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LABOR FORCE TRANSIT IN THE MIGRATION SYSTEM: CHANGES AND REPRODUCTION OF SOCIAL-LABOR RELATIONS

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Abstract: The article considers the peculiarities of the formation of labor force transit in the international migration system, which is directly related to changes and reproduction of social and labor relations. The complex methodical approach to the analysis of labor force transit and its life cycle in the international migration system of the state is substantiated, taking into account stimulating and disincentive factors of the formation of reproductive process of working capacity and labor productivity with change of social and labor relations in society. From the standpoint of the institutional and managerial approach, the structure of traditional (unilateral) transit of labor force in the international migration system is determined. An algorithm for estimating the level of intensity of migration processes in a specific transit of labor forceis presented. The criteria and limits of differences in the structure of labor force transit in the international migration system are determined. Indicators of structural change of labor force transit in the international migration system are formed and generalized. Indicators of demographic reproduction and the coefficient of natural and qualitative migration growth in Ukraine and Germany are analyzed, as well as the geographical structure of emigration of the working population is estimated. A comparative analysis of social and labor relations in the labor market of Ukraine and Germany is carried out. The growth rate of wages among the local population and Ukrainian migrants in Germany has been determined. The connection between the factors of social and labor relations and the indicators of migration of the population of Ukraine and Germany is proved and estimated. A method for assessing the labor efficiency of migrants of the donor country and the impact of its level on the growth of GDP of the recipient country is proposed. The maximum possible social economic benefits of migrants in the conditions of labor force transit functioning are offered and the scenario forecast of indicators of the development of activity and working capacity of the working population between Ukraine and Germany is carried out.

Keywords: labor force, labor resources, labor market, migration system, social and labor relations

1 INTRODUCTION

The development of the economy takes place in the conditions of informatization, growth of the value of knowledge, acceleration of technological progress in the world and permanent changes in the structure of production. This can be seen in the relationship between the main economic subsystems, one of which is the transit of labor force in the international migration system. Mostly structural changes in the economy are characterized by deep quantitative and qualitative transformations, which, on the one hand, open new opportunities for creating innovative types of employment, on the other – cause the acceleration of reproduction and change in social and labor relations. The term "socio-labor relations" refers to a group of economic, socio-psychological, administrative, and legal procedures and practices that are intended to include workers in the labor process and to reproduce it based on market mechanisms such as supply, demand, and market pricing. To lower the costs that are unavoidable during substantial social transitions, aspects of social regulation should be incorporated into the process of developing human resources and creating a new system of social and labor relations. Social control over the process of creating new kinds of social and labor relations can take the following forms: identification of socioeconomic processes from the perspective of the page's interests; formation of a system of indicators that reflect the processes of interaction of subjects of social and labor relations and, in accordance with the definition of information sources; research of the topic; formation and mastery of a single system of concepts by all subjects of social and labor relations.

However, the problem of mismatch of workers' competencies with the needs of jobs, educational and skills imbalance between labor supply and demand, lack of regulation of continuing education, imperfection of the social support system for vulnerable groups, leads to serious constraints of labor force transit (LFT), which needs to be improved through regulatory mechanisms of social and labor relations aimed at ensuring employment flexibility in the international migration movement of the working population. International labor force migration is a complex phenomenon caused by the action of socio-economic, political, socio-cultural and other factors. In recent decades, developing countries have remained the largest donors in the global process of external labor force migration.

The intensification of the migration movement of the population to the countries of the European Union is due to the large center of labor potential, which is not in demand in the domestic labor market. Qualitative characteristics of modern migration, such as the growing individualization of the cultural, social and economic life of migrants; the disappearance (or significant mitigation) of discriminatory barriers in host societies; growing segmentation of migrant communities by lifestyle, specialization, values, interests and leisure practices; the spread of cyclicality and recurrence of cross-border movement of migrants are also becoming increasingly noticeable (Libanova, 2004).

The study of the migrant community in the EU is due to the growing involvement of the working population in developing countries in European life, and hence

the need to change the social and labor relations of such groups and opportunities for their development in the context of current migration trends in order to form mechanisms for the implementation of labor force transit and migration policy aimed at supporting it. The effectiveness of the study of migratory communities in developing countries in such aspects as features of integration into host societies; social ties within them; circulation of various resources in networks of mutual support of migrants; is emphasized in the works by Yu. Marshavin (2014), E. Libanova (2004), I. Kravchenko (2015), A. Kolot (2007), L. Ilich (2015), S. Erokhyn (2002), L. Shaulska (2014). These works also highlight such problems as limited and public trust among migrants; mechanisms of collective social action of migrants. The growing differentiation of communities in the modern world, depending on their resources, in the context of the study of labor force transit through structural changes in the employment of migrants was substantiated by D. Acemoglu (1999), J. Pisshke (1999), J. Ahokas (2016), J. Allen and R. Van der Velder (2007), A. Arpaia, A. Kiss and A. Turrini (2014), T. Dauer (2002), F. Buchel and M. Van Ham (2003), G. Di Pietro (2002), P. Dolton and A. Vignoles (2000). The works of these authors made a significant contribution to the analysis of the incidence and effects of over education labor market.

The issue of theoretical aspects of labor migration was also raised. Various aspects of determining the intensity of structural changes in labor force transit in the labor market and practical recommendations on the need for their regulation were studied by R, Tesliuk, M. Bil, O. Makhoniuk and I. Baraniak (2014), S. Everett (1966), S. Abyilkalikov and M. Vinnik (2012), Ah. W. Ahmad-Yar and T. Bircan (2021). Theoretical and practical aspects of labor market regulation in the context of ensuring its flexibility were discussed by H. Herasymenko and O. Pozniak (2006), Kh. Chornopyska (2016), O. Haidash (2012), U. Sadova, S. Kniaziev and N. Andrusyshyn (2013), K. Shymanska (2017), M. Bil (2014), N. Pak (2017), O. Rovenchak (2009). The researchers analyzed its content, principles of organization and mechanism of functioning in the conditions of economic transformation.

The priority of our study is to substantiate a comprehensive methodological approach to the analysis of labor force transit and its life cycle in the international migration system, taking into account stimulating and disincentive factors in the formation of the reproductive process of work and productivity with changing social and labor relations in society.

2 MATERIAL AND METHODS

The general prerequisite and general factor in the formation of LFT in the international migration system is the bilateral nature of the way to meet the complex needs of the working population in the organization of their lives, which is manifested in space and time, due to a special type of transaction costs related to overcoming the difference between the physical place of permanent residence and the physical place of realization of economic activity (Libanovoi and Khvesyka, 2014). At the

same time, the special preconditions of LFT in the migration system are targeted and have clearly spaced space-time horizons. These include the common territory of residence of migrants, the system of their settlement (network of settlements), migration-related infrastructure, time and duration of migration movements, the unity of goals and mechanisms for regulating the migration situation. General and special prerequisites are essentially factors that stimulate the formation of LFT. It should be noted that along with the latter, there are many factors with the opposite sign, the so-called disincentives that constrain LFT (lack of a civilized housing market for migrant workers, imperfect labor systems for migrant workers – the institution of registration, low territorial and professional-qualification mobility of the labor force, the practice of punishing economic entities for attracting labor force from the number of migrant workers, if the work can be performed by the local population, etc.) (Sadova et al., 2013). Labor force transit in the migration system is a prototype for the development of regional labor markets. It helps to organize the processes of global economic transition of developing countries to a common market and new economic, political and social relations. Against the background of extremely rapid destruction of traditional economic and social ties, the displacement of people from the usual way of life, LFT shows why there are new mobile groups of carriers of labor potential, which actually through migration realize the goals of economic prosperity growth (Libanovoi and Khvesyka, 2014).

The structure of traditional (unilateral) LFT in the international migration system (IMS) according to the institutional and managerial approach is presented in Figure 1. Thus, the general factor in the formation and development of modern LFT in IMS is not just the need of the population to change its place of residence, but to change the place of its access to work (Sadova et al., 2013). The essence of the concept of LFT in the IMS is that in countries (regions) with a surplus labor force there is a low wage, high unemployment, while regions with a labor force shortage are characterized by high wages. The amount of wages acts as the main migration motive (expulsion factor) in the regions of origin of migrants and the main factor of attraction in the regions of destination.

Because of the uneven social and labor relations of the two LFT migration systems, there are intensive flows of migrants between the two countries of the migration pair within the migration corridor defined between the LFT participants at the legislative level. In a country that absorbs labor resources, the migration network is gradually growing; the appropriate infrastructure and conditions for the development of a particular LFT are being formed. Educational, family and other subtypes of migration are added to labor migration. Because of the redistribution of the population, labor supply decreases and wages increase in capital-poor countries, while in capital-rich countries the opposite processes take place. Investment flows are moving in the opposite direction from migrant labor flows, from capital-rich to poor countries.

