approaches**

№	Scientific approach	Author's definition
1	Legal	Business reputation is a system of legal characteristics that are within the framework of current legislation and can belong to both a natural person and a legal entity.
2	Marketing	Business reputation is an indicator of image and one of the components of a brand, which is formed due to the quality of corporate culture and is an objective assessment of the professional qualities of a natural or legal entity.
3	Marketing and accounting	Business reputation consists of an intangible element of image and brand and has a tangible component of "goodwill", which together express the market perception and value of a person.
4	Marketing process	Business reputation is considered as a continuous process of accumulation of intangible characteristics, which is converted into a positive image and transformation of the latter into a material component of "goodwill".
5	Accounting	Business reputation is considered as the activity of accumulating material wealth through professional activity within the framework of compliance, that is, legal norms and professional ethics.
6	Accounting and legal	Business reputation is a tangible expression of the intangible component of compliance.

*Source: compiled by the author based on [1-7]*

According to the results of the scientific work on reputational risks, we systematized the main types of such risks (Table 4).

The possible situations listed above are just examples of reputational risk scenarios that can cause serious damage to company's reputation.

**Managing Reputational Risk.** Effectively managing reputational risk begins with recognizing that reputation is a matter of perception. A company's overall reputation is a function of its reputation among its various stakeholders (investors, customers, suppliers, employees, regulators, politicians, nongovernmental organizations, the communities in which the firm operates) in specific categories (product quality, corporate governance, employee relations, customer service, intellectual capital, financial performance, handling of environmental and social issues). A strong positive reputation among stakeholders across multiple categories will result in a strong positive reputation for the company overall.

Reputation is distinct from the actual character or behavior of the company and may be better or worse. When the reputation of a company is more positive than its underlying reality, this gap poses a substantial risk. Eventually, the failure of a firm to live up to its billing will be revealed, and its reputation will decline until it more closely matches the reality.

To bridge reputation-reality gaps, a company must either improve its ability to meet expectations or reduce expectations by promising less. The problem is, managers may resort to short-term manipulations. For example, reputation-reality

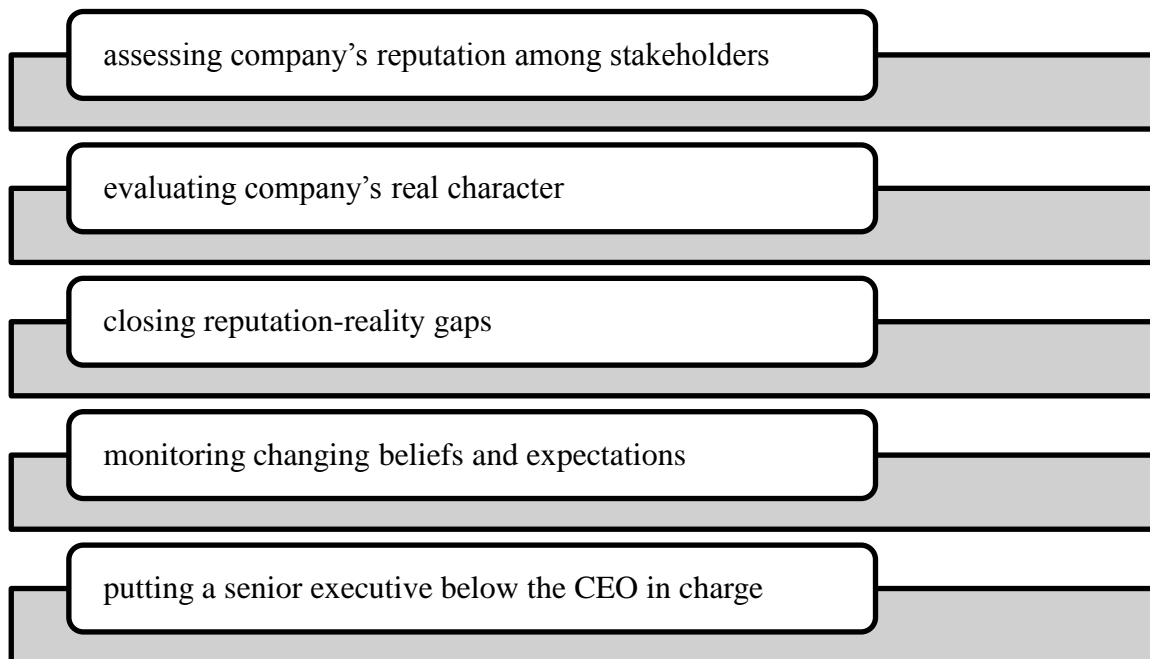
gaps concerning financial performance often result in accounting fraud and (ultimately) restatements of results. Computer Associates, Enron, Rite Aid, Tyco, WorldCom, and Xerox are some of the well-known companies that have fallen into this trap in recent years.

