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STAFFING TRENDS IN LOGISTIC POTENTIAL DEVELOPMENT IN THE CONDITIONS OF INCREASING MIGRATION PROCESSES

Abstract: The article presents an overview of the development of trends in labor market changes in the context of the development of unregulated internal migration processes. The logistic interpretation of the labor market and the impact of the migration process on the basis of analytical modeling with the use of mathematical tools for formalization of processes is given. The necessity of development of infrastructure support of the labor market for the purpose of liquidation of imbalance is substantiated. The basis of effective regulation of the labor market is the introduction of optimal parameters for the development of the labor market and its infrastructure support.The proposed mechanism of logistics of the processes of influencing the migration of the population to the state of work and staffing needs of the economic system of the national economy is a necessary condition for determining the optimal parameters of the labor market development of components, which maximizes the effectiveness of market regulation measures.

Keywords: labor market, migration, logistics, optimization, infrastructure.

JEL Classification: E24, C61.

Introduction

A characteristic feature of the modern labor market is the growth of labor mobility, provoked as an increase in the overall mobility of the population, as well as the liberalization of social and labor relations, as well as increasing the flexibility of the labor market. Mobility of the workforce also characterizes the flexibility of the labor market, the degree of libera-

lization of relations and the very model of the labor market. For example, for the US labor market, which is one of the most liberal and with a high labor mobility, the overall labor turnover in 2001-2008 ranged from 83.2% to 98.2%, while in 2009-2012, dropped to 74.0-76.0% [U. S. Bureau of Labor Statistics, 2017].In Ukraine, the overall turnover rate for the same period was not higher than 61.1%

Territorial mobility of the labor force improves the distribution of human capital, and a high level of professional mobility creates the preconditions for a rapid restructuring of the economic system. On the other hand, the high territorial mobility of the workforce, especially the migration outflow to other countries, brings changes for both recipient countries and donor countries. For the first influx of migrants, changes, first of all, into the socio-cultural space. For others, the outflow of labor-intensive population leads to a reduction in labor potential, a decrease in the quality of human capital.

Ukraine is now one of the largest donor countries in Europe. According to the results of the second national survey on labor migration, the number of citizens aged 15-70, who from January 1, 2010 until June 17, 2012, worked or were looking for work abroad was 1.2 million people, or 3 , 4% of the population of the corresponding age [The International labor organization, 2013]. Against the background of aging populations, labor migration in Ukraine is becoming one of the threats to economic development, producing changes in the demographic, social and psychological spheres. The disastrous consequences of this trend are well known since the 90s, which have received the characteristic features of the loss of intellectual potential in the people called "brain drain".

But, as practice shows, Ukraine can suffer significant losses of human capital from uncontrolled internal migration. As a result of the armed conflict in eastern Ukraine, the residents of the region faced the need for forced change of residence, provoking significant uncontrolled migration processes. The difficult situation in the East of Ukraine caused the outflow of population to other regions, first of all - the neighboring ones. As of the end of March 2017, the largest number of settlers lives in the controlled area of Donetsk Region (more than 532 thousand) and Luhansk (almost 291 thousand), 196 thousand were housed in the Kharkiv region, 163 thousand - in the city of Kiev, 76 thousand - in Dnipropetrovsk region and 59 thousand - in Zaporozhye region. The smallest number of settlers is located in Ternopil (2512 people), Rivne (3229), Transcarpathian (3549) and Chernivtsi (3556) regions. As of June 12, 2017, the Ministry of Social Policy of Ukraine, according to the departments of social protection of the population of the region and Kyiv city state administrations, took into account 1,593,466 immigrants from the Donbas and the Crimea [The ministry of social policy, 2017].

The complexity of the situation is that internally displaced persons tend to be difficult to adapt to in the new environment and, moreover, to compete on the labor market on an equal footing, and if there are reasons why a person can not leave his home, then the chances to find a job in this case, are minimal. Official statistics show a paradoxical situation when, against the background of significant migration processes, the employment situation in Ukraine will not undergo significant changes (Table 1).