The factor that attracts investment is the increased, by international standards, rate of return on capital in poor countries. The movement of capital also includes labor capital, i.e. the transfer of highly skilled workers from rich to poor countries, who hope to get high returns from their skills in a labor-poor environment (Hrynova

and Shulha, 2010). Migration and investment between the two countries of the migration pair takes place within a certain migration corridor, which is defined at the legislative level by the member states of the LFT. Estimation of the level of intensity of migration processes in a particular LFT is possible using the calculated indicators presented in Figure 2. Labor force transit (LFT) in the international migration system of the state is characterized by a structure that is constantly changing under the influence of various factors. The dynamics of the structure of supply and demand in the labor market is accompanied by internal changes in their elements and determines the variation of their causal relationships. Accordingly, the assessment of structural changes in the LFT in the international migration system is considered as one of the important tools of its state regulation. Indicators of structural changes in the LFT reflect the change in the proportions of the internal structure of the object of study (demand, supply, employment), which leads to the emergence of a new quality or new characteristics in the international migration system.

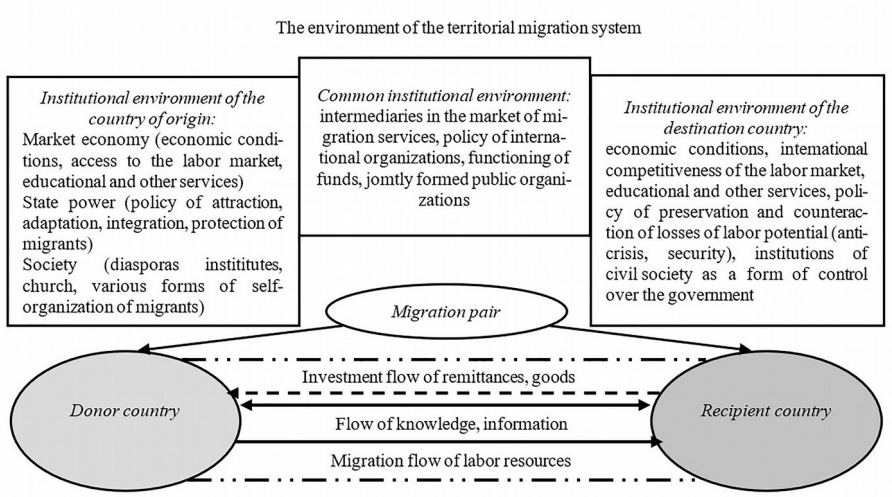

Figure 1 The structure of traditional (unilateral) LFT in the international migration system: institutional and managerial approach. Source: (Sadova et al., 2013).

Analysis of the dynamics of the structure of LFT in the migration system on the quantitative indicator of individual structural changes in aggregate demand for labor (mass of structural changes) is defined as the difference between the shares of structural elements in the current period and the period taken as a basis for comparison. However, a lot of structural changes require not only quantitative but also qualitative analysis. Thus, changes in the structure of the labor force by industry reflect the sectoral division of the economy, and changes in labor productivity, wages, household income and labor costs are indicators of socio-economic relations. Such shifts can be multifaceted, have different meanings over time, but a common link between them is

price dynamics (inflation rate), which differently affects the direction and rate of change in the cost structure and is less significant for the natural structure (labor force).

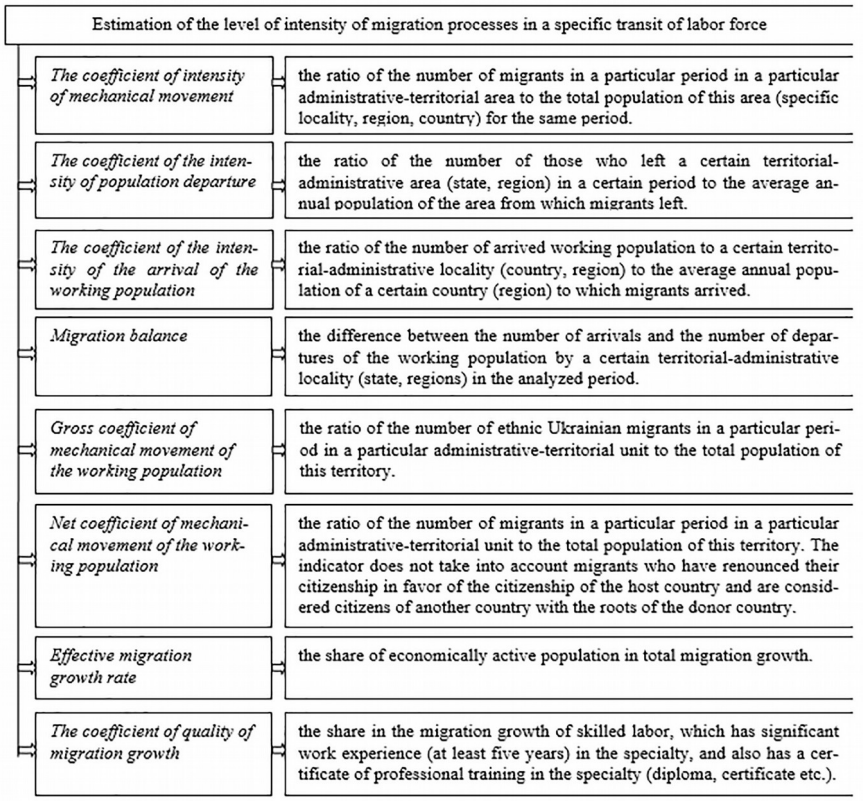

Figure 2 Algorithm for estimating the level of intensity of migration processes in aparticular transit of labor force. Source: generated by the authors according to data (Di Pietro, 2002; Sadova et al., 2013).

From the point of view of statistics, when studying the differentiation of incomes of the migrant population, the share of one or another group, which is considered a structural variable, increases or decreases; from the point of view of the economy, such a change will be considered a mass of structural shift. The structure of the migrant population by income is a change in the relationship between the elements of the set that characterizes the distribution of income, i.e. a change in the share of a group of migrant population, which will indicate a decrease in opportunities or the emergence of new ones to meet specific needs (Holubnyk, 2017; Voloshyn, 2011). The average growth rate of specific weight ($\overline{T p_{di}}$) characterizes the average relative change in the specific weight of the *i*-th structural fraction of

LFT for n periods and is calculated by the equation of the geometric mean (Eliseeva, 2004):

$$\overline{T\,p_{di}} = \sqrt[n-1]{T\,p_{di_1} \times T\,p_{di_2} \times T\,p_{di_3} \times \ldots \times T\,p_{di_{n-1}}} \quad , \tag{1}$$

The root expression in this equation is a consistent product of the chain growth rates of specific weight over all time intervals. After performing simple algebraic transformations, equation (1) will look like (Ryabtsev and Chudilin, 2002):

$$\overline{T\,p_{di}} = \sqrt[n-1]{\frac{d_{i_n}}{d_{i_1}} \times 100} \quad , \tag{2}$$

The individual indicator of relative structural changes for a constant comparison (growth rate of specific weight, $J_d^{const.base}$) is the ratio of the specific weight of an element for a certain period to the specific weight of the same element in the base period (Eliseeva, 2004):

$$J_d^{const.base} = \frac{d_{ij}}{d_{i0}} \quad , \tag{3}$$

An individual indicator of relative structural changes with a variable base of comparison (growth rate of specific weight, $J_d^{var.base}$) is the ratio of the specific weight of an element of the sum in a certain period to the specific weight of the same element in the previous period (Ryabtsev and Chudilin, 2002):

$$J_d^{var.base} = \frac{d_{ij}}{d_{i0}} \quad , \tag{4}$$

In order to generalize the analysis of structural changes in labor force transit in the international migration system for a certain period the linear and quadratic coefficients of absolute values are used. The linear coefficient of absolute structural changes in the transit of labor force in the international migration system with a constant base of comparison (base, $J_{\text{abs}}^{const.base}$) is defined as the sum taken as a module of the increase in specific weight divided by the number of structural parts. This indicator is used for the analyzed period in general for all structural shares of the population (equation (5)) (Eliseeva, 2004).

$$J_{\text{abs}}^{const.base} = \frac{\sum_{i=1}^{n} \left| d_{ij} - d_{i0} \right|}{n} \quad , \tag{5}$$

where, d_{ij} and d_{i0} – the proportion of individual elements in the comparative structures for the analyzed and base periods, respectively; n – the number of gradations in

the structure. The linear coefficient of absolute structural shifts with a variable base of comparison (chain, $J_{\text{abs}}^{const.base}$) is determined by equation (6) and is the arithmetic mean of the modules of absolute increments of particles, which are compared in the gradation of the structure. That is, the indicator characterizes the average value of deviations of particles (how many percentage points on average deviate from each other in the structure for the study period) (Eliseeva, 2004).

