# Investigating the Impact of Structural Changes: The Socio-Economic Security Framework

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**Abstract**

This study shows that ensuring socio-economic security of the country, which is defined as a set of conditions necessary to ensure normal economic development. It is almost the most important determinant that determines the favorable conditions of economic activity of economic entities. In general, the socio-economic security of business entities ensures the ability to create and maintain such conditions of economic activity, under which the influence of external and internal factors does not lead to negative processes regarding sustainable development, necessary for achieving the set goals. It considers the system approach to the assessment of socio-economic security of business entities considers which includes the following assessment parameters: main purpose and objectives of the analysis of socio-economic security, selecting types of the analysis of socio-economic security, establishing basic rules and analysis stages, selecting and using basic models, methods and indicators to assess socio-economic security, construction of the aggregated indicator. The study researches of the methods of assessment of socio-economic security. It suggests that the index of socio-economic security is defined by comparing volumes of a company's gross investments and the amount of resources needed to maintain an optimal indicator of socio-economic security, since the source of socio-economic security is the profit received by the company resulting from the interaction with external environment subjects. According to the results of the conducted assessment of socio-economic security by comparing volumes of the company's gross investments and the amount of resources needed to maintain an optimal indicator of socio-economic security, the integral estimate of security in recent years was obtained. The article outlines the aspects of simulating the socio-economic security of business entities, conducted by means of correlation and regression analysis and by forecasting the future security level using quantitative indicators. Using the trends, the paper analyzes the principle and characteristics of other simulating and forecasting techniques and identifies their advantages and disadvantages. It allows considering as practicable the use of correlation and regression analysis and its results, while making management decisions to enhance the socio-economic security of business entities.

*Keywords: economic security, national economy, national security, socio-economic security, structural changes, business entities, economic structure, modelling.*

## 1. Introduction

Nowadays, the problem of socio-economic security being part of national security is getting worse, and it is relevant not only at the level of individual business entities, but also at the level of markets or industries. National socio-economic security is defined as the key element of the new level of quality of Ukraine's strategic development and national security.

The aggravation of the problem of economic security is evident in new aspects of security theory related to the institutional transformation of the Ukrainian economy, which is a

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sine qua non for modernization. The current trends dealing with the institutional support for economic modernization are essential for the country's economic security. The recent research deals with the new concepts of developing methods and mechanisms, which are capable of protecting the economic interests of the state, enterprises and organizations, public and business structures, and are expressed in the strategy of Ukraine's social and economic development. The interconnected and multi-vector nature of the changes taking place in the modern social and economic system dictates the need for the development and implementation of an institutional approach, while solving the range of economic security problems.

At the same time, the economic sector transformation is a natural phenomenon resulting from globalization and economic processes, including the global reorganization of world production and the country's involvement in these economic changes. The effect of transnational corporations on the states' economic, political and social institutions cannot be unambiguously assessed. Despite the contentious relationship between some national governments and transnational corporations, the result of cooperation of international companies and their collective impact on the world economy is evident. Structural changes in the domestic economy and modernization of the system of public management and administration in the modern foreign policy environment, generate various risks and threats domination of the problems of socio-economic security of business entities. The ensuring for socio-economic security is the basic condition for the development of business entities and is also the principal characteristic of operation of modern economy. With the manifestation of one risk or a number of threats to socio-economic security, business entities find themselves in certain unfavorable circumstances. As a result, they fall into a dangerous financial condition and lose the opportunity to implement not only the strategy of innovative development, but in general to conduct economic activities.

The paper offers the activities to maintain the stable operation of the national socio-economic security system. The consequence of this will be an increase in investment capital and activation of investment processes in the economy. Activities such as protection of economic competition, tax system optimization, demonopolization and economic deregulation, ensuring for sustainable development, these create conditions for attracting foreign investment in principal sectors of the economy. Among the main ones are wholesale and retail, processing industry and agriculture. In the modern context, the economic reform process manifests itself in the need to meet the essential interests of society, such as balanced economy and dynamic socio-economic development. The urgency of the problem of socio-economic security, and hence the institutional support for a set of activities, depends on the level of national economy development.

## 2. A Literature Review

The researchers have conducted a comparative legal analysis and provided proposals to implement the positive experience of EU countries in the area of economic security of Ukraine. The paper has found that the international experience in solving problems of financial and economic security convincingly shows the need to improve the legislative basis of economic security in Ukraine's international business area, and to use positive signs of globalization for the country's social development and setting its

priorities. Thus, the state must both develop a national security concept based on the world experience and provide reforms of the economic internal and foreign policy to protect all business entities (Cherniavskyi, S. et al. 2021).

The paper of Novikova O. and Shamileva L. systematizes the main factors of worsening of workers' social and economic vulnerability during the structural transformations, which take place in the modern labor market. It develops and verifies the techniques for conducting risk assessment of workers' socio-economic vulnerability. Specifically, they are based on comparing the levels of component performance in certain periods of time (Novikova, O., Shamileva, L. 2020).

The paper contains the guidelines for determining the level of Ukraine's economic security, which is one of the main components of national security, on the basis of comprehensive analysis of economic security indicators and calculation of the integrated indicator of economic security level. The shadow economy is defined as one of the essential components of Ukraine's economic vulnerability (Verkhoglyadova, N., et al. 2020).