**Table 4. Main types of reputational risks of enterprises**

Types of Reputational Risk	Explanation	- Practical examples
1. Direct actions of your company and company practices.	These reputational risk scenarios are caused by direct actions of your company and company practices.	<ul style="list-style-type: none"> <li>- Not complying with regulations, like federal or local laws or industry regulations;</li> <li>- Data breaches due to unsafe practices that threaten the personal information and safety of consumers and employees;</li> <li>- Consistent inability to meet customer needs or falling short of customer expectations</li> <li>- Legal actions involving your business that become public knowledge;</li> <li>- Layoffs and internal scandals that become public knowledge;</li> <li>- Poor working conditions for employees or exploitative working conditions;</li> <li>- Poor quality products and services;</li> <li>- Purposeful misaction that consumers become aware of</li> </ul>
2. Actions of employees, leaders, investors, or anyone that directly represents your business or has a relationship with your business.	These risks typically occur because someone with direct ties to your business acts unacceptably or engages in unfair practices	<ul style="list-style-type: none"> <li>- C-Suite employees engaging in unethical conduct</li> <li>- Business leaders with negative reputations, or that develop negative reputations through specific actions;</li> <li>- Employees involved in misconduct that becomes publicly known;</li> <li>- Employees poorly representing your brand to others;</li> <li>- Individual employee misconduct towards customers;</li> <li>- Negative social media posts by or those associated with your business</li> </ul>
3. Direct actions by partners or suppliers.	Partners and suppliers often provide critical support that helps businesses run, but their behavior can pose a reputational risk to your business, especially if you have an established relationship.	<ul style="list-style-type: none"> <li>- Partner experiencing service interruptions that critically affect a pillar of your business, like malfunctioning software;</li> <li>- Partners or suppliers engage in misconduct that becomes public knowledge</li> <li>- Partners or suppliers speak negatively about your business</li> </ul>
4. As a result of external factors, like customers	Customers can have a significant impact on your business reputation, especially if they have a bad experience	<ul style="list-style-type: none"> <li>- Negative social media posts from consumers about their experience with your business;</li> <li>- Negative reviews left by customers on public review sites, especially if based on false experiences;</li> <li>- Negative articles and press</li> </ul>

*Source: compiled by the author based on [8-14]*

Effectively managing reputational risk involves five steps (Figure 1):



**Figure 1. Main steps of effectively managing reputational risk**

Source: compiled by the author based on [11-14]

1) *Assess reputation.* Since reputation is perception, it is perception that must be measured. This argues for the assessment of reputation in multiple areas, in ways that are contextual, objective, and, if possible, quantitative. Three questions need to be addressed:

- What is the company's reputation in each area (product quality, financial performance, and so on)?
- Why company has this reputation in each area?
- How do these reputations compare with those of the firm's peers?

Various techniques exist for evaluating a company's reputation. They include media analysis, surveys of stakeholders (customers, employees, investors, NGOs) and industry executives, focus groups, and public opinion polls. Although all are useful, a detailed and structured analysis of what the media are saying is especially important because the media shape the perceptions and expectations of all stakeholders.

2) *Evaluate reality.* Next, the company must objectively evaluate its ability to meet the performance expectations of stakeholders. Gauging the organization's true character is difficult for three reasons: First, managers—business unit and functional heads as well as corporate executives—have a natural tendency to overestimate their organizations' and their own capabilities. Second, executives tend to believe that their company has a good reputation if there is no indication that it is bad, when in fact the company has no reputation in that area. Finally, expectations get managed: Sometimes they are set low in order to ensure that performance objectives will be achieved, and other times they are set optimistically high in an attempt to impress superiors or the market.