$$J_{\text{abs}}^{var.base} = \frac{\sum_{i=1}^{n} \left| d_{ij} - d_{i-1} \right|}{n}, \tag{6}$$

where, d_{ij} and d_{i-1} – the share of individual elements in the comparative structures for the analyzed and previous periods, respectively; n – the number of gradations in the structure. Generalized indicators of relative structural changes in labor force transit characterize the average relative change of shares (in percentage points), and is determined by both constant and variable base of comparison. Thus, the linear coefficient of relative structural changes of LFT in the international migration system with a constant base of comparison $\left(L_{\frac{d_{ij}}{d_i}}\right)$ is calculated by equation (7) (Eliseeva, 2004):

$$L_{\frac{d_{ij}}{d_{i0}}} = \frac{\sum_{i=1}^{n} \left| \frac{d_{ij}}{d_{i0}} - 1 \right|}{n}, \tag{7}$$

The linear coefficient of relative structural shifts of LFT in the international migration system with a variable base of comparison $\left(L_{\frac{d_{ij}}{d_{i-1}}}\right)$ is calculated by equation (8) (Eliseeva, 2004):

$$L_{\frac{d_{ij}}{d_{i-1}}} = \frac{\sum_{i=1}^{n} \left| \frac{d_{ij}}{d_{i-1}} - 1 \right|}{n}, \tag{8}$$

The generalized indicator of relative structural shifts of LFT in the international migration system (quadratic coefficient of relative structural shifts, ($\sigma_{relative}$), is based on the weighted average square deviation and is calculated by equation (9) (Eliseeva, 2004):

$$\sigma_{relative} = \sqrt{\frac{\sum (d_{ij} - d_{ij-1})^2}{d_{ij-1}}} = \sqrt{\sum \left(\frac{d_{ij}}{d_{ij-1}} - 1 \right)^2 \times d_{ij-1}}, \tag{9}$$

It is proposed to calculate the modified linear and quadratic coefficients of structural changes of LFT in the international migration system through the average specific weight for the two analyzed periods (equations (10-11)) (Eliseeva, 2004; Krasylnykov, 2001). Linear coefficient of relative structural shifts of LFT in the international migration system (modified ($L^{mod}_{relative}$)) (Tesliuk et al., 2014; Hrynova and Shulha, 2010):

$$L_{relative} = mod \sum \left| \frac{d_{ij}}{\frac{d_{ij} + d_{ij-1}}{2}} - 1 \right|_{ij-1} , \quad (10)$$

average square coefficient of relative structural shifts of LFT in the international migration system (modified ($\sigma^{mod}_{relative}$)) (Eliseeva, 2004; Krasylnykov, 2001):

$$\sigma_{relative} = mod \sqrt{\sum \left(\frac{d_{ij}}{\frac{d_{ij} + d_{ij-1}}{2}} \right)^2 \times d_{ij-1}} , \quad (11)$$

Both modified coefficients are normalized, i.e. their value has limits ranging from 0 (complete identity of the structure) to 1 (completely different structures). The index of structural changes of LFT in the international migration system ($I_{str.shifts}$) characterizes the mass of change per unit of the basic indicator of LFT for a certain period (calculated as a fraction of a whole or as a percentage) (Eliseeva, 2004; Krasylnykov, 2001):

$$I_{str.shifts} = \frac{d_{ij} - d_{ij-1}}{d_{ij-1}} = \frac{M}{d_{ij-1}} , \quad (12)$$

where, M – the mass of structural change in the international migration system for the study period, which characterizes the qualitative feature of the relationship between elements of the economic structure, due to the dynamics of social needs of the migrant population to reproduce and place labor force in the country for a certain period.

The index of structural changes in the international migration system shows an increase (decrease) in the share of a group of migrants (an element of the labor force structure) over a period of time, which is interrelated with the rate of increase and growth (Eliseeva, 2004; Krasylnykov, 2001):

$$I_d = I_{str.shifts} + 1 , \quad (13)$$

In this case, the rate of structural changes of LFT (V) reflects the change in the mass of labor force per unit time and determines the asynchrony and intensity of

labor force transit in the international migration system. Its acceleration indicates the economic development of the labor market in the state, inhibition – a period of recession or depression (Eliseeva, 2004; Krasylnykov, 2001).

$$V = M_{ij} - \frac{M_{ij-1}}{T} \quad , \tag{14}$$

where, T – time of realization of structural changes of LFT in the international migration system; M_{ij}, M_{ij-1} – the mass of change in the labor force (labor population) in the international migration system in the study and base periods, respectively. In general, the coefficient of structural intensity of LFT in the international migration system is calculated by equation (15), (Eliseeva, 2004; Krasylnykov, 2001):

$$K = \frac{1}{2} \sum \left(d_i(t) - d_i(t-1) \right)_{\text{int}} \quad , \tag{15}$$

where, $d_i(t)$, $d_i(t-1)$ – the share of employed in the i-th region (or type of economic activity) in the total number of employed in the international migration system in the reporting and base periods, respectively.

A common indicator that characterizes the dynamics of structural changes in the international migration system is the indicator of the intensity of structural changes (E), which is determined by equation (16), where M is the mass of the labor population. (Eliseeva, 2004; Krasylnykov, 2001):

$$E = M \times V \quad , \tag{16}$$

The higher the intensity indicator the stronger the impact on the structure. The quality of structural change in the LFT in the international migration system is calculated by equation (17) (Kazinets, 1981):

$$K = I \times N \quad , \tag{17}$$

where, I – is the index of structural LFT in the international migration system of a certain direction; N – the direction of structural change of LFT in the international migration system. In particular, shifts in the direction of growth in the number of employees in science-intensive industries can be assessed as positive, i.e. $N = 1$, and shifts in the direction of growth in employment in agriculture as negative $–N = –1$ (Ryabtsev and Chudilin, 2001). It is necessary to take into account the factor of the scale of economic processes. To do this, we calculate the coefficient of structural mobility of LFT in the international migration system (K_m) (Kazinets, 1981):

$$K_m = K n_{\text{int}} \quad , \tag{18}$$

where, Kn_{int} – is the growth index of the total value added of labor force in the international migration system. According to the Ryabtsev criterion (K_r), which determines the territorial differences in the structure of LFT in the international migration system is the ratio of the actual limit of differences between the components of the two structures to their maximum possible value and allows to determine gradations of the statistical population in the structure (equation (19)) (Ryabtsev and Chudilin, 2002).

$$K_r = \sqrt{\frac{\sum_{i=1}^{n} (d_{ij} - d_{ij-1})^2}{\sum_{i=1}^{n} (d_{ij} + d_{ij-1})^2}} \quad , \tag{19}$$

Interpretation of structural changes of LFT in the international migration system (K_r) is carried out on a scale (Table 1). From the standpoint of comparative analysis of several structures of LFT in the international migration system, we apply the coefficient of uneven distribution. For its structure the number of dominant groups of the labor migration population is defined (labor resources – a share from 60% to 80%). The coefficient of uneven distribution of labor force in the international migration system ($K_{irr.dis}$) is determined by equation (20) (Ryabtsev and Chudilin, 2002):

$$K_{irr.dis} = \left(\frac{k \times l}{k - l}\right) \times \sum (d - p)^2 \quad , \tag{20}$$

where, k – the number of elements in the structure of the LFT in the international migration system; l – the number of dominant groups of the working population in the migration system of the state; d – the value of the share of the element in the structure of the LFT in the international migration system; p – the coefficient of a fixed share calculated under the condition of uniform distribution in the structure of LFT in the international migration system, $p = \frac{1}{k}$.