Table 1. **Dynamics of employment of individual regions in 2016 compared to 2013**

	Employed population, thousand people	
	2013	2016
Kyiv	1282.8	1236.6
Kharkiv region	1413.1	1364.3
Dnipropetrovsk region	1531	1425.4
Zaporozhye region	821.9	734.9
Ternopil region	442.9	407.6
Rivne region	494.9	474.2
Transcarpathian region	541.2	505.5
Chernivtsi region	391.6	376.1

Source: The Ministry of Social Policy of Ukraine

This situation is explained by the fact that internally displaced persons have somehow influenced the employment rate of Ukrainian regions, but it is impossible to investigate the direct relationship, since not all settlers are officially employed. However, the situation is somewhat deeper. This is a reflection of the discrepancy between the Ukrainian labor market architecture and the crisis in unregulated population migration.

The listed problems add to the problem of registration at a new place of residence and the official employment of such persons, which is the basis for their successful living in a new place and opportunities for developing a successful career.

Difficulties with the official employment of HBO may be due to the loss of a workbook in circumstances of forced migration. In this case, a duplicate of a workbook is issued on the basis of a statement by the employee and information received from him from the headquarters for the liquidation of the consequences of an emergency on the emergence of an emergency or the Antiterrorist Center of the Security Service of Ukraine on the conduct of an anti-terrorist operation on the territory where the person provided in arbitrary form [Supreme Council of Ukraine, 2017]. The cases of loss of a passport or birth certificate are more often encountered, in this case, internally displaced persons apply to the migration service at the place of stay, where during a day they issue a temporary certificate confirming Ukrainian citizenship.

Despite attempts by state authorities to create a new legislative framework for the registration of internally displaced persons, the process itself does not become simpler and affordable to the fullest for everyone. Also, the shortage of information in the system of accounting for the socio-demographic categories of internally displaced persons does not allow to provide necessary social assistance, to calculate pensions.

Thus, processes of internal migration of the population are accompanied by a violation of information links, a change in the structural basis of employment of the population without proper consideration of changes in the resource components.

1. Logistic interpretation of the labor market and the impact of the migration process.

Logistics is a comprehensive area in science that covers the management of information, material and resource flows. It is her principles and methods that should be the basis for optimizing the situation on the labor market in the context of the strengthening of migration processes.

The system of views on the improvement of economic activity by streamlining flows is the concept of logistics. In this case, the main, constructive principle on which flow management is constructed is the principle of systematicity, which means the organization and implementation of all stages of activity as a single process. Resource, information and material flows in the economy are formed as a result of the actions of many participants, each of which in general pursues its goal. If participants can coordinate their activities in order to rationalize the common object of management - through the material flow, then all together they will receive a significant economic gain. Identifying conditions for coordinating the activities of different participants is the main task of modeling logistics processes.

In logistics, the analytical form of mathematical modeling is widely used. Analytical modeling is a mathematical method for researching logistics systems that allows you to get accurate solutions. The advantages of analytical modeling include the great power of generalization and the multiplicity of use.

Analytical modeling is carried out in the following order.

The first stage. Mathematical laws linking system objects are formulated. These laws are written in the form of some functional relationships.

The second stage. Situational analysis. Comparison of theoretical assumptions with the situation (check for analytical adequacy).

Third stage Solving equations, obtaining theoretical results.

Fourth stage. Comparison of obtained theoretical results with practice (checking for general adequacy).

It is these stages that bits are the basis of the logistic interpretation of the labor market and the impact of the migration process.

1. 1 Analytical formalization of the logistic task

By its content and statement of tasks of logistics among the set of tasks of the scientific field of study operations can be mathematically formalized by a class of distribution or transport problems. Using the architecture of the transport problem, you can display the mathematical laws that connect the objects of the system.

The transport task on the criterion of cost is the following task of minimizing the cost of transportation.

Let the departure points A1, ..., Am contain, respectively, a1, ..., am units of some homogeneous cargo. This cargo must be transported to n destinations B1, ..., Bn, each of them should be delivered b1, ..., bn of cargo respectively. The cost of transporting a unit of cargo from item Ai to point Bj is equal to cij. Denoting by xij the number of units of cargo destined for departure from point Ai to Bj, we will have the task of finding a plan of transportation in which the total cost will be minimal:

$$\langle c, x \rangle = \sum_{i=1}^{m} \sum_{j=1}^{n} c_{ij} x_{ij} \to \min; \ x_{ij} \geq 0, \ i = 1, \ldots, m, \ j = 1, \ldots, n,$$

$$\sum_{j=1}^{n} x_{ij} = a_i, \ i = 1, \ldots, m, \quad (a) \qquad \sum_{i=1}^{m} x_{ij} = b_j, \ j = 1, \ldots, n. \quad (b)$$

The transport plan and the cost of transportation are presented in the form of vectors x = (xij, i = 1, ..., m, j = 1, ..., n), c = (cij, i = 1, ..., m, j = 1, ..., n) respectively.