In the course of the study, the essence of the concept of "national economic security" was clarified. The paper specifies the main constituent of national economic security, including financial, social, demographic, innovation, investment, food, energy and technology components. It suggests that a high level of national economic security is achieved through ensuring the security of each of its components (Golovko, V. 2019).

The author's concept deals with the development of socio-economic conditions, under which the economic relations between the participants of agrifood market, Ukraine's livestock market in particular, are being transformed, and assessment of the country's food and security. It also compares the position of the participants of Ukrainian agrifood market and those of four European countries: Germany, France, Italy and Poland, according to the same criteria (Kravchenko, O. et al. 2020). An increase in production, sales and, accordingly, the socio-economic security of enterprises, taking into attetion the current market situation and the resource potential available at enterprises, can be ensured if the state implements a set of supportive measures to increase the profitability of business entities (Sievidova, I.O. 2018).

The techniques for assessing the social and economic security of sustainable development of business entities include the most known approaches to assessing the social and economic security of sustainable development of enterprises, namely: resource and functional, indicative, investment, strategic, scenario and integrated approaches. One of the main approaches to assessing the level of the enterprise economic security is the so-called indicator approach, which makes assessment using a set of factors, i.e. indicators. The paper identifies the key groups of indicators. It offers integrated techniques for assessing the social and economic security of sustainable development based on the system approach (Subota, M.V. 2019). The article compares the vectors of innovative development of Ukrainian industrial enterprises and those of the world and analyzes the impact of environmental factors on the enterprises' innovation activities. It determines the structure-forming and priority vectors of branch development. It offers tools for the stimulation and state support of innovation activities (Zakharkin, O.O. et al. 2019).

Determining the essence of the imperatives of enterprise economic security in the national security system requires a reasonable approach to their classification and specific manifestations. The paper focuses on the analysis of imperatives of the environment,

process and result of the development of indicators of enterprise economic security. It substantiates the process of identification and formation of the system of imperatives of the development of enterprise economic security in the national security system (Avanesova, N.E. et al. 2018).

The research generalizes and systematizes scientific views on the essence of the "enterprise economic security" concept. It provides the rationale and on it bases the author's definition of the term of "enterprise economic security", the essence of the concept being revealed by means of "opportunity zones". The authors state that the enterprise economic security is a subjective state, which depends on a specific set of current threats to the enterprise. The proposed approach to the definition of enterprise economic security will enable to further substantiate the innovative methods of enterprise economic security management with due regard to opportunity zones (Harkusha, V. 2021).

The article reveals preconditions and threats of restricting competition in the machinery market and substantiates national competition policies aimed at enhancing economic security, depending on the causes and intensity of competition in accordance with the conditions of its manifestation. It assesses the institutional indicators of market environment economic security and measures the branch-specific competitive environment in the context of their impact on the level of economic security in the machine-building complex (Bublyk, M. et al. 2017).

This study determines the common features of the processes of ensuring the economic security and social responsibility of businesses. It substantiates the social orientation of the process of ensuring economic security of business entities in the post-industrial paradigm. It determines that these processes are interrelated components of the problematic area of entrepreneurship and influence its effectiveness. It specifies that the post-industrial society sets new priorities to ensure the economic security of business entities (Snishchenko, R.H. 2020).

The paper of Antoshkin V.K. identifies the special aspects of simulating social and economic security of agribusiness entities in Ukraine by means of correlation and regression analysis and forecasting future security levels. It analyzes the essence and special aspects of other methodological approaches to simulating and forecasting, trend-based approach in particular. It reveals its advantages and disadvantages, which allows us to verify the advantages of correlation and regression analysis and of using its results for management decision-making to ensure the social and economic security of agribusiness entities. It is facilitated by the identified cause-and-effect relationships in the "factors of impact - socio-economic security" system (Antoshkin, V.K. 2018). The article defines the theoretical basis of structural transformation of economy as the keystone of a new level of economic growth. It identifies a qualitative shift of the domestic economy and directions of improvement of the institutional environment for the national economy operation (Melnyk, A., Vasina, A. 2010).

The study focuses on the correlation between economic freedom and economic growth, including other factors as well. It analyzes various methods of assessing economic freedom and summarizes the interconnection of the index of economic freedom and indicators of economic independence and development. It establishes the differences between rigidity of estimated economic variables and the index of economic freedom. It has revealed a

connection between the development of the EFW index and public debt, tax burden, exports and unemployment (Mura, L. et al. 2017).

The results of the analysis of the state of economic security in the context of the main areas of activity, especially developed countries, members of the eurozone and developing countries, were obtained. The factors of the negative impact of the consequences of globalization on the world socio-economic security are summarized (Shopina, I. et al. 2017).

Research of theoretical and methodological approaches, as well as practical aspects of socio-economic system operation and management in modern economic conditions enable developing the economic and mathematical model of economic security of business entities under risk and uncertainty. The paper substantiates the development of Ukrainian business under risk and uncertainty in the context of European integration challenges. At the same time, it focuses on the main problems of business development management in the context of economic security and on the formation of development factors, which influence economic security under competition (Khalatur, S. 2021).

The techniques of panel assessment impact of economics structural changes on the income inequality give an opportunity to obtain empirical results, which show that the sector growth has not had a significant impact on the income inequality in any country. The research also shows that in the countries with above-average income unemployment has a relatively stronger impact on the income inequality than inflation, as opposed to the countries with below-average income, where unemployment is less correlated with income inequality than inflation. The results for the countries with high income show that the correlation between inflation and unemployment is not as significant here as in those countries with above-average income (Elhini, M., Hammam, R. 2021).

