

STRATEGIZING SOCIAL SECURITY IN THE LABOR MARKET IN THE CONTEXT OF TRANSFORMATION OF KEY THREATS

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Abstract. The *aim* of the article is to model strategies of social security in the labor market, which will provide an opportunity to conduct a scenario analysis of the effectiveness of current state policy measures, taking into account the impact of key threats to social security in the labor market and to strategize its priorities for the future in the context of the transformation of threats. The *subject* of the study is social security in the labor market and strategic priorities of its provision in the context of transformation of key threats. *Methodology.* To achieve the goal of the study, a set of general scientific and special methods was used, in particular abstract-logical (to determine methodological approaches to assessing the impact of key threats on the level of social security in the labor market), simulation modeling (to model strategies for ensuring social security in the labor market); system generalization (to substantiate strategic directions for ensuring social security in the labor market). Simulation modeling of strategies for ensuring social security in the labor market was carried out using economic indicators for 2006–2018, which makes it possible to specify the trends and factors of their change in the labor market in the conditions of its economic cyclicity (the period before and after the 2008 economic crisis, as well as the events of 2014 in Ukraine). Labor market indicators since 2019 were not taken into account in modeling strategies deliberately, since the study did not include an assessment of labor market parameters in the context of aggravation of social security risks that are pandemic (2020–2021) and military (2022) in nature due to their low controllability and spontaneity. The simulation model of the strategy for ensuring social security in the labor market was built using Powersim software. *Results.* The paper substantiates the expediency of using the method of simulation modeling as a tool for strategic management of complex socio-economic systems, in particular, relations in the labor market. The method of modeling social security strategies in the labor market, based on the method of simulation modeling, is proposed. The basis for the simulation experiment is to assess the dynamics of the main threats to social security in the labor market, expressed through seven economic indicators that characterize the security of employment and remuneration. Six variants of models of strategies for ensuring social security in the labor market have been generated, which illustrate certain types of state personnel and socio-economic policies that have been implemented (should be implemented) under the influence of certain transformation processes and environmental factors. *Practical implications.* The conclusions and methodological approaches to modeling strategies obtained as a result of the study can be implemented in the practice of state and regional management to reduce/neutralize the negative impact of certain types of threats on the labor market. *Value/originality.* The author's methodology of simulation modeling of strategies for ensuring social security in the labor market and a roadmap for strategizing social security in the labor market in the context of the transformation of key threats, which can be implemented at different levels of management.

Key words: labor market, social security, threats, simulation modeling, strategizing.

JEL Classification: E24, I38, J08

1. Introduction

In recent years, the labor market has been an extremely dynamic socio-economic system, both in the structure of the national economy of Ukraine and

the global economy as a whole. Global transformation processes, including changes in the mode of production, the nature of industrial relations and property relations, demonstrate the development of

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the information society and knowledge economy. They provoke significant transformations of the labor market, which are associated with the emergence of new and change of traditional professions; development of non-standard forms of employment and organization of labor relations; growing demand for new competencies and employees of a new type who possess them or are ready to quickly master them; growing risks of structural unemployment in case of unwillingness of the workforce to adapt to current or future business needs. The relevant processes have a significant impact on the development of economic systems in general and form fundamentally new qualities of social and labor relations, focused on the priority of innovation and information component.

At the same time, transformational changes in both the global and national economies carry numerous risks in the field of labor and employment, which provoke threats to social security in the labor market. In recent years, the most acute threats have been associated with the spread of informal employment, youth unemployment, the withdrawal of older people from the labour market, the decline in incomes, etc. In 2020, against the backdrop of the above, threats arose due to the spread of the COVID-19 pandemic (a decrease in the level of working capacity and quality of the workforce due to an increase in the incidence rate, massive layoffs in certain sectors of the economy and an increase in unemployment due to the suspension of business activity, the inability to continue working in the usual format for most employees / unreadiness of a certain part of the workforce for new employment conditions, etc.) Since the spring of 2022, after Russia's full-scale invasion of Ukraine on 24.02.2022, a number of new critical threats, which are signs of a wartime economy, have become acutely relevant for the Ukrainian labor market. They significantly complicate the maintenance of social security in the labour market and actualize the task of not only determining the current state of threats, but also their forecast characteristics, in order to maintain the labour market in a viable state, re-adjust the economy to new conditions and ensure social protection of the population of Ukraine. In addition, it should be noted that these threats to the labour market of Ukraine may to some extent extend to the labour markets of the EU countries and other countries of the world, which are connected with it by migration and globalization processes. Thus, the problem of maintaining social security of the labour market goes purely beyond the national economy.