When conducting a comparative analysis of the two structures of the LFT in the international migration system we determine the Spearman rank correlation coefficient $K_{irr.dis}$ (ρ), (Ryabtsev and Chudilin, 2002):

$$\rho = \frac{3\sum_{i=1}^{n} (R_{ij} - R_{ij-1})^2}{n^3 - n} \quad , \tag{21}$$

where, R_{ij-1}, R_{ij} – the ranks of the elements of the shares of the LFT structure in the international migration system in the current and base periods, respectively; n – the number of elements in the structure of the LFT in the international migration

system. The closer the value of Spearman rank correlation coefficient is to 0, the more significant the changes in the compared structures. The coefficient of concentration of LFT in the international migration system (K_{conc}) allows to characterize the degree of concentration of the distribution and is calculated by equation (22) (Ryabtsev and Chudilin, 2002):

$$K_{conc}=\frac{1}{2}\sum\left|d-\frac{1}{k}\right| \quad , \tag{22}$$

Table 1 Scale for estimating the limit of differences in the structure of LFT in the international migration system by criterion (K_r)

Criterion value intervals (K_r)	Characteristics of the degree of structural differences
0.000 – 0.300	Identity of structure
0.031 – 0.070	Very low level of differences
0.071 – 0.150	Low level of differences
0.0151 – 0.300	Essential level of differences
0.301 – 0.500	Significant level of differences
0.501 – 0.700	A very significant level of differences
0.701 – 0.900	The opposite type of structure
0.901 and above	The complete opposite of structures

This coefficient varies from 0 to 1 (i.e., with the value 0 – there is no concentration, there is a completely uniform distribution of elements of the LFT structure in the international migration system, with the value closer to 1 – it characterizes the higher concentration of units in one or more groups of the working population in the migration system). The most well-known indicator of concentration is the Gini coefficient (G), which is used as the limit of income differentiation of the migrant population or social stratification of labor resources (equation (23)), (Ryabtsev and Chudilin, 2002):

$$G=1-2\sum_{i=1}^{k} d_{xi}d_{yi}^{H}+\sum_{i=1}^{k} d_{xi}d_{yi} \quad , \tag{23}$$

where, d_{xi} – the share of the i-th group of the working population in the total population of LFT in the international migration system; d_{yi} – the share of the i-th group of the working population in the total volume of the dominant feature; d_{yi}^{H} – the accumulated share of the i-th group of the working population in the total volume of the dominant feature. If the shares are expressed as a percentage, the equation is adjusted as follows (Ryabtsev and Chudilin, 2002):

for 10% distribution of labor in the migration system:

$$G = 110 - 0.2\sum_{i=1}^{k} d_{yi}^{H} \quad , \tag{23.1}$$

for 20% distribution of labor in the migration system:

$$G = 110 - 0.4\sum_{i=1}^{k} d_{yi}^{H} \quad , \tag{23.1}$$

Thus, to assess the structural change in labor force transit in the international migration system, taking into account the potential number of working population, the authors proposed characteristic features – normalization, universality, elasticity and direction (Table 2) (Ryabtsev and Chudilin, 2002; Voloshyn, 2011; Holubnyk, 2017).

The selected system of indicators allows reproducing a holistic picture of the structural change of LFT in the international migration system of states, adapted to the scale, mass, concentration and effectiveness of dynamic changes in the environment of social and labor relations in a cyclical economy.

3 RESULTS AND DISCUSSIONS

The development of social and labor relations in Ukraine and Germany

The development of information technology in the context of globalization, new ways and philosophy of life have led to the transformation of demographic behavior, which led to a reduction in birth rates and an increase in the share of older people and exacerbate the crisis of social relations in European countries. Ukraine and Germany have similar trends in the development of social and labor relations, which also depend on the economic condition of the countries (Horodetska, 2014; Malynovska, 2018). A comprehensive analysis of the demographic processes in Ukraine and Germany for 2000-2020 showed that the population of Ukraine annually decreases by an average of 266 thousand people due to the negative value of natural (-250 thousand people) and migration growth (-16 thousand people). In Germany during this period, the population is reduced by 130 thousand people per year, due to low values of natural reproduction (Table 3) (Ahmad-Yar and Bircan, 2021), but due to mechanical movement – there was an increase on average by 290 thousand people per year. The population of Germany during the study period increased by 3.1% in 2020, in Ukraine – decreased by almost 18%.

The intensity of population decline in Ukraine due to the negative increase in the natural reproduction rate is 4 times higher than in Germany (Ahmad-Yar and Bircan, 2021; Migration profile of Ukraine, 2017; Baraniak, 2019). The migration system in Germany, absorbing a significant part of the world's labor force, is characterized by multi-vector intensive migration flows and a complex structure. About

Table 2 Classification of indicators of structural change of LFT in the international migration system

Indicators	Indexes	Normalizatio	Elasticity	Versatility	Orientation
Dynamics and variation of structural changes	Individual indicator of absolute structural changes with a variable (constant) basis of comparison			+	+
	Individual indicator of relative structural changes with a variable (constant) basis of comparison		+	+	+
	Average absolute weight gain			+	+
	The average growth rate of specific weight			+	
Irregularity and concentration	Concentration coefficient	+		+	
	Coefficient of uneven distribution	+		+	
	Gini coefficient	+		+	
	Lorentz coefficient	+		+	
Structural differences	Linear coefficient of absolute structural shifts with a variable (constant) basis of comparison	+		+	
	The root mean square coefficient of absolute structural shifts with a variable basis of comparison	+		+	
	The root mean square coefficient of absolute structural shifts with a constant basis of comparison	+	+	+	
	Linear coefficient of relative structural shifts with a variable (constant) basis of comparison	+		+	
	Linear coefficient of relative structural shifts based on weighted average deviation	+		+	
	Linear coefficient of relative structural shifts, modified	+		+	
	The root mean square coefficient of relative structural shifts with a variable (constant) basis of comparison	+		+	
	The root mean square coefficient of relative structural shifts, modified	+		+	
	Generalized indicator of relative structural shifts based on the mean weighted square deviation	+		+	
	Salai integral coefficient of structural differences	+	+	+	
	Gatiev integral coefficient of structural shifts	+	+	+	
	Spearman integral rank correlation			+	
	Riabtsev index of structure differences	+	+	+	
	Integral coefficient of relative differences of structures	+		+	
Intensity of structural changes	Index of intensity of structural shifts			+	
	Index of quality of structural shifts			+	

Table 3 Indicators of demographic reproduction in Ukraine and Germany in 2000-2020

Indicators	Ukraine				Germany			
	2000	2010	2015	2020	2000	2010	2015	2020
Indicators of population size and structure								
Population, million people	49.1	45.8	42.8	42.2	82.2	81.8	82.2	83.0
Population in economically active age (15-64), %	36.1	34.6	31.8	31.4	60.7	59.4	58.9	59.4
Proportion of children aged 0-14 years to the total population, %	17.9	14.2	15.1	15.5	15.5	13.4	13.2	13.6
Proportion of persons older than economically active ones (65+), %	8.5	10.2	10.5	10.1	10.9	13.9	15.0	14.8
The share of women of reproductive age 15-49 years to the total number of women, %	46.7	44.3	41.9	40.4	47.9	47.8	45.3	44.1
Fertility and life expectancy								
Total fertility rate, %	1.12	1.45	1.51	1.30	1.38	1.39	1.50	1.56
Crude birth rate, %	7.8	10.9	9.6	7.9	8.9	8.1	9.0	9.5
Crude rate of natural increase, %	-7.6	-4.4	-4.3	-6.0	-1.1	-2.3	-2.3	-2.0
The life expectancy at birth of a girl, years	73.6	75.5	76.3	76.7	80.8	82.6	83.1	83.3
The life expectancy at birth of a boy, years	62.4	65.3	66.4	66.7	74.8	77.5	78.2	78.5
Total mortality rate,%	15.4	15.3	13.9	13.9	10.1	10.4	11.3	11.5
Infant mortality rate, %	11.9	9.1	7.9	7.4	4.1	2.8	2.9	3.0
Marriage and divorce indicators								
Crude nuptiality rate, %	5.6	6.7	7.8	6.0	5.1	4.7	4.8	5.4
Crude divorce rate , %	3.7	4.0	3.3	3.9	2.4	2.3	2.0	1.8
Migration indicators								
Balance of migration, thousand people	-133.6	16.1	14.2	18.6	167.1	127.7	1139.4	399.7

75% foreigners who are employed in Germany – from the European Union, 16% – from Asia and about 5% – from Africa. As a result, the migration activity of the population in Germany disrupts the structure of transit of the country's labor force and increases the risk of interethnic misunderstandings and conflicts that do not contribute to the effective functioning of LFT at the national or regional level (Baraniak, 2019).

The migration movement causes a change not only in the structure of labor force transit, but also in the settlement structure of the country, creating centers of attraction and expulsion of labor resources. Traditionally for Germany, the highest share of foreigners falls on the southern federal states, namely Bavaria, Baden-Württemberg, Hesse and the city-states of Berlin and Hamburg. In contrast to Ger-

many, in Ukraine in 2000-2020, taking into account the negative balance of migration of the working population, the number of inhabitants of the country decreased by 0.5 million people. Along with the change in the structure of labor force transit, the geographical vector of Ukrainian foreign migration changed to the western direction (Figure 3) (Migration profile of Ukraine, 2017).

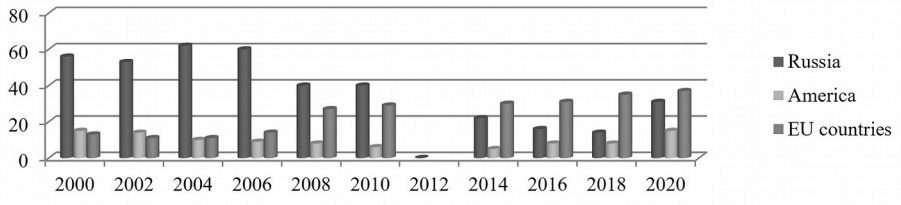

Figure 3 Geographical structure of emigration of the working population of Ukraine in2000-2020, %

In general, in Ukraine during 2000-2020 the share of migrants leaving for permanent employment in the European Union increased 12 times, and the share of emigration to the Russian Federation decreased to 31%. In the structure of labor emigration, the share of people leaving Ukraine for Belarus, Moldova, and Romania has halved, from 80% in 2000 p. to 40% in 2018. The share of activity in the emigration process of labor resources to America in 2000-2005 was 16%.