The systematize of risks caused by both excessive and insufficient administrative influence on the activities of transnational companies helps to reveal the negative consequences at the level of the whole country and its individual regions, and study global menaces to the economic security with due respect to the nature of relationship between business entities and public authorities in the context of globalization processes. A special focus is laid on the anti-corruption component of economic security as a prerequisite for effective cooperation of government agencies and business groups (Pesotskiy, A.A. 2021).

The assessment of current state of Ukraine's creative industries helps to determine their role in GDP generation and identify development challenges. The paper substantiates the choice of creative vector for promoting the socio-economic development of Ukraine. It also offers the key guidelines for optimizing the strategy of socio-economic development of Ukraine in the direction of building a "creative economy" (Adamovych, M.P. 2016).

Diagnostics and cognitive simulation are considered as modern elements of managing both the economy as a whole and socio-economic security in agribusiness entities. The substantiated stages of cognitive analysis of the economic security of agribusiness entities enable identifying the criteria of forecasting method classification (Antoshkin, V.K. 2018). It has been found that the development tendencies of Ukrainian trading businesses make it possible to determine the socio-economic factors of their business activities with due regard to various characteristics of their operation. The study of regional gross product dynamics and foreign trade balance has revealed the administrative and territorial units with the highest trade concentration (Frolova, L.V., Rozhenko, O.V. 2016).

It is shown that now it is necessary to define the economic security of the state as a certain community of factors that ensure adequate development of the social and economic spheres and reduce the backlog of Ukraine and the eurozone countries. The determinants are presented that determine the main directions for analyzing the current state and directions for the development of the national system of socio-economic security (Mohilevskyi, L. et al. 2021).

The authors have developed the structure of the model of strategic planning of national economic security, which includes several levels, such as main goal, areas of national economic security, threats, concept, strategy, program, plan, activities. The experts have determined the areas of national economic security and their priority using the hierarchy analysis. The paper provides the model of strategic planning of national economic security, which gives an opportunity to simulate the main processes of strategic planning, diagnose changes in external and internal environments, and make management decisions (Prodius, O.I. 2016).

The researchers show that to ensure economic security, first of all, an indicative analysis of the main indicators of the economy is necessary. This is ensured by the development and implementation of a set of socio-economic measures. Such arrangements are aimed at minimizing the level of impact of external and internal threats under crisis, and at the improvement of financial, physical, information and human resource availability (Zigunova A. et al. 2020).

In the context of global changes in the economy and modern political processes, one of the main tools for ensuring socio-economic security is the optimization of the economic management system. It should focus on the maximum mitigation of risks and the elimination of threats to business entities using modern methods and techniques. And also to use all available modern management opportunities to stimulate the priority activities of socially and economically promising subjects.

## 3. Materials and Methods

The purpose and objectives of this study involve justifying a set of measures aimed at enhancing socio-economic security based on the study of theoretical, methodological and analytical aspects of providing the socio-economic security of business entities. To achieve this purpose, we set the following objectives: to study the techniques for assessing the socio-economic security of business entities, substantiate the essence of socio-economic security of business entities and its basic components that will guarantee effective operation in dynamic environment, make forecasts about the socio-economic security of business entities using programming resources.

## 4. Results
### 4.1. Special aspects for determining the impact of structural changes in the economy on the provision of socio-economic security of business entities

The interpretation of paper (Khudolei, L.N. 2011) regarding the enterprise economic security is accurate, the enterprise economic security being considered as a state of protection of the enterprise's vital interests from real and possible sources of danger or economic threats. We agree with the way the paper (Korystin, O.Ye. 2010) considers

individual economic security, i.e. as a state of human life when their interests are sure to be legally and economically protected and main constitutional rights are respected. Each level of economic security in the hierarchical structure is very important, and it interacts closely with the other levels, but it is national economic security that is a kind of "transitional" level uniting international security and economic security at micro levels, such as regions, enterprises and individuals. Adherence to the basic methodological principles of socio-economic security assessment is an important aspect to obtain correct (valid) results and make the rational financial and economic management possible. It should be noted that the integrated techniques for assessing the socio-economic security of sustainable development of business entities is based on the system approach (figure 1).
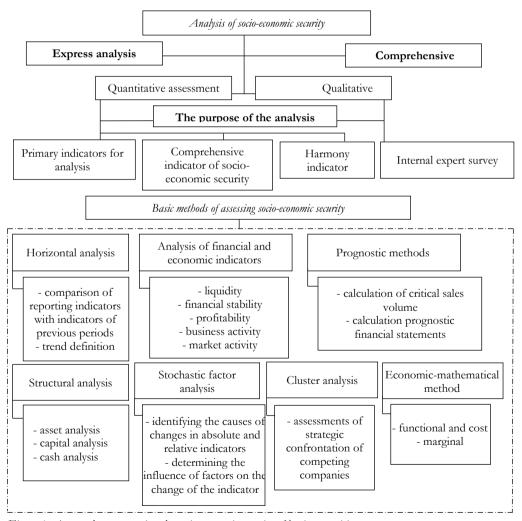


*Figure 1. Approaches to assessing the socio-economic security of business entities*

The system approach comprises the following assessment parameters:

1. Main purpose and objectives of the analysis of socio-economic security. They can include as follows: making management decisions on improving the financial position, borrowing capacity analysis, analysis of bankruptcy of business entities, study of sustainable development of enterprises, meeting customer needs, performance and productivity of business entities.
2. Selecting types of the analysis of socio-economic security.
3. Establishing basic rules and stages of analysis.
4. Selecting and using basic models, methods and indicators to assess socio-economic security and structure of the aggregated indicator.