The results of the study of the problems of labor market development and social security were reflected in the scientific works of both foreign and domestic authors. Among the works of foreign researchers, it should be noted the study of A. Hijzen and B. Menyhert (Hijzen, Menyhert, 2016), which

highlights the risks in the field of labor market security and their consequences; C. Crouch (2010), who defines the concept of flexible security in the context of workforce flexibility. Scientific value has the approach of foreign scientists T. Wilthagen (Wilthagen, 2002) and F. Tros (Wilthagen, Tros, 2004), who consider it necessary to distinguish between: work safety, which concerns the actual stay at a particular workplace; job security, which refers to the security of permanent employment; income security, and "combined" security, i.e., the ability to achieve a balance between work and personal life. The scientific works of G. Standing (Standing, 1999) are also devoted to the problems of security in labour and employment issues, he considers job security, workplace security, health and safety, as well as representative security, or the right to representation through trade unions.

In previous studies (Shaulska, 2020), it is substantiated that the management of the national economy acquires supranational features and can be effective if strategic management tools are used, since it allows taking into account dynamic changes in the external environment, predicting their parameters and ensuring positive dynamics of performance indicators in the future. Using cluster analysis, based on modeling the impact of labor market and education indicators and GDP growth in the EU and Ukraine, the strategic directions that should become the basis of the state personnel policy and ensure economic growth were substantiated. However, it is obvious that the current challenges for the labour markets of Ukraine and the EU will not only change the trends of their development, but will also affect the involvement of individual national labour markets in certain clusters, which will require a change in the priorities of the state socio-economic and human resources policy.

The aim of the study is to model social security strategies in the labor market, which will provide an opportunity to conduct a scenario analysis of the effectiveness of current state policy measures, taking into account the impact of key threats to social security in the labor market and to strategize its priorities for the future in the context of the transformation of threats.

2. Simulation modeling as a tool for strategizing

Justification of strategic directions of ensuring social security in the labor market of Ukraine based on the priorities of state policy, taking into account the current economic situation, becomes possible through the use of a wide range of economic and mathematical modeling tools. In the process of assessing the dynamics of the development of

economic systems and phenomena, as well as trends of their changes in the future, a high level of effectiveness is evidenced by simulation modeling, during the application of which imitation takes place, that is, the reproduction of specific events, phenomena, objects, etc. Simulation modeling has a number of advantages that play a leading role in the process of assessing the prospects for neutralizing threats to social security in the labor market. Among them: the possibility of identifying not only the patterns of existence, but also trends in the development of the situation in the future; characterization of the interaction of components in the overall system; determination of dynamic processes and various behavioral aspects of the economic environment, taking into account the variability of external conditions. Among the wide range of possibilities of using simulation modeling, namely, methods of system dynamics, discrete modeling, agent-based modeling, it is advisable to use system-dynamic models that provide a description of the behavior of the selected object under different conditions that may change. The main value of simulation modeling is that it is based on the methodology of system analysis, which allows to use this type of modeling as a universal method for decision-making under uncertainty and to take into account in the models of difficult to formalize factors, as well as to apply the basic principles of the system approach to solve practical problems (Vlasjuk, 2013).

The key to the success of simulation modeling is the passage of all its stages provided by the procedure. Thus, in order to conduct a simulation experiment on the impact of key threats to social security in the labor market on the choice of a particular strategy, it is important to have such stages as: setting goals and objectives; selection of evaluation parameters and characterization of their numerical values; collection and systematization of information; software implementation of the simulation model using the Powersim software package; checking the adequacy and accuracy of the obtained model; conducting simulation experiments; evaluating the results; substantiating the directions of the strategy for ensuring social security in the labor market of Ukraine.

3. Methodology of strategy modeling

In order to substantiate the types of strategies for ensuring social security in the labor market in the context of the transformation of key threats, the author's methodology based on the method of simulation modeling has been developed. The basis for the simulation experiment is the assessment of the dynamics of the main threats to social security in the labor market, which are expressed in the form

of quantitative indicators. Taking into account the significant threats that take place in the labour market of Ukraine and impede the achievement of social security in it, we consider it appropriate to choose parameters that indicate such threats and negative phenomena as:

- spread of informal employment;
- growth of youth unemployment;
- low level of wages.