Germany ranks second (after Poland) in the list of most desirable countries for labor migration (Baraniak, 2018). At the same time, the main pull-factor (attraction factor) of Ukrainian migrants is the relatively high values of wages in the recipient countries. Thus, a characteristic feature of the German labor market is the constant growth of staffing needs. Thus, in 2015-2018, the number of vacancies increased by more than 25%, i.e. to 1.174 thousand people (Labor market. Statistical information, 2020). The main factor in attracting labor resources in Germany is the polarity of the level of wages of Ukrainians who are employed in this European country – almost in 5.0 times this figure is bigger in Ukraine (Table 4) (Ahmad-Yar and Bircan, 2021; Migration profile of Ukraine, 2017; Baraniak, 2019; Labor market. Statistical information, 2020).

Thus, in 2006, a Ukrainian migrant in Germany received 1048 EUR for his work, while in Ukraine the level of wages was only 164 EUR; in 2020 in Germany – 1715 EUR, with the average salary in Ukraine in 265 EUR. The crisis in the labor market in Ukraine has led to deterioration in the economy as a whole, declining purchasing power, high inflation, instability of financial and foreign exchange markets, increased competition in the labor market, the spread of shadow employment with 3.0 million people in 2000 to 4.3 million people in 2015 p. The devaluation of the national currency in 11%, while in Germany – by 24%. This indicates an increase in the gaps in wage levels and the growing role of this factor in the formation of the Ukrainian-German migration flow.

Table 4 Comparative analysis of social and labor relations in the labor market in Ukraine and Germany in 2010-2020

Indicators	2010	2014	2015	2016	2018	2020
Germany						
Average wage, euro / month	1741	1929	1985	2030	2094	2157
Remuneration of migrants, euro / month	1449	1484	1651	1676	1736	1813
Remuneration of Ukrainians, euro / month	1232	1376	1420	1594	1660	1715
Unemployment rate, %	7.6	5	4.6	4.1	3.8	3.4
Minimum wage, euro / month.	-	-	1360	1360	1414.4	1414.4
Inflation index, %	101.1	100.9	100.3	100.5	101.8	101.7
The ratio of the average wage to the wages of employed Ukrainians in Germany	1.41	1.40	1.40	1.27	1.26	1.26
Ukraine						
Average wage, euro / month	213.6	221.4	173.1	183.2	236.8	275.8
Unemployment rate, %	8.8	9.7	9.5	9.7	9.9	9.1
Minimum wage, euro / month.	82.5	77.5	50.0	49.0	106.7	115.8
Inflation index, %	109.1	124.9	143.3	112.4	113.7	109.8
Ukraine / Germany						
The ratio of wages of employees in Germany to the average wage of employees in Ukraine	8.2	8.7	11.5	11.1	8.8	7.8
The ratio of wages of employed Ukrainians in Germany to the average wage of employed in Ukraine	5.8	6.2	8.2	8.7	7.0	6.2
The ratio of unemployment in Ukraine to Germany	1.2	1.9	2.1	2.4	2.6	2.7
The ratio of the minimum wage in Germany and Ukraine	-	-	27.1	27.9	13.3	12.2

The average level of earnings of German-Ukrainian migrants varies within 35-40% of the earnings of an ordinary German worker (Figure 4) (Ahmad-Yar and Bircan, 2021; Migration profile of Ukraine, 2017; Baraniak, 2019; Labor market. Statistical information, 2020). However, in recent years there has been a trend towards equalization of wage levels between migrants and local residents, which indicates the intellectualization of the work of Ukrainian migrants. Thus, the incomes of Ukrainian migrants have increased to 63.6%, while among indigenous people – only by 34.5%. In general, the average level of material remuneration for work performed in Germany in 2020 is 8.0 times higher than in Ukraine.

The second important indicator that reflects the real state of affairs in the labor market is the unemployment rate. Dynamic changes in this indicator in both countries show common downward trends. However, the rate of increase in the unemployment rate in Ukraine has increased by 2.0 times, in Germany against the background of a steady increase in the number of vacancies the unemployment level is declining, as it provides almost 4.8 million jobs in other EU countries. In the context of the intensity of migration processes for labor force transit (LFT) and in order to

determine in more detail the relationship between individual factors of social and labor relations and economic indicators of Germany and Ukraine, a correlation analysis was performed (Table 5).

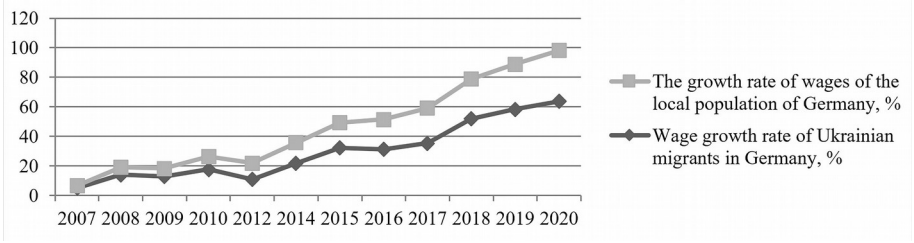

Figure 4 Wage growth rates among the local population and Ukrainian migrants inGermany, 2007-2020, %

The functioning of labor force transit, as any systemic phenomenon, leads to certain consequences and effects, which are expressed in the form of economic, social, political benefits or losses for the recipient country (Germany) and the donor country (Ukraine). Large gaps in income levels in labor force transit (LFT) are one of the main economic reasons for the intensification of the migration process of the population of Ukraine to Germany. The consequence of the functioning of the LFT is to improve the economic situation of displaced persons and families of migrant workers due to the growth of remittances. This form of migratory capital is an investment resource that usually receives passive (consumer) purposes of use (Horodetska, 2014; Malynovska, 2018).

In 2020, Germany invested 1.84 billion EUR in the economy of Ukraine, which was 4.9% of the total amount of foreign direct investment attracted to the economy of Ukraine. In 2018, the cumulative volume of direct investments from Germany into the economy of Ukraine amounted to1.79 billion EUR. Thus, Germany ranked fifth among the main investors in Ukraine (Trade and economic cooperation – "Ukraine-Germany"…, 2021). The volume of investment flows due to the restoration of social and labor relations between Ukraine and Germany is presented in Figure 5 (Trade and economic cooperation – "Ukraine-Germany"…, 2021). Thus, the number of attracted German investments in 2006-2014 averaged 5.56 billion EUR annually. The largest investment flow in 2010 amounted to 6.74 billion EUR, but in 2015-2018 it decreased by 11.8% and only in 2020 began to grow gradually.

Ukrainian investments in the German economy are relatively insignificant. Thus, in 2020, Ukraine invested in the German economy 3.4 billion EUR, of which in the processing industry – 72%. In addition, Ukrainian investments are made in such areas as construction, transport, warehousing, postal and courier activities (Trade and economic cooperation – "Ukraine-Germany"…, 2021). In this regard, the construction of a system of estimates and forecasts of population migration, in order to solve related problems, is relevant in the formation of new migration systems and networks, including for Ukraine, which is one of the largest migrant

Table 5 Assessment of the relationship between the factors of social and labor relations and indicators of migration of the population of Ukraine to Germany

Factor \ Dependent variable	Arrival intensity ratio (to Germany)	Departures intensity ratio (from Ukraine)	Gross coefficient of mechanical movement intensity	Net coefficient of mechanical movement intensity	The number of Ukrainians per one native German	Net migration ratio
Inflation index in Germany	-0.51	0.34	0.02	-0.42	-0.41	-0.58
Unemployment rate in Germany, %	-0.73	-0.03	-0.49	-0.57	-0.66	-0.62
Unemployment rate among Ukrainian migrants in Germany, %	-0.68	-0.04	-0.48	-0.49	-0.58	-0.57
Average income of the population, euro	0.83	-0.01	0.63	0.93	0.96	0.73
The average income of employed Ukrainians in Germany, EUR	0.81	0.0	0.66	0.92	0.96	0.70
GDP per a person employed in Germany, billion EUR	0.84	-0.02	0.63	0.93	0.96	0.73
Inflation index in Ukraine	0.57	-0.38	0.07	0.51	0.44	0.66
Unemployment rate in Ukraine, %	0.64	-0.14	0.44	0.62	0.65	0.61
Personal economic benefits from migrant migration	0.81	-0.01	0.65	0.93	0.97	0.71
The ratio of income of Ukrainians in Ukraine and Germany	0.68	-0.22	0.3.	0.83	0.79	0.68
The ratio of household incomes in Ukraine and Germany	0.57	-0.26	0.09	0.70	0.63	0.61
Unemployment ratio in Ukraine and Germany	0.82	0.0	0.60	0.80	0.86	0.71