Let us consider several methodological approaches to assessing the level of socio-economic security of business entities, which differ in specific methods of calculation, their general practical focus and different criteria of socio-economic security.

According to the scientists (Kozachenko, H.V. et al. 2003), the source of socio-economic security is the profit received by the company and resulting from the interaction with external environment subjects. It is suggested that the index of socio-economic security is defined by comparing volumes of the company's gross investment and the amount of resources needed to maintain an optimal indicator of socio-economic security. The index of socio-economic security is calculated:

$$P_{ES} = \frac{GI^t}{I_{ES}^t} ,$$

where $GI^t$ is gross investment in year t, UAH,

$I_{ES}^t$ is investment to support socio-economic security in year t, UAH.

The assessment of socio-economic security should include both calculation of a quantitative index according to this formula and qualitative interpretation (table 1).

**Table 1.** Qualitative interpretation of the socio-economic security index

| | |
|---|---|
| Maintenance level up to 0.05 | Socio-economic security is instable; the enterprise may lose it in case of an insignificant profit |
| Minimal level 0.06-0.10 | The enterprise enjoys economic security and is able to maintain it for a short period of time |
| Very low level 0.11-0.19 | The amount of investment to maintain the enterprise socio-economic security makes it possible to maintain its position in the current period, but puts this position at risk in the short term |
| Low level 0.2-0.29 | The amount of investment, which provides conditions guaranteeing economic security, makes it possible to maintain a certain market position in the current period and in the near future |
| Medium level 0.3-0.49 | The amount of investment, which provides conditions guaranteeing economic security, makes it possible to maintain a certain market position both in the current period and in the medium term, as well as to create a basis for the enterprise's competitive advantages |
| High level 0.5-0.7 | The amount of investment, which provides conditions guaranteeing economic security, makes it possible to maintain the enterprise's strategic position in the market and obtain significant competitive advantages |
| Very high level > 0.7 | The amount of investment, which provides conditions guaranteeing economic security, makes it possible to maintain significant strategically-oriented competitive advantages and be a market leader |

This interpretation of the levels of socio-economic security has a number of drawbacks. For example, the minimal level is described as a state in which "the enterprise enjoys economic security and is able to maintain it for a short period of time", however, it may enjoy a sufficiently high level of security. Besides, the technique implies testing it in practice at profitable enterprises, although almost half of domestic enterprises are unprofitable according to official statistics (Venhliuk, I.V. 2014).

Gross investment includes reinvested earnings (RE) and depreciation deductions (*DD*), as well as reinvestment of previous years (*R*) and reinvested earnings in the form of bank loans (*BL*). The formalized structure of gross investment (*GI*) looks as follows:

$$GI^t = RE + R + BL^t\left(1 - \frac{LR}{100}\right) - \Delta DD^t,$$

where *LR* is a long-term loan rate, %,

*BL*' is the amount of bank loan given in year t, UAH,

$\Delta DD^t$ is the difference between the accumulated and actual depreciation deductions, UAH.

As to the determination of the structure of gross investment, from the standpoint of formal logic the amount of gross investment according to this formula should be reduced by the difference between accumulated and actual depreciation deductions (Δ*DD*). It will allow de facto reflecting the impact of inflation on the means needed for simple reproduction of capital.

The impact of all internal and external factors on the enterprise economic security is seen in the change of indicators characterizing its activities. That is, the enterprise economic security ($P_{ES}$) is a multivariable function:

$$P_{ES} = F(X_i) = b_1 f(x_1) + b_2 f(x_2) + \cdots + b_n f(x_n),$$

where $x_1, x_2, \ldots, x_n$ are basic indicators of the enterprise activities,

$f(x_1), f(x_2), \ldots, f(x_n)$ are functions of dependence of socio-economic safety on the set indicators of enterprise activities,

$b_1, b_2, \ldots, b_n$ are the share of priority of each indicator for socio-economic security ($\Sigma\ b_i = 1$),

n is the number of indicators.

For the minimal level indicators, the critical value is achieved at a high level of socio-economic security, i.e. $x > x_{cv}$ and $P_{ES} > 0$, an example of such an indicator is workforce productivity. For the maximum level indicators, it is just the opposite, i.e. $x > x_{cv}$ and $P_{ES} < 0$, the deterioration of fixed production assets can serve as an example of it. For the intermediate level indicators, the function of socio-economic security can become positive only if the argument values are within a certain range. The function value remains constant and largest in the range between the critical values of the arguments of $x_{cv1}$ and $x_{cv2}$ and be within (*1–a*) range, where α is an infinitesimal value.

The curve of the function of the first type rises upwards to the value of (*1–a*) at the point of $x = x_{max}$. This point corresponds to the maximum real value of the indicator, so it is ideal for socio-economic security. Subsequently, the curve asymptotically approaches *1*.