That is why the main parameters of the modeling were defined as: informal employment rate (%); unemployment rate of persons aged 15-24 years (%); unemployment rate of persons aged 25-29 years (%); unemployment rate of persons aged 30-34 years (%); average monthly wage (UAH); real wage index (%); ratio of wage arrears to wage bill (times). In particular, the above list of indicators provides an assessment of the phenomena in the field of employment security (level of informal employment, youth unemployment rate) and wage security (average monthly wage, real wage index, ratio of wage arrears to wage bill).

The period from 2006 to 2018 inclusive was chosen as the time period of the study, which makes it possible to specify the trends and factors of their change in the labor market in the conditions of its economic cyclicity (the period before and after the economic crisis of 2008, as well as the events of 2014 in Ukraine). Labor market indicators since 2019 were not taken into account in modeling strategies deliberately, since the study did not include an assessment of labor market parameters in the context of aggravation of social security risks that have a pandemic (2020–2021) and military (2022) nature due to their low controllability and spontaneity. This may become the direction of further scientific research.

The coefficient of labor supply and demand (the ratio of vacancies to the number of registered unemployed), which determines the degree of equilibrium of the labor market and its corresponding situation at the time of analysis (K_{ds}), was chosen as an effective indicator that reflects the essence of the strategy of ensuring social security in the labor market. Thus, in case the coefficient reaches the level of one, full compliance of labor supply and demand and equilibrium labor market conditions are ensured, which, unfortunately, is unattainable in real economic conditions. If the number of vacant jobs exceeds the number of registered unemployed, the labour market situation is labour deficient, which indicates an excess of demand for labour over its supply. At the same time, the excess of the number of unemployed labour force over the number of vacancies represents a labour market surplus and determines the excess of labour supply over demand. Thus, the closest possible approximation of the value of K_{ds} to unity is an important condition for balancing the labour market and ensuring social security of the population in terms of employment.

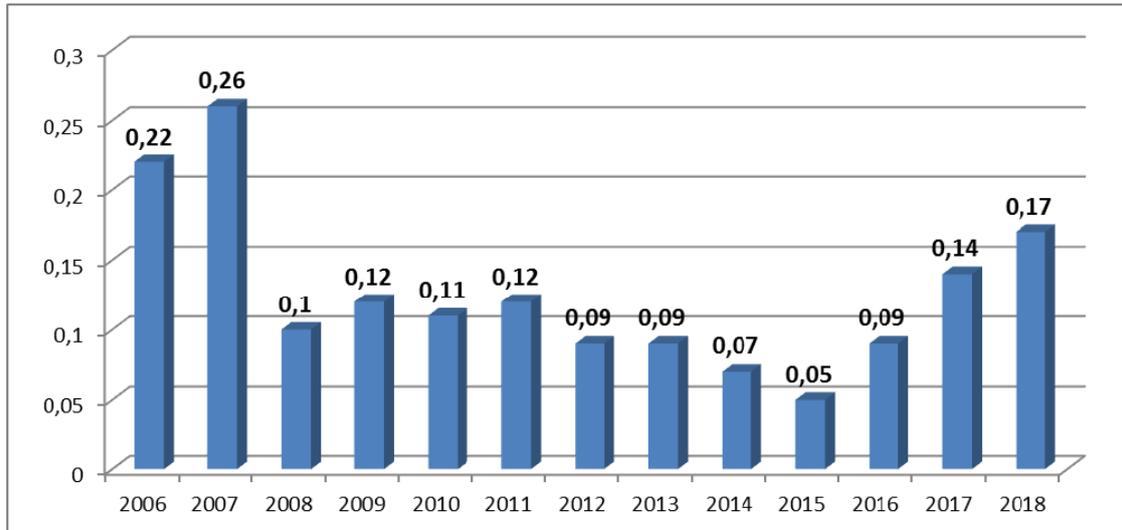


Figure 1. Ratio of labor supply and demand in the labor market of Ukraine (Kds) during 2006–2018