Source: generated by the authors according to data (Trading Economics. Germany Indicators, 2022; Trading Economics. Ukraine Indicators, 2022)

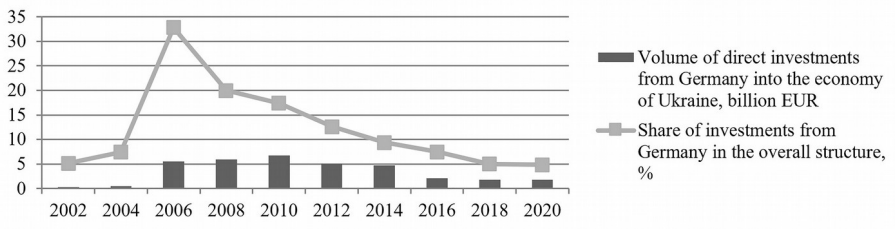

Figure 5 Volume of foreign direct investment from Germany in the general structure of investments of Ukraine in 2002-2020, %

donors for the EU, USA, Canada, etc. In these recipient countries, population immigration is becoming increasingly important given the declining impact of natural change on population dynamics, which is especially important for Germany, Italy, Poland, etc., where there is already zero or negative natural population growth (Westeuropa wächst, Osteuropa schrumpft, 2021). Based on the above description, we equationted two hypotheses:

Hypothesis 1. The formation of the Ukrainian-German vector of migration activity and working capacity of the working population occurs under the long-term and mostly unilateral influence of socio-economic factors that lead to the transformation of migration behavior of Ukrainian emigrants.

Hypothesis 2. The demographic situation and the situation on the German labor market vary with migratory flows from other donor countries (including Ukraine) of labor force.

Since the nature of the formation of labor force transit (LFT) is economic, we try to mathematically express the economic effects of its development at the state level, using equations (24) – (29), (Baraniak, 2019):

$$GDP^{f}_{(j)cost} = GDP(z)_{y(j)} \times Z_{H(j)} \quad , \tag{24}$$

where, $GDP^{f}_{(j)cost}$ – GDP that was not received by the donor country as a result of employment of migrants in the recipient country in the *j*-period; $GDP(z)_{y(j)}$ – GDP per a person employed in the migrant donor country in the *j*-period; $Z_{H(j)}$ – the number of migrants from the donor country who worked in the labor market of the recipient country in the *j*-period. We propose when calculating the total economic losses to take into account the outflow of all economically active and able-bodied population from the donor country. They are calculated by equation the number of migrants of the donor country in economically active and working age, who can be a labor force in the labor market of the recipient country in the *j*-period (25), (Baraniak, 2019):

$$GDP^{general}_{(j)cost} = GDP(z)_{y(j)} \times Z^{ean}{}_{H(j)} \quad , \tag{25}$$

where, $Z^{ean}{}_{H(j)}$ Zеан – the number of migrants of the donor country in economically active and working age, who can be a labor force in the labor market of the recipient country in the *j*-period. Similarly, the actual migration benefits for the recipient country as a result of attracting additional labor force, in the context of changing the conditions of LFT formation, are proposed to be calculated as the product of the number of migrants in the donor country and the value of GDP in the country per one employee (26), (Baraniak, 2019):

$$GDP^{f}_{(j)profit} = GDP(z)_{y(j)} \times Z_{H(j)} \quad , \tag{26}$$

where, $GDP^{gneral}_{(j)\,profit}$ – GDP of the recipient country, taking into account employed migrants of the donor country in the j-period. The maximum possible benefits from the operation of LFT, are proposed to be achieved with the employment of all migrants in economically active and working age (equation (27)), (Baraniak, 2019).

$$GDP^{max_{H(j}\,^{ean}{}_{H(j)}}_{(j)\,profit}, \tag{27}$$

where, $GDP^{max}_{(j)\,profit}$ – GDP of the recipient country in the absence of unemployment among migrants of the donor state in economically active and working age in the *j*-period; $GDP(z)_{H(j)}$ – GDP per one person employed in the recipient country in the *j*-period. We propose to determine the efficiency of labor of migrants of the donor state in the growth of the GDP of the recipient country based on the index method. Accordingly, the index of economic efficiency of labor migrants (IEELM) will look like this (equation (28)). It is calculated as the ratio of the share of additional GDP generated by migrants of the donor country in the total GDP of the recipient country adjusted for the share of economically active labor migrants of the donor country in the general structure of the working population of the recipient country (Baraniak, 2019):

$$IEELM = \frac{\frac{GDP^{ad}_{mdc}}{GDP_{rc}}}{\frac{N^{ea(ab)m}_{dc}}{N^{ea(ab)\wp}_{rc}}}, \tag{28}$$

where, *IEELM* – index of economic efficiency of labor migrants; GDP^{ad}_{mdc} – the amount of additional GDP generated by labor migrants of the donor country in the *j*-period; GDP_{rc} – the volume of GDP of the recipient country in the *j*-period; $N^{ea(ab)m}_{dc}$ – the number of economically active and able-bodied migrants of the donor country in the *j*-period; $N^{ea(ab)\wp}_{rc}$ – the number of economically active and able-bodied working population of the recipient country in the *j*-period.

The value of the index, which is close to 0 indicates the presence of significant reserves to increase the use of labor capital. Values that are close to 1 indicate an increase in the efficiency of labor of migrants from the donor country and approach to the general level of the recipient country.

The social economic benefits of labor migrants from the donor state as a result of employment abroad are proposed to be calculated in monetary terms as an increase in wages in the recipient country and the departure of migrants for the *j*-th period (equation (29)). The positive value indicates a growing gap in the country of exit and destination of migrants, as well as the likely increase in the flow of migration "donor country – recipient country" in the future. The decrease in this indicator indicates the equalization of the income level of the population in the countries of the migration pair of LFT, the slowdown in the growth rate of the influx of new migrants in this migration channel. Negative value indicates that the level of income in

the country that is a donor of labor resources is higher than in the recipient country. In this case, the transformation and destruction of traditional ties and structures begins in the LFT; the recipient country ceases to be migratory and attractive to new labor movements and existing migrants. That is, there is a process of re-emigration to the previous place of residence or the search for more economically attractive areas and the formation of a new transit of labor force (Baraniak, 2019).

$$\Delta E B_{mj} = L I_{Hj}^{rc} - LP W_{yj} \quad , \tag{29}$$

where, $\Delta E B_{mj}$ – social economic benefits of employed migrants of the recipient country in the donor country in the *j*-period; $L I_{Hj}^{rc}$ – the level of income of migrants in the recipient country, received in the *j*-period; $LP W_{yj}$ – the estimated level of possible wages of migrant workers in the absence of labor force transit (LFT) in the *j*-period.

As labor migration is carried out in order to improve the economic condition of the household, the economic effects of the functioning of the LFT are proposed to be measured through the volume of remittances between the states involved in the creation of the LFT. Assessing the value of this indicator will determine the amount of reverse financial support for migrant workers to relatives, will help determine the amount of their financial capacity to meet not only personal needs but also to accumulate deposits in the economy of the country of residence and households. According to the results of LFT operation in Germany (Figure 6), the economic efficiency of the use of labor capital of Ukrainian migrants in value terms has increased by average 11.0 times. Ukrainian migrants in the German labor market in 2006-2020 additionally created goods and provided services to the GDP of the recipient country in the amount of 98.32 billion EUR, which is 0.26% of the total GDP of Germany. During the study period 2006-2020, the share of German GDP created by Ukrainians showed a tendency to increase from 0.17% in 2006 p. to 0.36% in 2020.

Also in 2006-2020 the employment of Ukrainian migrants in Germany increased by 2.5 times (from 63 thousand people in 2006 to 150 thousand people in 2020) and economic activity (up to 159 thousand people in 2020), which indicates the active development of modern LFT. Given employment in the Ukrainian labor market, the same number of migrants in full employment could further increase Ukraine's GDP by 8.91 billion EUR.

The average share of GDP that the Ukrainian economy did not receive as a result of the functioning of the LFT is – 0.65%. At the same time, the development of LFT has helped to increase the efficiency of the use of migrant labor by 11.0 times. Accordingly, this clearly demonstrates significant disparities in the economic development and labor productivity of Ukraine and Germany. In 2020, the total earnings of Ukrainian migrants working in Germany amounted to 0.26 billion EUR. Given their employment in Ukraine, their wages would be 6.3 times less and would be only 0.041 billion EUR (Figure 7).