The curve of the function of the second type falls downwards to the value of (*−1 + a*) at the point of $x = x_{max}$. This corresponds to the maximum real value of the worst indicator of socio-economic security. Subsequently, the curve asymptotically approaches *-1*. The function of the indicator of the third type behaves identically. The indicator function of a continuous random variable as a basis for the function of dependence of the degree of socio-economic security on the minimum level indicators:

$$F(x) = F1 - e^{-\lambda x},$$

The graph of such a function looks like a curve, which is asymptotically close to *1*. To transfer the beginning of the graph of the function to the point of $x_{cv}$ and describe the left part of the graph of the function, which depends on the minimum level indicators, one can make appropriate conversions of formula:

$$F_1(x) = -1 + e^{-\lambda(x-x_{cv})}; \; F_2(x) = 1 - e^{-\lambda(x-x_{cv})},$$

where *F1(x)* is the function of dependence of socio-economic security on the enterprise performance indicators in the range from *0* to $x_{cv}$,

*F2(x)* is the function of dependence of socio-economic security on the enterprise performance indicators with values exceeding $x_{cv}$.

The value of λ1 and λ2 can be determined by finding the logarithm of the left and right parts of the curve at the points of (0; α):

$$\lambda_1 = \frac{In_\alpha}{x_{cv}}; \; F\lambda_2 = In_\alpha(x_{cv} - x_{max})$$

Having considered the critical and maximum values of each indicator and value of *a*, we can find functions of the enterprise socio-economic security from each significant indicator of the enterprise operation, and these will be of minimum, maximum or intermediate type. The share of significance of such indicators of the enterprise socio-economic security can be determined proportionally, by using the average percentage of the growth of function of *f(xᵢ)* (left and right parts) with the argument of $x_i$ increasing by 1%.

The socio-economic security of business entities is simulated by modern programming tools using the trend models (Zhyvko, Z.B. 2012), which allow forecasting based on linear, logarithmic, power-bounded, polynomial, quantitative indicators and equations and show the same socio-economic security trends. However, the trends are calculated only for a short term and are based on a single dependence, that being the time dependence, which is not always indicative. Because of this, simulation and forecasting, which are based on establishing dependencies on another factor, i.e. correlation and regression analysis, are of great importance (Marmul, L.O. et al. 2016). The advantage of this method lies in showing the cause-and-effect relationship in quantitative terms, i.e. how much the value of *Y* (socio-economic security of business entities) changes because of changes in the values of x (impact factors). It also allows forecasting values of the dependent variable of *Y* using one or more variables of $x_n$, i.e. it determines the contribution of individual independent variables to the variation in the dependent variable under study (Iliashenko, O.V. 2016). The result of correlation and regression analysis consists in obtaining the following equation:

$$Y = a_0 + a_1 x$$

Economic interpretation of the model parameters: *a₀* is the absolute term in the regression equation, which reflects the impact of factors not included in the model, *a₁* is the parameter of an independent variable, which shows how much Y changes because of replacing *x* with *1*. It should be taken into account that if *a₁ > 0*, there is direct relationship between *x* and *Y* (when *x* increases, *Y* also increases); if *a₁ < 0*, there is inverse relationship between *x* and *Y* (when x increases, *Y* decreases).

Based on the above, it is necessary to build a model of dependence of socio-economic security of agribusiness entities to analyze security trends. (*Y*) is a variable dependent on a

set of factors, $\{x_1, x_3 - x_6, x_8 - x_{15}, x_{17} - x_{18}, x_{21} - x_{23}, x_{28} - x_{30}\}$ are factors (arguments), which determine the level of security.

From a practical perspective, the information on the projected level of socio-economic security of business entities is required and relevant both on the scale of the whole Ukraine and its regions (Ihnatenko, M.M. 2015). Therefore, the forecast equation is to be built to describe trends at the national level as well as at the level of the country's administrative and territorial units or natural units, agricultural resource units and zones. Since we grouped the regions of Ukraine into appropriate clusters, it is reasonable to simulate the level of socio-economic security of agribusiness entities and give forecasts for each cluster according to its location (Heiets, V.M. et al. 2006).

Based on the above, a model of the dependence of socio-economic security is built, and its trends are analyzed. The model input parameters combine (aggregate) the values of many factors (indicators), calculated by means of multidimensional analysis technique (Moiseienko, I.P. 2013). Simulation and forecasting of socio-economic security of business entities have a special theoretical and practical significance and relevance because food supplies for the country's population depend significantly on security levels and dynamics.

### 4.2. Determining the impact of structural changes in the economy on the provision of socio-economic security of business entities

The dynamics of the Ukrainian economic structure does not correspond to the general trends of structural changes, which presently occur in the world's developed economies and consist in increasing the share of high-tech processing industry, telecommunications, financial and business services, as well as socially oriented economic activities, and in the advanced development of knowledge-intensive high-tech industries (Sievidova, I., Tkachenko, S. 2022).

The dynamics of Ukraine's GDP formation shows that certain changes took place in the sectoral structure of the national economy during a long period of time (table 2).