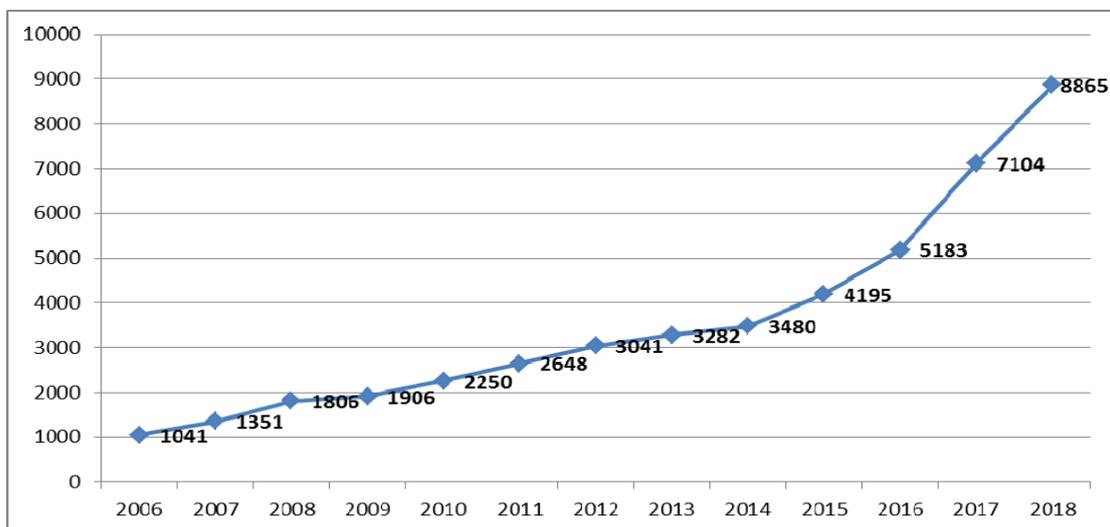


Figure 2. Dynamics of the average monthly wage in Ukraine for 2006–2018

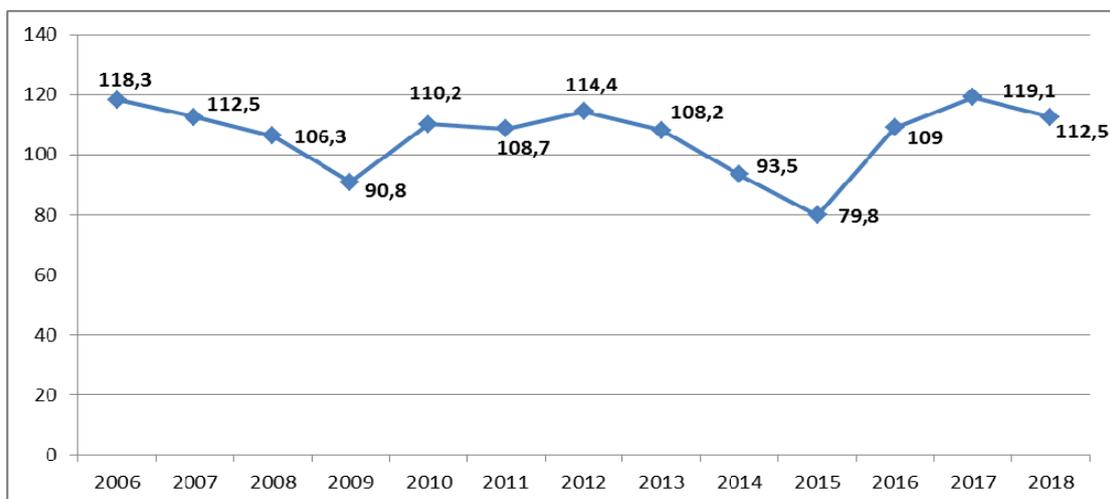


Figure 3. Dynamics of the real wage index in Ukraine for 2006–2018

During the period under study, there was a significant imbalance between supply and demand in the Ukrainian labour market, with the most significant gap between the number of vacancies and workers seeking employment occurring during the 2008 crisis, when there was a significant reduction in labour demand and an increase in the number of unemployed (State, 2022). In general, during the period under study, the volume of demand for labor decreased by 65.7%, the volume of supply – by 56.2%. Thus, the rate of reduction in the number of vacant jobs significantly exceeds the rate of reduction in the number of registered unemployed, as evidenced by a decrease in the ratio of supply and demand (Figure 1).