Equations (a) mean that from the point of departure Ai, the entire consignment has been taken to destination (consumption). Equations (b) mean that the quantity of goods brought to point Bj from all points of departure corresponds to the required. It is natural to assume that the total supply of goods at all points of departure is equal to the total need of all destinations, that is

$$\sum_{i=1}^{m} a_i = \sum_{j=1}^{n} b_j = M.$$

In this case, it is said that there is a closed model of a transport problem.

Let's consider open models of a transport problem. And let's show how they can be reduced to a closed model. If total shipments of shippers exceed the total need for destinations, i.e.

$$\sum_{i=1}^{m} a_i > \sum_{j=1}^{n} b_j,$$ then equality (a) is replaced by inequalities

$$\sum_{j=1}^{n} x_{ij} \leq a_i, \ i = 1, \ldots, m,$$ and condition (b) remains unchanged. In this case, a fictitious destination Bn + 1 with the required import value is entered

$$b_{n+1} = \sum_{i=1}^{m} a_i - \sum_{j=1}^{n} b_j$$ and the zero cost of transportation to this point. By adding new nonnegative variables $x_{i_{n+1}}, i = 1, ..., m$, we arrive at a closed model of a transport problem with constraints in the form of equations (a) - (b).

If total shipments of shippers are less than total item queries destination, i.e. $\sum_{i=1}^{m} a_i < \sum_{j=1}^{n} b_j$ equality (b) are replaced by inequalities

$$\sum_{i=1}^{m} x_{ij} \le b_j, \ j = 1, \ldots, n,$$

and condition (a) remains unchanged. In this case, a fictitious point of departure of Am + 1 with the required export value is entered $$a_{m+1} = \sum_{j=1}^{n} b_j - \sum_{i=1}^{m} a_i$$ and zero cost of transportation from this item. Adding new non-reactive variables xm + 1 j, j = 1, ..., n, we arrive at a closed model of a transport problem with constraints in the form of equations (a) - (b).

1. 2 Analytical interpretation of the logistic problem
By transposing these provisions into the labor market, we will note the main principles of the principle.

The labor market, like any system, has its own structure. It has common elements in different countries, but at the same time there may be some differences. Depending on the objectives of the market structure analysis, you can implement different criteria. But, first of all, it is necessary to identify the structure of the labor market, as such, regardless of national and other characteristics. This can be done by the most important, necessary for the functioning of the modern civilized labor market.

Subjects of the labor market. The main subjects of the labor market include employees (and their unions) and employers (and their associations).

Hired workers are the largest part of the labor market. These include people who do not have means of production, who live at the expense of selling their abilities to work - labor. Their welfare, reproduction depends on how successful they can sell their workforce - to conclude a contract, get a job.

Based on the terms of the transport task, the employees are the suppliers of the resource, that is, the point of departure *A1*, ..., *Am*, in which, respectively, *a1*, ..., *am* are the units of working time of workers of appropriate training and qualifications.

The cost of providing workforce resources from a territorially and professionally determined point Ai of a territorially separated employer Bj is equal to cij. These costs are related both to the provision of appropriate conditions for employees, and the costs associated with the adaptation of staff to the specifics of the enterprise.

By marking *X ij* the number of units of labor resource (working hours of the specialization and qualification) intended to be sent from vacancies *Ai* to applications for employment *Bj*, we will have the task of finding a plan of supply in which the total value will be minimal:

$$\langle c, x \rangle = \sum_{i=1}^{m} \sum_{j=1}^{n} c_{ij} x_{ij} \to \min; \ x_{ij} \geq 0, \ i = 1, \ldots, m, \ j = 1, \ldots, n,$$

$$\sum_{j=1}^{n} x_{ij} = a_i, \ i = 1, \ldots, m, \quad (a) \quad \sum_{i=1}^{m} x_{ij} = b_j, \ j = 1, \ldots, n. \quad (b)$$

It is natural to assume that in the conditions of the developed national economy, the strategy of training corresponds to the needs of the industrial complex, that is

$$\sum_{i=1}^{m} a_i = \sum_{j=1}^{n} b_j = M.$$

In this case, it is said that there is a closed model for the allocation of labor resources of the problem.