**Table 2.** Dynamics of GDP structure by types of economic activity in Ukraine in 2016-2020, %

| Branches of the economy | 2016 | 2017 | 2018 | 2019 | 2020. |
|---|---|---|---|---|---|
| Agriculture, forestry and fisheries | 11,73 | 10,19 | 10,14 | 8,97 | 9,27 |
| Mining and quarrying | 5,52 | 5,94 | 6,02 | 5,59 | 4,54 |
| Processing industry | 12,22 | 12,06 | 11,56 | 10,81 | 10,13 |
| Supply of electricity, gas, steam and air conditioning | 3,09 | 2,88 | 3,14 | 3,14 | 2,93 |
| Water supply; sewerage, waste management | 0,36 | 0,33 | 0,32 | 0,36 | 0,39 |
| Building | 1,99 | 2,16 | 2,28 | 2,70 | 2,87 |
| Wholesale and retail trade | 13,33 | 13,74 | 13,25 | 13,23 | 13,96 |
| Transport, warehousing, postal and courier activities | 6,57 | 6,41 | 6,38 | 6,66 | 6,26 |
| Temporary accommodation and catering | 0,65 | 0,63 | 0,71 | 0,89 | 0,64 |
| Information and telecommunications | 3,74 | 3,70 | 3,90 | 4,59 | 4,97 |
| Financial and insurance activities | 2,74 | 2,73 | 2,75 | 2,88 | 3,16 |
| Operations with real estate | 6,12 | 5,75 | 5,79 | 6,07 | 6,38 |
| Professional, scientific and technical activities | 2,87 | 2,90 | 3,18 | 3,56 | 3,26 |
| Administrative and support services activities | 1,24 | 1,19 | 1,36 | 1,56 | 1,42 |
| Public administration and defense | 5,16 | 5,49 | 5,98 | 6,70 | 7,23 |
| Education | 3,73 | 4,46 | 4,45 | 4,34 | 4,32 |
| Health and Social Care | 2,47 | 2,55 | 2,17 | 2,40 | 2,70 |
| Arts, sports, entertainment and recreation | 0,57 | 0,58 | 0,57 | 0,60 | 0,54 |
| Provision of other types of services | 0,71 | 0,75 | 0,81 | 0,98 | 0,81 |
| Taxes on products | 15,42 | 15,85 | 15,46 | 14,23 | 14,46 |

In 2020, wholesale and retail became the leading sectors of the economy (13.4%). It happened so because their revenue mix duplicates the income of the rest of sectors of real economy: it is the resale of those goods that have been already included in the revenue of plants and factories. However, the commercial enterprises constitute an important and financially reliable segment of the customer base and are contractors of companies with a B2B business model.

The processing industry (10.1%), agriculture (9.3%), public administration and defense (7.2%), real estate transactions (6.4%) take the next places in the rating of economic sectors. This industrial and agrarian structure of the economy points to a low share of high-tech production and insufficient processing required for value added maximization.

The share of agriculture has significantly decreased (by 21%), the same as the share of mining industry, quarry development and processing industry. On the other hand, the indicators of construction (by 44.1%), public administration and defense, compulsory social insurance (by 40.1%), as well as sectors of the social sphere (education, health care and social assistance, professional, scientific and technical activities) have increased the most. According to the results of the conducted assessment of socio-economic security by comparing volumes of the company's gross investment and the amount of resources needed to maintain an optimal indicator of socio-economic security, the integral estimate of security in recent years was obtained (figure 2).
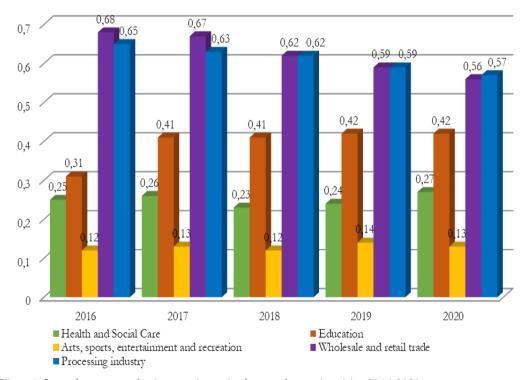


*Figure 1. Integral assessment of socio-economic security, by type of economic activity, 2016-2020*

During the study period, the integral estimate of socio-economic security according to the types of economic activities was obtained for all economic sectors; however, Fig. 2 shows the socio-economic security of only one industry. The organizations involved in the wholesale and retail trade and processing industry have a high level of socio-economic security. However, though the level is high, it constantly fluctuates. This level is characterized by a high amount of investment to provide conditions, which guarantee economic security and make it possible to maintain the enterprise's strategical market positions and obtain significant competitive advantages. The organizations involved in education activities have an average level of socio-economic security. This level proved to be more stable, not violating the established limits. The average level of socio-economic security makes it possible to maintain market positions both in the current period and in the medium term, as well as to provide a basis for creating competitive advantages of the enterprise. The organizations involved in health care and social assistance have a low level of socio-economic security. This level did not change during the study period. The low level of socio-economic security guarantees economic security and makes it possible to maintain a certain market position in the current period and in the near future. The organizations involved in arts, sports, entertainment and recreation have a very low level of socio-economic security. This level makes it possible to maintain a certain position in the current period, but puts this position at risk in the short term.

## 5. Research Results

Simulation and forecasting based on establishing dependencies on another impact factor, i.e. correlation and regression analysis, were used to forecast the level of socio-economic security of business entities. Simulation according to the types of economic activities was conducted in Statistica software for the enterprises of different levels of socio-economic security. The graphical representation of the obtained results includes the coefficients of correlation and regression equation.

The calculation of values of the parameters of the model of the level of socio-economic security of business entities for the future allow analyze of potential menaces to economy. The analysis result in obtain the integral estimate of the level of socio-economic security of the whole economy and separate spheres of activities. The model parameters are as follows: SEB is an aggregated indicator characterizing the level of social and economic security of business entities; integrated indicators of the level of microeconomic (M), innovation and investment (I), production and reproduction (V), foreign economic (Z), social (S), environmental security (E) which, respectively, aggregate the values of indicators.