The lowest values of the supply-demand ratio were recorded in the crisis and post-crisis periods (2008 and 2015), which was caused by a simultaneous reduction in the number of vacancies along with an increase in the number of unemployed persons. At the same time, it is worth noting a certain improvement in the dynamics of the studied indicator since 2016, which is confirmed by positive trends in its growth, in contrast to the unstable dynamics of previous years.

Regarding changes in the level of threats to social security in the labor market, it is worth noting the increase in their severity during the crisis periods of 2008–2009, 2014, as evidenced by the increase in youth unemployment and informal employment, as well as the ratio of wage arrears to the wage bill. Among the positive changes in the dynamics of labor market indicators, only a slight decrease in the level of informal employment and wage arrears can be noted. At the same time, the youth unemployment rate was characterized by unstable dynamics with a tendency to increase, showing a critically high level in the age group of young people aged 15-24.

Despite the constant growth of the average monthly wage during the study period, the real wage index is characterized by opposite trends, significantly decreasing in the post-crisis periods of 2009 and 2015 (Figures 2, 3).

The low degree of controllability of inflationary processes and the insufficient level of efficiency of macroeconomic policy causes the process of reducing real incomes of the population, which poses a significant threat to social security. The above changes in the dynamics of the main indicators of labor market development, in particular in the context of highlighting key threats to social security, require a detailed study.

In accordance with the chosen logic of the study and taking into account the work of other scientists (Berger, Biffi, 2016), the mathematical model of the strategy for ensuring social security in the labor market is built according to equations (1-5). Thus,

the Mincer equation provides an opportunity to calculate the average monthly wage:

$$\log(W) = \beta_0 + \beta_1 X + \beta_2 SCH + \beta_3 EXP + \beta_4 EXP^2 + \beta_5, \quad (1)$$

where EXP – work experience;

X – is a control variable that estimates the additional value added of an employee;

SCH – duration of study, in years;

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ – coefficients estimated empirically, most often by the least squares method.

The empirical formula of gross consumer expenditures is used to estimate the economic parameters:

$$UC = \frac{(1 - t^{prof} sub^i)(r + \delta^K) - t^{prof} \delta^K}{1 - t^{prof}} - t^{cap}, \quad (2)$$

where UC – gross costs of the consumer,

t^{prof} – income tax,

sub^i – investment subsidy,

r – interest rate (discount coefficient),

δ^K – impairment of fixed assets,

t^C – capital tax.

Gross value added is also recognized as an economic parameter of the labor market:

$$G_{VA} = y - k - c - p - \tau^C, \quad (3)$$

where G_{VA} – gross value added,

y – the value of the production function,

k – expenses incurred to fill the vacancy,

c – expenses incurred for additional training of the employee,

p – costs associated with management efforts to retain employees,

τ^C – administrative expenses for dismissal of the employee.

It is substantiated that the wage fund is influenced by the gross domestic product:

$$G_{DP} = G_{VA} + t^{prod} - sub^p, \quad (4)$$

where G_{DP} – gross domestic product,

G_{VA} – gross value added,

t^{prod} – taxes on the product,

sub^p – subsidy for products.

The cost of firing an employee is described by the following equation:

$$\tau^F = \tau^S + \tau^{Fire} + \tau^C, \quad (5)$$

where τ^F – expenses for dismissal of an employee,

τ^S – payments to dismissed employees,

τ^{Fire} – taxes on the dismissed employee,

τ^C – administrative expenses for dismissal of the employee.

During the simulation experiment, the dependence of the coefficient K_{ds} is presented in the form of a parametric equation describing its function from 7 variables:

$$K_{ds} = \{\omega_1, \omega_2, \omega_3, \omega_4, \omega_5, \omega_6, \omega_7\}, \quad (6)$$

where K_{ds} – a coefficient that characterizes the ratio of supply and demand of labor and is an indicator of the

effectiveness of the strategy of ensuring social security in the labor market;

- ω_1 – level of informal employment, %;
- ω_2 – unemployment rate of young people aged 15-24, %;
- ω_3 – unemployment rate of young people aged 25-29, %;
- ω_4 – unemployment rate of young people aged 30-34, %;
- ω_5 – level of average monthly wage, UAH;
- ω_6 – real wage index, %;
- ω_7 – is the ratio of wage arrears to the wage bill, times.