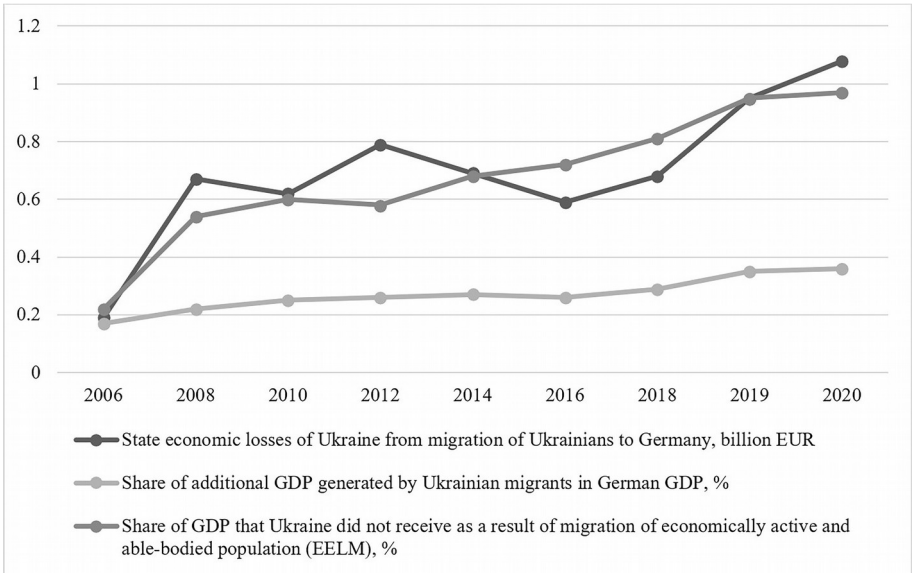

Figure 6 State migration benefits and losses in the conditions of LFT operation between Ukraine and Germany for the period 2006-2020

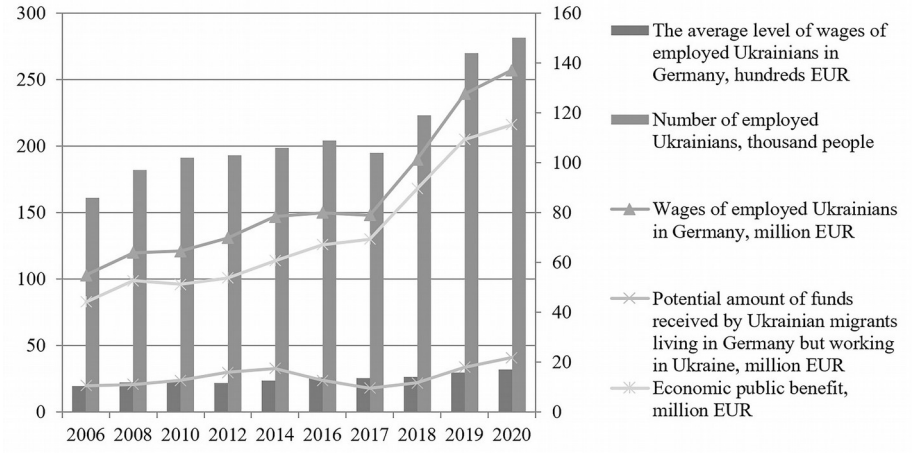

Figure 7 Actual social economic benefits of migrants in the functioning of labor force transit (LFT) in 2006-2020

The maximum possible level of wages of Ukrainian migrants and social economic benefits of migrants in the absence of unemployment among economically active and able-bodied Ukrainians officially living in Germany are calculated (Figure 8).

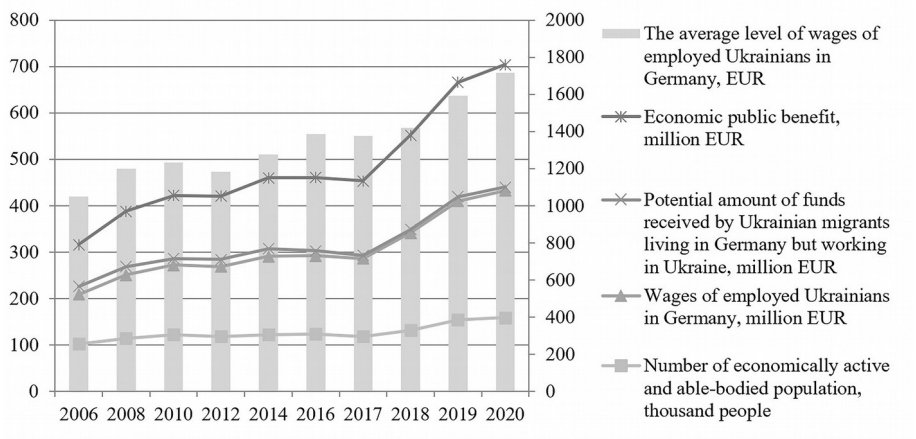

Figure 8 The maximum possible social and economic benefits of migrants in the functioning of the LFT in 2006-2020

Thus, with the forecast of full employment of the economically active and able-bodied population from Ukraine for the period 2006-2020, migrants could receive income in the form of wages in the amount of 2.22 billion EUR, while at the same employment in Ukraine – only 0.168 billion EUR. Accordingly, the efficiency of using the labor potential of migrants is 13.2 times higher in Germany than in Ukraine.

Regression analysis social relations factors of labor migration from Ukraine

The existence of a close relationship between the level of emigration of Ukrainians to Germany and social relations factors is based on the method of least squares, which takes into account the possibility of interaction between dependent variables in the country (Malynovska, 2018) and is confirmed by a multiple correlation coefficient equal to 0.91.

$$KOEF = C_0 + C_1 INF^{UA} - C_2 SA\,L^{UA} - C_3 UNEM\,P^{GERM} \quad , \tag{30}$$

where, $KOEF$ – the growth rate of the coefficient of intensity of arrival of Ukrainians in Germany, %; INF^{UA} – inflation rate growth in Ukraine, %; $SA\,L^{UA}$ – growth rate of the average real wage in Ukraine, %; $UNEM\,P^{GERM}$ – the growth rate of unemployment in Germany, %.

$$KOEF = 1.091 + 0.349\,INF^{UA} - 0.575\,SA\,L^{UA} - 0.698\,UNEM\,P^{GERM}\ adj.\ R^2 = 0.828\ DW = -1.59 \quad (31)$$

Based on the constructed economic-mathematical model (31), probable variants of the Ukrainian-German vector of migration activity and working capacity of the population (Table 6) for medium-term (until 2025) and long-term (until 2030) periods are estimated.

Table 6 Forecast indicators of the development of migration activity and working capacity of the working population of Ukraine to Germany in 2025 and 2030

	Inflation rate in Ukraine, %	Inflation rate in Germany, %	The average level of wages in Ukraine, EUR	The average level of wages in Germany, EUR	Number of labor resources of other nationalities arrived in Germany from Ukraine, thousand people	Number of Ukrainians arriving in Germany from Ukraine, thousand people	The number of ethnic Ukrainians who came to Germany from Ukraine, thousand people	Number of employed ethnic Ukrainians in Germany, thousand people
Standard – 2025	2.8	2	875	2296	9.3	196.6	378	186
Optimistic – 2025	2.8	3.9	875	1685	1.1	146	327	142
Tendentious – 2025	9.7	2	583	2295	15.7	222	403	198
Pessimistic – 2025	20.1	2	304	2296	50.3	354	535	263
Standard – 2030	0.8	1.9	3010	2950	1.5	197.3	378	170
Optimistic – 2030	0.8	5	3010	1700	0.1	128	309	119
Tendentious – 2030	9.7	1.9	1120	2818	10	264	445	200
Pessimistic – 2030	20.1	1.9	392	2816	64.3	630	811	364

According to the pessimistic scenario, the level of inflation in Ukraine will reach its highest level in the 2030. According to expectations, this level will stabilize in the following years. The standard scenario of the medium-term forecast assumes the preservation of existing trends in the development of social and labor relations in Germany (reduction of unemployment from 3.4% in 2020 to 2% in 2030, maintaining the trend of increasing wages against the background of increasing deficit of labor force) and a significant improvement in the economic situation in Ukraine (reduction of inflation to 2.8% in 2025 and 1% in 2030 stabilization of the exchange rate, growth of the average wage to 875 EUR in 2025 p. and up to 3 thousand EUR

in 2030). The positive dynamics of indicators will allow improving economic indicators by 2030, which are stimulating levers of influence on the processes of the development and deformation of labor force transit. The annual average unemployment rate in Germany for 2022 was 5.3 percent. It was the highest unemployment rate since 2021, and there were now 2.538 million unemployed people, an increase of 17,000.