The development process according to each parameter of the model (M, I, V, Z, S, E) resulted in the following static forecast model of dependence of the level of social and economic security on the studied parameters of industrial enterprises:

$$SEB = 0.26M + 0.49I + 0.03V + 0.13Z + 0.69S + 0.03E + 0.37$$

In retrospect, the model proved to be in compliance with the input data, so we can state with assurance that the model is adequate for forecasting. In view of the above-mentioned considerations, the economic interpretation of simulation results is of a scientific and practical interest and offers a number of conclusions:

1. The value of the absolute term of equation (0.37) characterizes the impact of other factors, not taken into account in the model, on the total indicator of socio-economic security of industrial business entities as positive. It means that when analyzing a wider range of factors, this trend will have an increasing value.

2. The indices of each analyzed parameter of the model show how much the studied parameter (SEB) is going to change, i.e.:

- if the level of macroeconomic security changes by 1 point, the total indicator of socio-economic security in the industrial sector will increase by 0.26 points,

- if the level of innovation security changes by 1 point, the total indicator of socio-economic security will increase by 0.49 points,

- if the level of production and reproduction security changes by 1 point, the total indicator of socio-economic security will increase by 0.03 points,

- if the level of foreign economic security changes by 1 point, the total indicator of socio-economic security in the industrial sector will increase by 0.13 points,

- if the level of social security changes by 1 point, the total indicator of socio-economic security in the industrial sector will increase by 0.69 points,

- if the level of environmental security decreases by 1 point, the total indicator of socio-economic security of business entities will decrease by 0.03 points.

The static forecast model of dependence of the level of socio-economic security on the studied parameters of enterprises in the field of information and telecommunications is as follows:

$$SEB = 0.24M + 0.43I + 0.02V + 0.12Z + 0.63S + 0.03E + 0.31$$

The economic interpretation of simulation results led to the following conclusions:

1. The value of the absolute term of equation (0.31) characterizes the impact of other factors, not taken into account in the model, on the total indicator of socio-economic security of business entities in the field of wholesale and retail as negative. It means that when analyzing a wider range of factors, this trend will have a decreasing value.

2. The indices of the model parameter indicate as follows:

- if the level of macroeconomic security changes by 1 point, the total indicator of socio-economic security in the field of wholesale and retail will increase by 0.24 points,

- if the level of innovation security changes by 1 point, the total indicator of socio-economic security will increase by 0.43 points,

- if the level of production and reproduction security decreases by 1 point, the total indicator of socio-economic security will increase by 0.02 points,

- if the level of foreign economic security changes by 1 point, the total indicator of socio-economic security will increase by 0.12 points,

- if the level of social security changes by 1 point, the total indicator of socio-economic security will increase by 0.63 points,

- if the level of environmental security changes by 1 point, the total indicator of socio-economic security of business entities in the field of wholesale and retail will increase by 0.03 points.

The obtained static forecast model of dependence of the level of socio-economic security on the studied parameters of educational enterprises:

The economic interpretation of simulation results led to the following conclusions:

$$SEB = 0.30M + 0.25I + 0.19V + 0.22Z + 0.38S + 0.06E + 0.45$$

1. The value of the absolute term of equation (0.45) characterizes the impact on the total indicator of socio-economic security of educational business entities as positive. It means that when analyzing a wider range of factors, this trend will have an increasing value.

2. The indices of the model parameter show as follows:

- if the level of macroeconomic security changes by 1 point, the total indicator of socio-economic security will increase by 0.30 points,

- if the level of innovation security changes by 1 point, the total indicator of socio-economic security will increase by 0.25 point,

- if the level of production and reproduction security changes by 1 point, the total indicator of socio-economic security will increase by 0.19 points,

- if the level of foreign economic security changes by 1 point, the total indicator of socio-economic security will increase by 0.22 points,

- if the level of social security changes by 1 point, the total indicator of socio-economic security will increase by 0.38 point,

- if the level of environmental security changes by 1 point, the total indicator of socio-economic security of agribusiness entities will increase by 0.06 points.

The static forecast model of dependence of the level of socio-economic security on the studied parameters of enterprises in the field of health care and social assistance:

The economic interpretation of simulation results offers a number of conclusions:

$$SEB = 0.28M + 0.32I + 0.15V + 0.20Z + 0.43S + 0.36E + 0.32$$

1. The value of the absolute term of equation (0.32) characterizes the impact on the total indicator of socio-economic security of business entities in the field of health care and social assistance as positive. It means that when analyzing a wider range of factors, this trend will have an increasing value.

2. The indices of the model parameter show as follows:

- if the level of macroeconomic security changes by 1 point, the total indicator of socio-economic security will increase by 0.28 points,

- if the level of innovation security changes by 1 point, the total indicator of socio-economic security will increase by 0.32 points,

- if the level of production and reproduction security changes by 1 point, the total indicator of socio-economic security will increase by 0.15 points,

- if the level of foreign economic security changes by 1 point, the total indicator of socio-economic security will increase by 0.20 points,

- if the level of social security changes by 1 point, the total indicator of socio-economic security will increase by 0.43 point,

- if the level of environmental security changes by 1 point, the total indicator of socio-economic security of agribusiness entities will increase by 0.36 points.