The simulation model of the strategy for ensuring social security in the labor market was built using Powersim software based on economic indicators of the labor market (variables presented in equations 1-5).

4. Models of social security strategies

According to the results of the study, six variants of models of strategies for ensuring social security in the labor market were generated, which are mathematically described by a different combination of vectors of the dynamics of the above variables (equation 6), and substantively (economically) are an illustration of certain types of state personnel and socio-economic policies that are implemented (to be implemented) under the influence of certain transformation processes and environmental factors (in particular those that cause threats to social security in the labor market). Accordingly, each of the models of strategies for ensuring social security in the labour market provides for its own set of optimal policies and management actions to be implemented at different levels of government. At the same time, it should be noted that some of the built models of strategies cannot be considered as relevant for the Ukrainian economy under martial law, since,

for example, reducing the severity of threats to employment security and wages is not possible at the moment, and reducing the level of youth unemployment may be "artificial" due to the emigration of some young people or their transition to other activities (service in the armed forces, volunteering, etc.).

Assume that the strategy of ensuring social security in the labor market can be expressed by the following conditions (Figure 4).

This strategy defines macroeconomic measures such as price stabilization and control of the limits of their growth (decrease in ω_6, ω_7), combined with a decrease in funding for measures to control the number of unemployed (reflected in the growth of $\omega_2, \omega_3, \omega_4$). Such a strategy corresponds to the state of the labor market of Ukraine before the "pandemic" period (2018–2019), which is reflected in a slight decrease in the level of informal employment, an increase in youth unemployment in all age groups of young people, an increase in the average monthly wage, a decrease in the real wage index, as well as a certain decrease in the ratio of wage arrears to the wage bill. The decrease in the performance indicator, which expresses the essence of the strategy of ensuring social security in the labor market, shows its inefficiency, which is clearly reflected in the form of a decrease in the ratio of supply and demand (Figure 9).

Suppose that the strategy of ensuring social security in the labour market can be expressed by the following conditions (Figure 5).

According to the above conditions, the strategy provides for the lack of control over the indicators of informal employment and youth unemployment, which is expressed in the growth of parameters $\omega_1, \omega_2, \omega_3, \omega_4$. At the same time, the indicators of wage security, including the average monthly wage, the real wage index, the ratio of wage arrears to

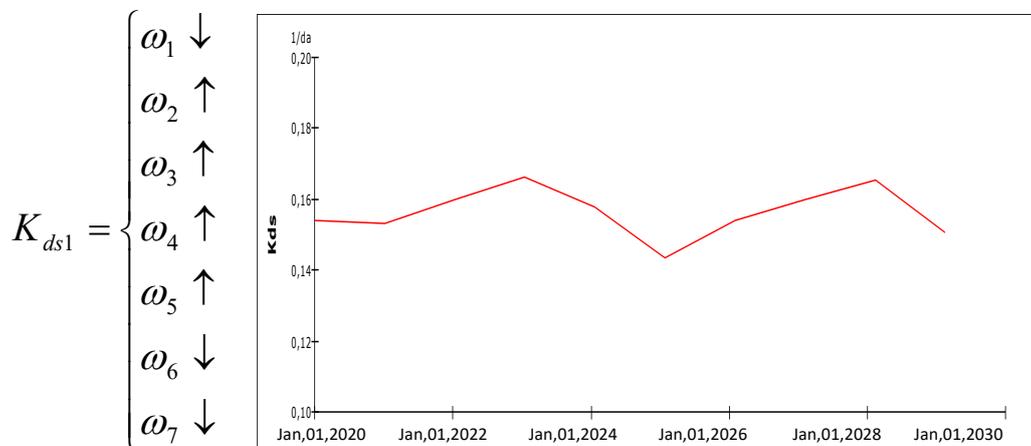


Figure 4. Parameters of the first type model (K_{ds1}) – "pre-pandemic" strategy for ensuring social security in the labor market