The optimistic scenario assumes a possible deterioration in the values of indicators of migration activity and working capacity of the working population in Germany: rising unemployment (from 3.4% to 5%), slowing the growth rate of income of local people and Ukrainian migrants in particular. However, the trends in the development of the Ukrainian territorial system, from the standpoint of the reference scenario, are preserved. The most probable scenario is a tendency one, as this approach is based on the average trends observed in the studied period (2006-2020) in Ukraine, except for the crisis years 2008-2009 and 2014-2015. According to this scenario of the development a moderate level of inflation (at the level of 10-13% per year) and an increase in average annual wages by 20% will occur. The forecast of migration of the working population of Ukraine to Germany, which is presented as a pessimistic version of events until 2030, assumes critically low social and labor relations and the importance of indicators of financial instability and economic shocks. The results of the forecast assessments show that Ukraine will continue to be a labor donor for the German economy in the coming years. However, the reliability of the long-term forecast depends on the parameters of economic growth of both countries. Given the economic development in Ukraine and the constant economic course of Germany, which is provided by the reference scenario (Figure 9), the number of Ukrainians who will move to Germany each year will remain at 10-12 thousand persons per year until 2025 with a sharp reduction in 2030 to 1.5 thousand persons per year.

Thus, the number of ethnic Ukrainian communities will grow by 2025 and will be equal to 380 thousands of people. The change in the trend in this version of the forecast is associated with the equalization of the main indicators that act as stimulators of migration activity and working capacity of the working population of Ukraine, namely wages, unemployment and inflation. In 2030, with an average salary of 3 thousand EUR, both in Ukraine and in Germany, the personal economic benefits of migration will be negative. Under such conditions, the number of potential emigrants from Ukraine will be significantly reduced, and systematic labor migration will change the course to educational and tourist-family. In this case, the Ukraine-Germany migration system will be in a state of socio-economic equilibrium, and new migration flows will be more stochastic than targeted and regular.

4 CONCLUSIONS

Thus, the European labor crisis is becoming apparent, as the struggle for labor potential in the future will only gain momentum. Due to the significant difference in

economic development, Ukraine will continue to be a labor donor for the EU countries, including Germany, which will deepen the problems of social and labor relations in the country. The prognostic model of reproduction of the labor market of Ukraine and Germany allowed revealing the general prospects of the development of processes of transit of a labor force. However, a further decline in the birth rate and the aging of the local population will exacerbate demographic and economic problems within both countries. Thus, the restoration of labor potential at a young working age remains one of the effective ways to optimize the structure of gender and age characteristics of labor force transit in the international migration system.

Regulating legislation on labor force transit in the international migration system should reduce formal barriers to the immigration of workers from outside the EU, including: creating favorable conditions for employment opportunities for workers and people with secondary education (currently the migration policy of many EU countries focuses on the migration of highly qualified professionals with higher education); getting a job in any profession without defining the sectors of the economy; abolition of the procedure for checking the applicant for the position applied for by a citizen of the recipient country or another EU country; opportunity to look for a job in the system of vocational education for six months, provided that there are financial resources for living (about 5,000 EUR) and the appropriate level of knowledge of English (German). The new laws should serve two main purposes: to promote labor migration to recipient countries outside the EU and to create conditions for the integration of migrants who adopt the "rules of the game" of labor force transit in the labor market of other countries. Since LFT is a prototype of regional labor markets, it becomes clear that changes in social and labor relations in society are closely linked to the economic situation in countries and its overall migratory attractiveness. Therefore, migration processes and migration policy should influence the migration movement to change social and labor relations, the composition of the population of both donor and recipient countries. Therefore, migration policy should be considered as a tool for demographic recovery and the formation of labor force transit (LFT) directly related to the economic situation.

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Tranzit pracovnej sily v migračnom systéme: Zmeny a reprodukcia spoločensko-pracovných vzťahov

Súhrn

Rozvoj ekonomiky prebieha v súčasnosti v podmienkach informatizácie, rastu hodnoty vedomostí, akcelerácie technologického pokroku vo svete a trvalých zmien v štruktúre výroby. Vidno to na vzťahu medzi hlavnými ekonomickými subsystémami, z ktorých jedným z dôležitých je aj tranzit pracovnej sily v systéme medzinárodnej migrácie. Prevažne štrukturálne zmeny v ekonomike sú charakterizované hlbokými kvantitatívnymi a kvalitatívnymi premenami, ktoré na jednej strane otvárajú nové možnosti pre vytváranie inovatívnych typov zamestnanosti, na

druhej strane spôsobujú zrýchlenie reprodukcie a zmenu sociálnych a pracovných vzťahov. Pojem „sociálno-pracovné vzťahy“ označuje skupinu ekonomických, sociálno-psychologických, administratívnych a právnych postupov a praktík, ktoré sú určené na začlenenie pracovníkov do pracovného procesu a jeho reprodukciu na základe trhových mechanizmov, akými sú ponuka, dopyt, a trhové ceny. Aby sa znížili náklady na produkciu a sociálne zabezpečenie, čo je dnes nevyhnutné počas podstatných sociálnych zmien, mali by sa aspekty sociálnej regulácie začleniť do procesu rozvoja ľudských zdrojov a vytvárania nového systému sociálnych a pracovných vzťahov. Sociálna kontrola nad procesom vytvárania nových druhov sociálnych a pracovných vzťahov môže mať tieto formy: identifikácia socio-ekonomických procesov z pohľadu záujmov stránky (i); vytvorenie systému ukazovateľov, ktoré odrážajú procesy interakcie subjektov sociálnych a pracovných vzťahov a v súlade s definíciou informačných zdrojov (ii); výskum v oblastiach jednotlivých tém vstupujúcich do sociálnych a pracovných vzťahov (iii); kreovanie a osvojenie jednotného systému pojmov všetkými subjektmi sociálnych a pracovných vzťahov (iv).

Európska kríza spojená s nedostatkom pracovnej sily sa postupom času stáva čoraz významnejším problémom a tak možno predpokladať, že v blízkej budúcnosti boj o pracovnú silu na globálnej a medzinárodnej úrovni len naberie na intenzite. Vzhľadom na výrazný rozdiel v ekonomickom vývoji bude Ukrajina aj naďalej donorom pracovnej sily pre krajiny EÚ vrátane Nemecka, čím sa prehĺbia problémy sociálnych a pracovných vzťahov v krajine. Prognostický model reprodukcie trhu práce Ukrajiny a Nemecka umožnil odhaliť všeobecné perspektívy vývoja procesov tranzitu pracovnej sily. Ďalší pokles pôrodnosti a starnutie obyvateľstva však prehĺbi demografické a ekonomické problémy v rámci oboch krajín. Obnova pracovného potenciálu v mladom produktívnom veku tak zostáva jedným z efektívnych spôsobov optimalizácie štruktúry rodových a vekových charakteristík tranzitu pracovnej sily v systéme medzinárodnej migrácie.

Regulácia legislatívy o tranzite pracovnej sily v medzinárodnom migračnom systéme by mala znížiť formálne bariéry pre imigráciu pracovníkov z krajín mimo EÚ, vrátane vytvorenia priaznivých podmienok pre pracovné príležitosti pre pracovníkov a ľudí so stredoškolským vzdelaním (v súčasnosti sa migračná politika mnohých krajín EÚ zameriava na vysokokvalifikovaných odborníkov s vyšším vzdelaním), získania zamestnania v akejkoľvek profesii bez definovania sektorov hospodárstva či zrušenia postupu preverovania uchádzača o pozíciu, o ktorú sa uchádza občan prijímajúcej krajiny alebo inej krajiny EÚ. Rovnako dôležité je vytvoriť podmienky pre možnosť hľadať si prácu v systéme odborného vzdelávania na šesť mesiacov za predpokladu zabezpečenia finančných prostriedkov na živobytie, pri zodpovedajúcej úrovni znalosti anglického (nemeckého) jazyka. Nové zákony by mali slúžiť dvom hlavným účelom a to podporiť pracovnú migráciu do prijímajúcich krajín mimo EÚ a vytvoriť podmienky pre integráciu migrantov, ktorí si osvoja „pravidlá hry“ tranzitu pracovnej sily na trh práce iných krajín. Keďže tranzit pracovnej sily je podmienený daným typom regionálnych trhov práce, je zrejmé, že zmeny v sociálnych a pracovných vzťahoch v spoločnosti úzko súvisia s ekonomickou situáciou v krajinách a ich celkovou migračnou atraktivitou. Migračné procesy a migračná politika by preto mali ovplyvňovať samotný migračný pohyb, aby sa zmenili sociálne a pracovné vzťahy, zloženie obyvateľstva darcovských aj prijímajúcich krajín. Preto je potrebné migračnú politiku považovať za dôležitý nástroj moderácie tranzitu pracovnej sily priamo súvisiacej s ekonomickou situáciou, ale aj riešenia demografickej krízy ako takej.