As is the case in assessing reputation, the more contextual, objective, and quantitative the approach to evaluating character, the better. Just as the reputation of a

company must be assessed relative to competitors, so must its reality. For example, performance-improvement targets based only on a company's results for the previous year are meaningless if competitors are performing at a much higher level. The importance of benchmarking financial and stock performance and processes against peers' and those of companies regarded as "best in class" is hardly a revelation. However, the degree of sophistication and detail as well as the accuracy or reliability of benchmarking data can vary enormously. The reasons include transcription errors (a big problem when a large amount of data in paper documents has to be manually entered into electronic spreadsheets), for instance, and the inability to determine whether the way competitors report information in an area is consistent. One company might include customers' purchases of extended warranties in its revenues, while another might not.

3) *Close reputation-reality gaps.* When a company's character exceeds its reputation, the gap can be closed with a more effective investor relations and corporate communications program that employs the principles of strategic media intelligence discussed above. If a reputation is unjustifiably positive, the company must either improve its capabilities, behavior, and performance or moderate stakeholders' perceptions. Of course, few companies would choose the latter if there were any way to accomplish the former. If, however, the gap is large, the time required to close it is long, and the damage if stakeholders recognize the reality is likely to be great, then management should seriously consider lowering expectations—although this obviously needs to be done in careful, measured ways.

4) *Monitor changing beliefs and expectations.* Understanding exactly how beliefs and expectations are evolving is not easy, but there are ways to develop a picture over time. For instance, regular surveys of employees, customers, and other stakeholders can reveal whether their priorities are changing. While most well-run companies conduct such surveys, few take the additional step of considering whether the data suggest that a gap between reputation and reality is materializing or widening. Similarly, periodic surveys of experts in different fields can identify political, demographic, and social trends that could affect the reputation-reality gap. "Open response" questions can be used to elicit new issues of importance—and thus new expectations—that other questions might miss. It is generally useful to supplement these surveys with focus groups and in-depth interviews to develop a deeper understanding of the causes and possible consequences of trends.

5) *Put one person in charge.* Assessing reputation, evaluating reality, identifying and closing gaps, and monitoring changing beliefs and expectations will not happen automatically. The CEO has to give one person responsibility for making these things happen. Obvious candidates are the COO, the CFO, and the heads of risk management, strategic planning, and internal audit. They have the credibility and control some of the resources necessary to do the job. In general, those whose existing responsibilities pose potential conflicts probably shouldn't be chosen. People holding top "spin" jobs, such as the heads of marketing and corporate communications, fall into this category. So does the general counsel, whose job of defending the company means his relationship with stakeholders is often adversarial



and whose typical response to media inquiries is “no comment.” The chosen executive should periodically report to top management and the board on what the key reputational risks are and how they are being managed. It is up to the CEO or the board to decide whether the risks are acceptable and, if not, what actions should be taken. In addition, top management and the board should periodically review the risk-management process and make suggestions for improving it.

**Discussions.** Therefore, taking into account the above, for effective management of reputational risk it is necessary:

- be transparent – it is necessary to be honest with the company's stakeholders in order to maintain a reliable image;
- monitor the company's online presence - the company must respond to any negative social media posts, maintain professional social media accounts, and ensure that social media posts contribute to the chosen branding strategy;
- prioritize accountability - company management must be able to take responsibility for any errors or mistakes;
- maintain a positive attitude - by maintaining a positive attitude in company messages, you can make a positive impression on the public;
- use a client-oriented approach - it is necessary to prioritize relations with clients and their satisfaction in managing the company;
- establish feedback with clients - it is necessary to listen to client feedback and respond to their needs to clarify all disputed issues;
- comply with legal norms - the company must comply with all legal acts in the course of its activity;
- monitor the safe storage of information about consumers and employees - it is necessary to monitor the collection and storage of the specified information in order to prevent its abuse by competitors and fraudsters;
- constantly monitor the quality of products - it is necessary to comply with the requirements regarding the appropriate level of product quality and customer after-sales service;
- to maintain a safe working environment for employees - it is necessary not only to control the state of labor safety of workers in the company, but also to create a favorable psychological climate;
- implement internal control - it is necessary to create internal groups that would conduct regular inspections of all business operations to identify possible risk areas or areas that need improvement;
- use a systematic approach to neutralizing reputational risks - it is necessary to understand that everything can affect the public's perception of your business and potentially risk your reputation.