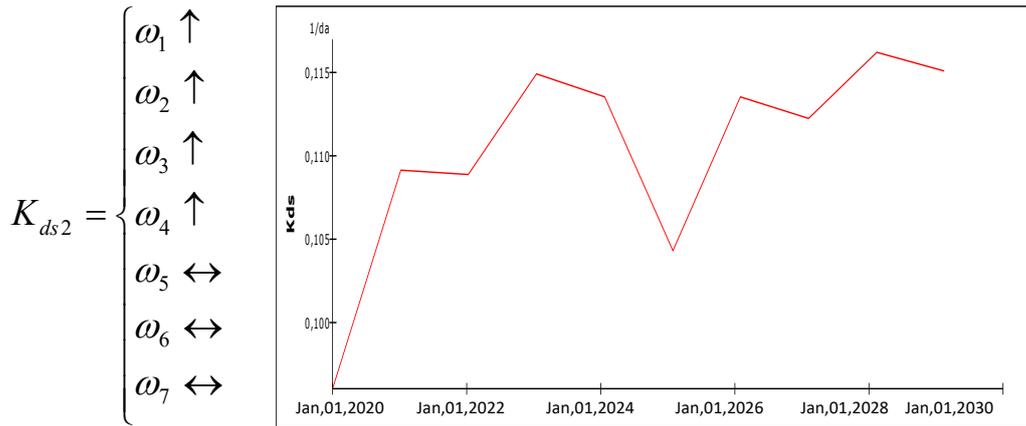


Figure 5. Parameters of the second type model (Kds_2) of the strategy for ensuring social security in the labor market

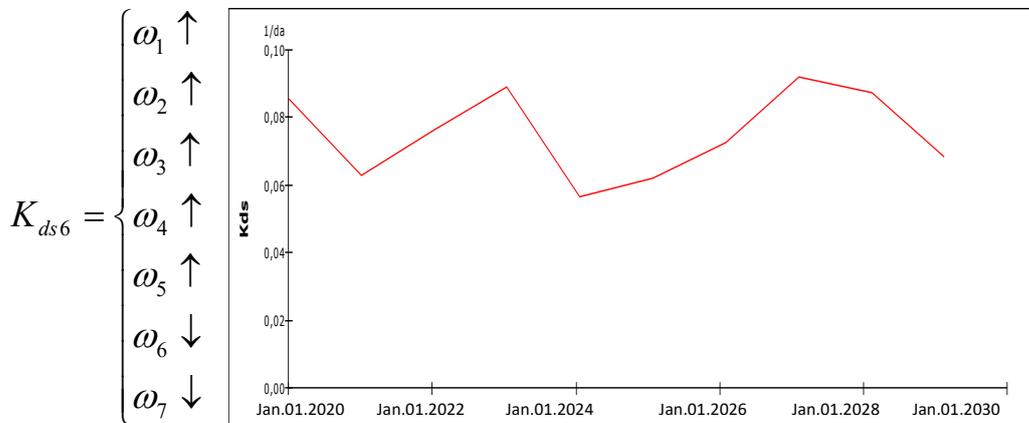


Figure 6. Parameters of the sixth type model (Kds_6) of the strategy for ensuring social security in the labor market

the wage bill, remain within the specified conditions without significant changes.

According to the results of running the model taking into account the above conditions, it can be concluded that in 5 years a significant decrease in the ratio of supply and demand in the labor market is expected. In addition, it should be noted the unstable dynamics of the performance indicator, which is associated with the lack of positive changes in wages, the growing threat of informal employment, which is reflected in the increase in its scale, as well as the increase in youth unemployment. All this proves the ineffectiveness of this strategy in case of its practical implementation.

Change the strategy Kds_1 , excluding measures aimed at reducing the level of informal employment of youth unemployment while increasing only nominal wages. In this case, the level of informal employment and youth unemployment will increase, the average monthly wage will also increase, while the real wage index and the ratio of wage arrears to the wage bill will show a downward trend.

Thus, the description of variables fluctuations will be as follows (Figure 6).

As a result of the experiment, a model was obtained that characterizes the unstable dynamics of the ratio of labor supply and demand with its significant decline in the long run (Figure 6). Under this strategy, both threats to employment security and threats to wage security are expected to increase. The state policy on the labor market in the case of the above strategy is characterized by passive regulation of employment relations, weakness of controlling institutions for the de-shadowing of social and labor relations, ineffective anti-inflationary measures.