Obviously, the unregulated migration process is the source of an imbalance in the labor market. Ideally, the structural equilibrium in the labor market is achieved provided that the ratio of the number of unemployed to the number of vacancies in all professions is equal to the overall average [Gainanov D.A., Gallyamov R.R., 2006]. However, in practice, when checking the structural balance of the labor market, it is more appropriate to use the condition that the ratio of the number of unemployed to the number of vacancies for each individual profession should go to the overall average.

$$\frac{s_i}{d_i} \to \frac{\sum_{i=1}^{n} s_i}{\sum_{i=1}^{n} d_i}$$

where s_i - supply in the labor market of a particular sector of the structure (the number of unemployed in a particular professional group);

d_i- demand in the labor market of the relevant sector;

$\sum_{i=1}^{n} s_i$ - general supply in the labor market (total number of unemployed);

$\sum_{i=1}^{n} d_i$ - total demand in the labor market.

The questions of estimating the imbalance in the labor market are considered in the works of Russian and Ukrainian scientists [Renewa E. V., Grinevich L. V., 2009]. The basis of the developed methods for conducting the analysis is the approach of Korovkin A. G., according to which the structural imbalance of a certain segment of the labor market can be calculated as the difference between the share of the segment's offer in the general struc-

ture and the share of the segment's demand in the overall structure. Summing up all the imbalances in the selected section you can get an estimate of the share of the structural component of unemployment in the total number. The level of imbalance is calculated according to the formula [Korovkin A.G., Korolev I.B., Dolgova I.N, Akhundov O.V, 2006]:

$$I_d = \frac{1}{2}\sum_{i=1}^{n}\left| \frac{s_i}{\sum_{i=1}^{n}s_i} - \frac{d_i}{\sum_{i=1}^{n}d_i} \right|$$

where I_d — level of imbalance in the labor market,%.

But this indicator does not allow us to draw conclusions on the achievement of the basic condition for structural stability in the labor market, namely: approximation to the overall average. To take into account this condition it is necessary to use the indicator of structural imbalance in the labor market on the basis of calculating the quadratic coefficient of variation:

$$DLM = \left(\sqrt{\frac{\sum_{i=1}^{n}\left(\left(\frac{s_i}{d_i} - \frac{\sum_{i=1}^{n}s_i}{\sum_{i=1}^{n}d_i}\right) \times \frac{s_i}{\sum_{i=1}^{n}s_i}\right)}{n}} \div \frac{\sum_{i=1}^{n}s_i}{\sum_{i=1}^{n}d_i} \right) \times 100\%$$

where DLM - indicator of structural imbalance in the labor market,%.

This indicator characterizes the value of the average deviation of the load on a certain segment of the labor market in comparison with the overall load index. That is, it shows how much the average load on a particular segment in the labor market may differ from the general one. The higher this indicator, the higher the imbalance in the labor market.

The most complete data for such analysis are contained in the State Employment Service of Ukraine (2017), which collects data on demand and supply in the labor market, broken down by professional groups and regions. However, it should be borne in mind that this information applies only to the registered labor market (ie vacancies and jobseekers who are registered with the State Employment Service).

Returning to the principles of logistics and its mathematical format in the form of a transport task, we turn to the actions related to the correction of the situation of imbalance. In the general sense, the openness of the model of the transport problem for its solution is corrected by the addition of the corresponding "absent for balance" of the participant, that is, either a fictitious supplier, or a fictitious consumer, and the write-off of surpluses or deficits on it. That is, we can conclude that in the process of formalizing the problem it was found that for the organization of the cut-off natural movement of the resource it is necessary to have an appropriate converter capable of correcting the structural imbalance of the labor market. In the conditions of an ex-

cess of personnel resources, a partial (at the expense of the surplus) of mobilizing it into a group of employers is needed, that is, the necessary work is to attract mercenaries to entrepreneurship, which will enable them to reduce the number of unemployed and prepare the environment for job creation. Conversely, in the face of shortages of skilled professionals, create conditions for outsourcing, outstaffing and additional employment of scarce personnel.

Summarizing the above, we can say that it is a well-established mechanism for infrastructure support labor market.