The specified directions for neutralizing reputational risks should become part of general anti-crisis management and standard business practices that reduce the likelihood of reputational risk scenarios.

**Conclusion.** Based on the results of the research, the following conclusions can be drawn. The main results of the article are the author's interpretation of the concept of "company's business reputation". The article also summarizes the main

components of the company's business reputation, namely: image; reputation of the manager; information transparency; transparent organizational culture; financial stability of the company; goodwill social adaptability of the company; product quality; compliance.

As a result of the research carried out by the author, the definitions of the scientific phenomenon of business reputation were systematized according to the multi-level principle in terms of different approaches; legal; marketing; marketing and accounting; marketing process; accounting; accounting and legal.

According to the results of the scientific work on reputational risks, we systematized the main types of such risks: direct actions of your company and company practices; actions of employees, leaders, investors, or anyone that directly represents your business or has a relationship with your business; direct actions by partners or suppliers; as a result of external factors, like customers.

Effectively managing reputational risk involves five steps systematized, namely: assessing company's reputation among stakeholders; evaluating company's real character; closing reputation-reality gaps; monitoring changing beliefs and expectations; putting a senior executive below the CEO in charge.

The main measures for effective management of reputational risk are proposed, which can become the basis of further research.

**Author contributions.** The authors contributed equally.

**Disclosure statement.** The authors do not have any conflict of interest.

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## FEATURES OF THE ECONOMIC SECURITY OF THE NATIONAL ECONOMY IN WARTIME

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**Abstract.** The article examines the important issue of the economic security of the national economy in wartime. The purpose of the article is to study the features of the economic security of the national economy in wartime, the interrelationship of economic and military security systems, directions for the use of economic and military-economic potentials to maintain a sufficient level of the state's defense capability. During the scientific research, methods of synthesis and analysis were used (when studying the essence of the economic security of the national economy during the wartime period); systematization (to determine the relationship between economic and military security systems, components of economic security in wartime); logical-structural (to determine the directions of economic influence on the war); induction synthesis (to determine an effective toolkit to ensure the necessary level of economic security of the national economy of the state and stable functioning of the economy in wartime). The main areas of influence of the economy on the war are highlighted. In the study, the author identified the requirements of the war for the economy, as well as the components of the economic security of the national economy of the state during wartime. An effective toolkit has been identified to ensure the necessary level of economic security of the national economy of the state and stable functioning of the economy in wartime conditions.

**Keywords:** economic security, military security, national economy, wartime, defense.

**JEL Classification:** H 56

**Formulas:** 0; **fig.:** 0; **tabl.:** 0; **bibl.:** 8

**Introduction.** Today, the biggest challenge to economic security is military aggression, which can be carried out by individual countries. In wartime conditions, the essence of economic security of the national economy is qualitatively transformed. It is not perceived as a set of measures designed to preserve the «status quo», as «absence of danger». In this case, to the destabilizing factors and crisis phenomena of peacetime is added the influence of those difficult conditions created in the country in connection with the mobilization of the economy, the transfer of civil defense and administration from a state of peace to a state of war.

The state and possibilities of using the economic and military-economic potentials to maintain a sufficient level of the state's defense capability determine the problem of ensuring the stability of the functioning of the economy, in the conditions of the action of destabilizing factors both in peacetime and especially in wartime. At the same time, the military-economic potential of the state, which is derived from the economic one (a part of it), integrates the country's capabilities to ensure military security, and which the state can use for military purposes with maximum military-economic efforts, minimizing all non-military needs of society [1].

At the same time, undermining the very economic security of the state can cause undermining of its economic potential, and hence the military-economic potential. Therefore, almost all components of economic security have a defensive significance, and also directly affect the military-economic security of the national economy.

**Literature review.** Problems of the features of economic security and structure are devoted to scientific work of both foreign and domestic researchers: as A. Arkhipova, O. Bandurka, Z. Varnalii, T. Vasiltsiv, O. Vlasyuk, O. Galtsova, V. Geets, M. Gerasimov, V. Goncharova, Ya. Zhalilo, A. Ilarionov, E. Krykhtina, O. Lazareva, V. Martynenko, E. Mykulchynova, V. Muntiyan, A. Nesterenko, E. Oleinikov, G. Pasternak-Taranushenko, K. Petrova, R. Pokotylenko, S. Pokropivny, A. Revenko, V. Senchagov, V. Tarasevich, I. Chervanov, A. Chimitova, V. Shlykov, etc.