Comparing the modeling data with the economic indicators of the labor market development, it should be noted that such a model of state policy was applied in 2012 and 2014–2015, which is reflected in the lowest indicators of the ratio of labor supply and demand (0.05-0.09). Then the public policy model has undergone positive changes in the direction of combating informal employment, which is reflected in the Kds_1 model.

Analyzing each of the above strategies, it should be noted that the highest possible level of social security in the labor market can be ensured by the Kds_3 strategy, which provides for a reduction in the severity of threats to employment security in the form of reducing the level of informal employment and youth unemployment, as well as strengthening wage security in the context of increasing the average monthly wage, real wage index, reducing the indicator of wage arrears in relation to the wage fund.

5. Strategizing social security priorities in the labor market

In the course of the study, conclusions were drawn on the impact of each modeled component on the indicator of labor market balance, which is expressed in the ratio of demand for labor and its supply. Thus, the reduction of informal employment provides a positive effect of state policy measures aimed at protecting the interests of the population in the labor market. At the same time, focusing only on reducing the threat of shadow employment without taking into account all other components of social security in the labor market will not be effective.

The threat of rising unemployment among young people of all age groups can be neutralized through a set of state policy measures aimed at solving the problem of interaction between the labor market and the market of educational services by harmonizing the interests of educational institutions, employers and the state; development of youth entrepreneurship; creation of new jobs with fair wages. According to the results of the modeling, measures to normalize the level of unemployment among young people are the leading tool for achieving a balanced development of the labor market, which is reflected in the increase in the ratio of supply and demand of labor. At the same time, the only one among the considered simulation strategies that ensures the growth of the effective indicator is the Kds_3 strategy, the priority of which is to combine efforts to neutralize threats to employment security in the first place.

The indicator of wage security, the growth of which takes place in almost all the studied variants of strategies, is the average monthly wage. It should be noted that the increase in the average monthly wage in itself does not have a positive impact on the ratio of labor supply and demand. Only by increasing the real wages of workers it is possible to improve the state of social security and reduce the negative manifestations of threats associated with low wages. The ratio of wage arrears to the wage bill determines the level of fulfillment of the state's guarantees regarding the timeliness of payments and a kind of minimum wage security. Together with other measures of the state policy on the labor market aimed at

regulating the incomes of the population, the reduction of arrears will increase the level of balance between the demand and supply of labor.

In order to implement the proposed methodology for modeling strategies for ensuring social security in the labor market in the practice of socio-economic management at the state level, it is advisable to develop a certain roadmap. The following sequence of enlarged steps in the process of strategizing social security in the labor market in the context of transformation of key threats is proposed:

1. Updating the map of key threats to social security in the labor market.

2. Updating the data set on the actual value of economic indicators of the labor market and their dynamics.

3. Modeling strategies to ensure social security in the labor market under certain types of threats (according to the above methodology).

4. Formation of a vision of the desired (probably possible) state of the labor market in the future and fixing the relevant prospective values of its economic indicators (justification of strategic priorities).

5. Identify the features of the current social security strategy in the field of employment and remuneration and assess its effectiveness in terms of moving towards the desired one.

6. Selection of variables of the model of social security strategy on the labour market that should be subject to priority impact.

7. Justification of the system of measures and formation of appropriate policies to achieve strategic priorities of social security in the labor market.

It should be noted that the proposed sequence of actions can be implemented both at the national and regional levels, and given the global nature of threats and the integration of labor markets of individual countries – adapted even for supranational, interregional level.

6. Conclusions

According to the results of the study, it can be concluded that in order to ensure social security in the labor market, it is necessary to form a strategy that can not only neutralize the existing threats and negative manifestations of economic instability, but also to maximize the level of protection of the population's interests in the field of employment and remuneration as much as possible under the conditions of certain types of threats and available resources of the state policy in the field of social policy, regulation of the labor market, economic policy formation, etc.

The model of the strategy for ensuring social security in the labor market, built with the help of simulation tools, provides an opportunity to analyze various scenarios for the development of

economic phenomena and changes in the dynamics of major threats; forecasting trends in the labor market, taking into account various configurations of existing parameters; adjusting public policy based on the identified strategic priorities. Thus, the results of the simulation modeling of the strategy for ensuring social security in the labor market in the context

of changes in the level of key threats are the source of the development of key principles of state policy aimed at the development of employment and remuneration, which aims to achieve a balanced development of the labor market and the formation of a high standard of living and well-being of society.

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