2. Situational analysis of the logistic interpretation of the labor market and the impact of the migration process.

In order to assess the situation, it is necessary to consider the activity of various participants in solving the structural imbalance identified by the unregulated internal migration. Appropriate shifts from the authorities and the international community have been made to streamline the situation through stimulating the development of small and medium-sized businesses. The study was conducted on the example of the Lugansk region.

In the first quarter of 2017, support for entrepreneurship in the region was carried out in accordance with the measures of the Regional target program "Attraction of investments, development and support of small and medium enterprises in Luhansk region for 2016-2017 years", similar municipal and district programs, implementation in the area of laws of Ukraine: "On development and state support of small and medium enterprises in Ukraine", "On investment activity", "On administrative services", "On the principles of state regulatory policy in the field of economic activity", other normative-legal acts. UAH 49 million has been actually used for implementation of the Program, including: from the region budget - UAH 48.8 million, city and district budgets - UAH 1.4 thousand, other sources - UAH 219.4 thousand.

In order to facilitate business start up, there are 16 administrative service centers in the region, including 12 district and 4 city centers. During the first quarter of 2017, through the centers of the region, economic entities and citizens provided over 58 thousand administrative services, which is 2 times more than in the first quarter of 2016. On average, over a month, about 19.5 thousand services were provided through the centers.

Entrepreneurial structures during the first quarter of 2017 transferred 149 premises with a total area of 26.7 thousand square meters.

In the reporting quarter 71 subjects of small business took part in regional purchases. As a result, 508 agreements were concluded for the total amount of UAH 69.5 million.

Since the beginning of the year, the financial and credit institutions of the region have provided loans to 19 entities, including 14 farms, in the amount of 13.3 million UAH.

In order to quickly solve urgent business-related issues, "hotlines" for entrepreneurs working in the region formed in the executive committees of city councils of cities of region significance and rayon state administrations. During the reporting period, 175 appeals were received from entrepreneurs on the "hot lines" for which clarification was provided.

At the Luhansk regional state administration, rayon state administrations and local self-government bodies, regional and local councils of entrepreneurs, coordination councils on business development issues and working groups on the promotion of small business operate.

During the first quarter of 2017, in Lugansk region, with participation of local agricultural producers, 228 fair events were held on which agricultural products were sold for the total amount of 19.9 million UAH.

According to the reporting of the Lugansk Regional Military-Civil Administration in the framework of the modernization of the services of the employment service and their orientation to the European level in the Severodonetsk City Employment Center, the Consultancy Center for the provision of free support to entrepreneurs has begun its work. In the Lisichansk City and Kreminna District Employment Centers, unemployed support and support studio "Business Standard" operate, aiming at providing knowledge and assistance in informing about conditions for grants, filling in questionnaires and preparing business plans.

Within the framework of the UNDP Small Grants Program:: support for entrepreneurship among IDPs and local population of Donetsk and Lugansk regions" only in the Luhansk region on January 1, 2017 inception, renewal or expansion signed 93 grant agreements totaling 11.95 million.

The International Union for Migration, with the support of the European Union, is launching a project to support the employment of migrants. The organization will provide grants for the creation and development of own business for beginner entrepreneurs. In February-March 2017, began a major project for ATO participants, residents of Donetsk and Luhansk regions. The project includes trainings, individual consultations, protection of business plans and the provision of grants for the procurement of equipment. The amount of the grant for self-employment will be 650 euros, microenterprise - 2150 euros, vocational guidance training - up to 400 euros.

According to local self-government bodies and rayon state administrations, in the first quarter of 2017, 743 new jobs were created in the region due to small and medium-sized enterprises.

Conclusions

Thus, the problem of the structural imbalance in the labor market of the Eastern region, which manifests itself in the excess of labor supply, is being sought by operators by attracting unemployed to entrepreneurship through the liberalization of small business conditions and the provision of grants by international organizations. This is the starting point for creating the ne-

cessary labor market support infrastructure. However, the uncertainty of the optimal quantitative and qualitative parameters of the development of the labor market support infrastructure leaves the effectiveness of its functioning at a minimum level.

The proposed mechanism logistics impact of migration processes vital to the labor market and staffing needs of the economic system , the national economy is a prerequisite for determining the optimum parameters of the components of the labor market that maximizes the effectiveness of the measures of market regulation.

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