The questions of the concept, features of the modern state of military and economic security and ways of its improvement on at the global, regional and national level, such scientists as: T. Paul, U. Lind, D. Gordienko, R. Pustoviyt, M. Tyapkin, O. Korov'yanskyi, D. Makarenko, V. Mandragel, O. Machynskyi, O. Poltoratskyi, G. Perepelitsa, I. Rusnak, A. Sobolev and others.

**Aims.** The purpose of the article is to study the features of the economic security of the national economy in wartime conditions, the interrelationship of economic and military security systems, directions for the use of economic and military-economic potentials to maintain a sufficient level of the state's defense capability.

**Methods.** During the scientific research, methods of synthesis and analysis were used (when studying the essence of the economic security of the national economy during the wartime period); systematization (to determine the relationship between economic and military security systems, components of economic security in wartime); logical-structural (to determine the directions of economic influence on the war); induction synthesis (to determine an effective toolkit to ensure the necessary level of economic security of the national economy of the state and stable functioning of the economy in wartime).

**Results.** The policy of ensuring economic security in wartime conditions acquires a different dynamic, receives close connections with other areas of state policy and national security. In such conditions, the economic support of the military-industrial complex is the basis of the country's development and economic security, ensuring its stability and economic growth, preserving sovereignty and territorial integrity. Resource provision of military security becomes the most important function of such a specific subsystem as the military economy, which acts as a connecting link between economic and military security, and its scale and condition are determined by their interconnection and have a significant negative impact on economic and military power, on economic and military security. The economy exerts a multifaceted influence on the development of the armed forces, on the forms and methods of armed struggle, on the nature of war, the possibilities of its "localization", on its duration, course and outcome. Military and economic security is one of the factors in meeting the requirements of military security, which is possible in the case of sufficient economic security. However, meeting the requirements of military and economic security contributes to economic security as well. This is due to the fact that certain directions of various types of security have a dual purpose, due to which close relationships are created.

Specifying the relationship between economic and military security systems, we note the following:

a) only a reliable, effective system of ensuring economic security can be a guarantor of the country's sovereignty and independence, its stable and sustainable socio-economic development. In the case of long-term and chronic exceeding of the threshold values characterizing the normal level of economic security, not only extremely negative, but also irreversible consequences are possible in the mechanisms of ensuring the security of the state, society and the individual;

b) the economy is the material basis of military security. The state of the economic sphere of the country, its defense and industrial complex determines the systems of technical and rear support of military security institutions, the quantity and quality of weapons, military equipment and other material means, their functioning in peacetime, wartime and in crisis situations. A decrease in the level of economic development of the country as one of the indicators of a decrease in the level of its economic security, in turn, creates prerequisites for a decrease in the level of military security;

c) the necessary combat capability of the forces providing military security, based on historical experience, can be maintained only in full accordance with the economic capabilities of the state. Taking into account the fact that the possibilities of increasing the functioning of the economy with the start of hostilities will be limited due to many objective reasons, it is necessary to have the necessary stocks of military products and raw materials for the emergency increase of the process of their production and activation of the work of active and reserve production facilities. The state can create (and maintain) mobilization and strategic economic reserves only if the economy of the country is functioning reliably, and without them considerations about defense and military security lose their meaning;

d) since economic security is the basis of national security, which allows the functioning of all its other subsystems, it influences the military component indirectly, through other subsystems. For example, the inconsistency of the system of economic industrial relations with the needs of production and economic development of the country as the most important factor of economic security inevitably leads to distortions in the social structure of society, which, in turn, cause distortions in favor of various social groups and strata and, being transformed into politics, cause irreparable damage to both political and military security [2].

At the same time, the following main directions of economic influence on the war can be identified:

- serves as the material and technical base of the war. It manufactures weapons and military equipment, technical means of armed struggle, organizes the operation of transport and supply systems, improves the infrastructure necessary for the actions of the armed forces;

- ensures the improvement of the means of armed struggle, thereby determining the development of military affairs and military art;

- is one of the factors that contain, in a hidden or open form, the origins of contradictions that lead to clashes between social groups and states;

- the economic factor turned into one of the constituent elements of the war; forms and methods of economic struggle are increasingly intertwined with armed struggle.