This has a reasoned socio-economic interpretation. Based on the calculations, it can be determined that the current state of socio-economic security is directly related to structural shifts in the national economy, which are determined by the demographic factor, the state policy of economic restructuring, investment and monetary policy, the state policy of priority development of individual industries and territories, sectoral differences in wages and income levels of the population, social reorientation of the economy. This is a serious economic and social problem. Ukraine's exit from the economic crisis and the solution of the strategic tasks in restoring the national economy are possible with a significant increase

in the socio-economy security. There is a need to ensure the efficiency of government decision-making, which, however, requires justification for the efficient use of material resources, especially energy, the cost of which is constantly growing. Therefore, of ensuring a satisfactory level of socio-economic security requires not only overcoming the crisis in all areas of the national economy, but also cardinal transformation of the economy.

## 6. Discussions

Given the long-term crisis reduction in production against the background of progressive inflationary processes, an analysis of the state of socio-economic security seems to be a top priority. Forecasting its state will serve as the basis for the development of a comprehensive system of measures to help achieve the full productivity of the economy. In order to optimize and increase the efficiency of the national economic structure, it is necessary to pursue an active structural policy involving the potential of all state institutions. The structural policy should be based on a detailed analysis of the impact of basic market and social institutions on the structure of domestic economy.

According to the integral estimate of socio-economic security by types of economic activities, the organizations were distributed by the level of their socio-economic security during a five-year period as follows. The high level of socio-economic security encompasses organizations belonging to the following economic sectors: taxes on products, wholesale and retail, motor transport maintenance, processing industry, agriculture, forestry and fishery. These industries also have the highest share in the structure of Ukraine's GDP and a fairly stable competitive position in domestic and foreign markets. The average level of socio-economic security encompasses organizations from the following sectors of the economy: transport, warehousing, postal and courier activities, real estate transactions, mining industry and quarry development, public administration and defense, compulsory social security, information and telecommunications, education. The share of these sectors in the structure of Ukraine's GDP constitutes 3.7-6.7%. The low level of socio-economic security encompasses organizations from the following sectors of the economy: power, gas, steam and air conditioning supply; professional, scientific and technical activities; financial and insurance activities; health care and social assistance; construction; administrative activities and accessorial services. Their share in the structure of Ukraine's GDP is 1.2-3.1%. The very low level of socio-economic security encompasses organizations from the following sectors: provision of other services, temporary accommodation and catering, information and telecommunications, water supply, sewerage, waste management. Their share in the structure of Ukraine's GDP is 0.98-0.32%.

## 7. Conclusion

The main principle of improving the social and economic security of business entities is the transformation of economic interests between business entities, therefore the implementation of this concept should take place systematically and at different organizational levels. In the current economic and social conditions of society development, it is the principles of implementing social and economic security that act as

the key approach that will help to respond and to adapt to social changes, economic and political challenges in a modern democratic society in a timely manner.

The study brought to light a significant dependence Ukraine has on external economic conditions since it is a state with a transitional economy. As such, it becomes necessary to use all available tools to study the current state of social and economic security by type of economic activity.

The built model of the level of social and economic security of industrial enterprises makes it possible to identify and quantify the cause-and-effect relationship between the level of security and a number of factors that have a significant impact on this level. It has been also found that social (0.69) and innovation (0.49) factors have the greatest impact on the level of security. The production and reproduction factors, as well as environmental factors have the least impact, constituting 0.02 and 0.03, respectively. The calculations allow us to state that the social and innovative factors are the basis for ensuring the social and economic security of the industrial sector in the future. Thanks to the built model of the level of social and economic security of enterprises in the field of wholesale and retail, it has been found that the social (0.63) and innovation (0.43) factors have the greatest impact on the level of security. The production and reproduction factors, as well as environmental factors have the least impact, constituting only 0.03. Consequently, the social and innovative factors are the basis for ensuring the social and economic security of business entities in the future. The model of the level of social and economic security of the education sector indicates that the social (0.38) and macroeconomic (0.30) factors have the greatest impact on the level of security. The foreign economic factors, as well as production and reproduction factors have the least impact, constituting 0.22 and 0.20, respectively. Thus, it is the social and macroeconomic factors that are the basis for ensuring the social and economic security of business entities of the education sector in the future. The model of the level of social and economic security in the field of health care and social assistance indicates that the social (0.43) and environmental (0.36) factors have the greatest impact on the level of security. The production and reproduction factors, as well as foreign economic factors have the least impact, constituting 0.15 and 0.20, respectively. Thus, it is the social and environmental factors that are the basis for ensuring the social and economic security of business entities in the future.

Possessing up-to-date data of such calculations, business entities gain real opportunities to strengthen economic security. The implementation of the foundations of socio-economic security increases competitiveness, reduces the risks of entrepreneurship, allows entering foreign markets, and increases economic and social efficiency. This will allow business entities to reduce the negative impact of foreign economic factors, and the state to attract investments to ensure the normal economic development of the country.

However, ensuring the social and economic security of both economic entities and industries as a whole depends on the ability of the country's leadership to respond in a timely manner and adequately influence these factors with maximum efficiency, maximizing positive effects and mitigating or even neutralizing negative ones. In the short term, the strengthening of the socio-economic security of the Ukrainian state will depend primarily on the creation of favorable conditions for ensuring stability and creating prerequisites for economic growth in the context of the entire macroeconomic environment.

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