In turn, the war makes the following demands on the economy:

- ensuring the development and continuous improvement of military industries and military R&D;
- preparation for mobilization restructuring of the economy in case of war;
- promotion of the development of communications and infrastructure, their maintenance in a high-quality condition suitable for use;
- increasing the stability of the economy, its ability to function in wartime conditions;
- ensuring the stability of management and the reliable supply of information [3].

The essence of the very economic security of the national economy of the state in this case can be presented:

firstly, as the ability of the state's military economy to sustainably maintain its own necessary military power and to realize the military-economic potential in the measure and terms stipulated by the state's military doctrine [4];

secondly, as the state of the national economy, under which there is sufficient development and preservation of the scientific and production potential of the military economy, which ensures the necessary level of material and technical equipment of the armed forces [5].

At the same time, the economic security of the national economy of the state in wartime, as a complex category, should include the following components:

- military-economic self-sufficiency of the state, i.e. the ability of its national economy to satisfy its own basic military needs both in peacetime and in conditions of military confrontation at the expense of its own resources;
- reliability and stability of the functioning of the military sector of the state economy;
- the ability of the military economy to develop its scientific and technical capabilities in such a way that current and prospective military-economic needs are met with minimal expenditure of all types of resources;
- the availability of mobilization opportunities for the deployment of military production [6].

Organically interrelated with military and economic security, the military-economic security of the state can be presented as a state of protection of the national economy from external and internal threats, in which it is able to satisfy the economic needs of the state in the conditions of a state of war and should basically be based on the same principles, as well as economic security and to be supplemented by the principles:

- as much as possible ensuring the achievement of the duality of measures (for the military and civilian spheres);
- increased readiness to respond to military and economic threats;

- duplication of particularly important measures to eliminate them, primarily in wartime [7].

**Discussions.** It should also be taken into account that in recent years, under the influence of the technical revolution in military affairs, scientific and technological progress and other factors, deep changes have been observed in the material and technical base of military power, methods of economic support for military construction, in the form of a military economy. There are processes of transformation of the military economy, the formation of its new model, which fundamentally differs from the previous one in terms of basic qualitative and quantitative parameters, the system of organization and management, forms of relationships with the military organization of the state, the general economy and other areas of social activity. All this leads to the formation of a new paradigm for the functioning of the economy and ensuring economic security in wartime.

Economic preparedness has always played and will play a significant role in the future in ensuring the military efforts of the warring parties. Achieving a high readiness of the economy to reflect external challenges and aggression is a complex and multifaceted task, and it is necessary to solve it in modern conditions in advance, in particular, by creating and supporting the necessary military sector of the national economy, which ensures the military and economic security of the country. Preventive and preparatory actions, which must be carried out in peacetime, are of special and important importance for ensuring the necessary level of economic security of the national economy of the state and stable functioning of the economy in wartime conditions.

**Conclusions.** The military (defense) security of the state should be classified as one of the most important types of economic security along with defense-industrial, food, energy, and financial security - throughout centuries of history up to the second half of the 20th century, military power was equivalent to power. Sufficient military power of the state means its adequacy:

- firstly, the economic capabilities of the state (in some cases of the Commonwealth of States);
- secondly, to real goals based on the global balance of power;
- thirdly, the requirements of modern military affairs.

This inseparable trinity stems from the modern understanding of power, its structure, the nature of the relationship between its elements, the actual place of military power in the modern system of power, which is not reduced to military power and therefore does not involve the maximization of the latter, but the optimization of the entire power structure. The correct ratio of economic and military power is of decisive importance [8].

Now the competition in military power is a way that can impose an economically stronger state to achieve victory without waging war. Going to such a competition in conditions where there is a critical military force is pointless. At the same time, by maintaining sufficient military power, the country does not lose anything except unfounded ambitions, but acquires security and the necessary conditions to realize all its potential opportunities.



All this requires new approaches to solving the problems facing the world community and an individual state. It is also necessary to take into account that these and some other phenomena are taking place against the background of geopolitical contradictions associated with the reformatting of the world political and economic system, the redistribution of the country's allocation of global economic potential and the change of the core of global technological leaders, which are deepening and do not contribute to reducing tensions in international relations. All this must be taken into account both with regard to the prospects for the development of the domestic economy and with regard to the parameters of economic security, mechanisms and tools for its support.

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