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LABOR MARKET DEVELOPMENT AS A PREREQUISITE FOR SMART CITY FORMATION

RYNEK PRACY JAKO WARUNEK WSTĘPNY FORMACJI INTELIGENTNEGO MIASTA

РАЗВИТИЕ РЫНКА ТРУДА КАК ПРЕДПОСЫЛКА РАЗВИТИЯ «УМНОГО ГОРОДА»

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Abstract

The place and role of the labor market for smart city development are determined. Proposed methodology for assessing the labor market, according to which the diagnostics of the labor markets development in the regions of Ukraine was conducted. According to the results of the integral indicator calculation, the assessment and grouping of regional labor markets at different levels of development was carried out. Based on the comprehensive application of econometric tools, a model for the development of regional labor markets in Ukraine based on indicators of demand, supply and prices for labor was built, as well as the most significant factors of labor market development is determined. According to the results of the regional labor markets development analysis, prospects for the formation of smart cities located on their territory are determined.

Keywords: *smart city, labor market, economic activity of the population, unemployment, employment, labor force*

Streszczenie

Artykuł stanowi próbę określenia miejsca i roli rynku pracy dla inteligentnego rozwoju miast. Autorzy zaproponowali metodologię oceny rynku pracy, zgodnie z którą przeprowadzono diagnostykę rozwoju rynków pracy w regionach Ukrainy. Zgodnie z wynikami obliczeń integralnego wskaźnika przeprowadzono ocenę i grupowanie regionalnych rynków pracy na różnych poziomach rozwoju. W oparciu o kompleksowe zastosowanie narzędzi ekonometrycznych opracowano model rozwoju regionalnych rynków pracy na Ukrainie w oparciu o wskaźniki popytu, podaży i cen pracy, a także określono najważniejsze czynniki rozwoju rynku pracy. Zgodnie z wynikami regionalnego rozwoju rynków pracy.

Słowa kluczowe: *inteligentne miasto, rynek pracy, aktywność gospodarcza ludności, bezrobocie, zatrudnienie, siła robocza*

Аннотация

Определены место и роль рынка труда для развития «умного города». Предложена методика оценки рынка труда, согласно которой проведена диагностика развития рынков труда в регионах Украины. По результатам расчета интегрального показателя осуществлена балльная оценка и группирование региональных рынков труда по разным уровням развития. На основе комплексного применения эконометрического инструментария построена модель развития региональных рынков труда Украины по показателям спроса, предложения и цены на рабочую силу и установлен наиболее значимый фактор развития рынка труда. По результатам проведенного анализа развития региональных рынков труда определены перспективы становления «умных городов», расположенных на их территории.

Ключевые слова: *«умный город», рынок труда, экономическая активность населения, безработица, занятость, рабочая сила*

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Statement of the problem in general outlook and its connection with important scientific and practical tasks.

Cities play a key role as the driving forces of the regional economy and economic development (COM, 2006; SEC, 2006). Cities are the heart of most places of work, companies and institutions of higher education, so their actions are crucial to ensuring social cohesion. They are the center of innovation, entrepreneurship and economic growth.

Several factors converge to make cities the pre-eminent location for the emergence of on-demand work: (1) population density, (2) expansion of the tertiary sector in urban economy, (3) salaried employment crisis, and (4) the emergence of new work aspirations.

The "tertiarisation" of urban economy encourages the development of a service society. As it happens, the tertiary sector provides the best fit for on-demand work. To take one example: the "services to individuals" sector, highly represented on digital platforms, provides a source of employment that will equate to more than 170,000 positions by the end of 2016 and 800,000 in the longer term (Wyman, 2014). Because they are closely related to the use of on-demand economy, cities are seen as key players in framing, or even regulating, the sector.

The formation of smart cities involves balanced development in three interrelated areas, one of which is the labor market. Therefore, the objective assessment of the processes and phenomena which taking place in the labor market, for its effective regulation is an important prerequisite for the formation of a smart city.

Analysis of latest research where the solution of the problem was initiated.

The research of the labor market at the national and regional levels was carried out by such scientists as Leonid Beztelelsna (L. Beztelelsna et al., 2012), B. Vorvynets, V. Ostroverkhov (V. Ostroverkhov, 2012), L. Shevchenko (L. Shevchenko, 2004), G. Yurchik and others. The issue of creating smart cities and the preconditions for their formation are disclosed in scientific works Wyman O. (O. Wyman, 2012), Komninos N. (N. Komninos, 2008) A. Caragliu, C. Del Bo,P.Nijkamp (Caragliu et al., 2011), B. Johnson (B. Johnson, 2008), D. Ménascé (D. Ménascé, 2017) and others.

However, in the publications of scientists there is still open question about determining the prerequisites for smart cities development in the context of European integration processes. More attention is needed to the study of the labor market as a component of the smart city development and its evaluation in order to determine the prospects for the formation of a smart city.

Sustainable development implies a balance between the social and economic spheres, and smart growth requires innovation in both areas. Accordingly, in order for development of smart city, an integrated system of interaction between the economy and the labor market should be created, which will help to improve the situation in general.

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Caragliu et al. found some elements that could characterize a smart city. They include (a) utilization of networked infrastructure to improve economic and political efficiency and enable social, cultural, and urban development; an underlying emphasis on business-led urban development; (b) a strong focus on the aim of achieving the social inclusion of various urban residents in public services; (c) profound attention to the role of social and relational capital in urban development; and (d) social and environmental sustainability as a major strategic component (Caragliu et al. 2011).

Cities should be attractive places for doing business, which in turn requires regulation of the labor market through the development of a skilled workforce that is both entrepreneurial and innovative. Working with and engaging companies in policy-making and delivery is essential as is linking them to the world of education and training in order to achieve an effective economic and employment ecosystem. All of this requires the ability to build our own capability, knowledge, skills and knowhow. We need to be innovative in our approaches, prepared to take risks, to learn from others and to be self-critical. We need to be imaginative in our policies (Cities of Tomorrow, 2013).

Modern labor markets are shaped by both internal factors (such as the effect of domestic legislation, migration processes within the country, the political situation and the differentiation of interregional development, etc.) and external factors. The difference in the level of wages and the quality of life in general, as well as in the context of territorial proximity to foreign countries, enhances the possibility of smoothing the disproportion of the market situation due to external labor migration.

Aims of paper. **Methods.**

In the research, the methods commonly used in economic science are applied: theoretical, comparative and retrospective analysis – to reveal the theoretical foundations of the development and regulation of the labor market, directions of its improvement, taking into account the prospects for the smart cities development; statistical groupings, generalization – to improve methodological approaches to the analysis of the development of the region labor market; economic and statistical, modeling, rating estimations, graphic – in the process of disclosing the development of regional labor markets in Ukraine and determining the prerequisites for the smart cities development.

Exposition of main material of research with complete substantiation of obtained scientific results. **Discussion.**

Therefore, the proposed methodology for analyzing the labor market in the region involves the collection and proper interpretation of data taking into account the internal situation in the labor market, studying and assessing the experience of regulating labor markets of foreign countries, as well as the development of migration processes. In general, taking into account the peculiarities of the functioning of the labor market of the region, it is possible to distinguish four main stages of evaluation of its development (Fig. 1).

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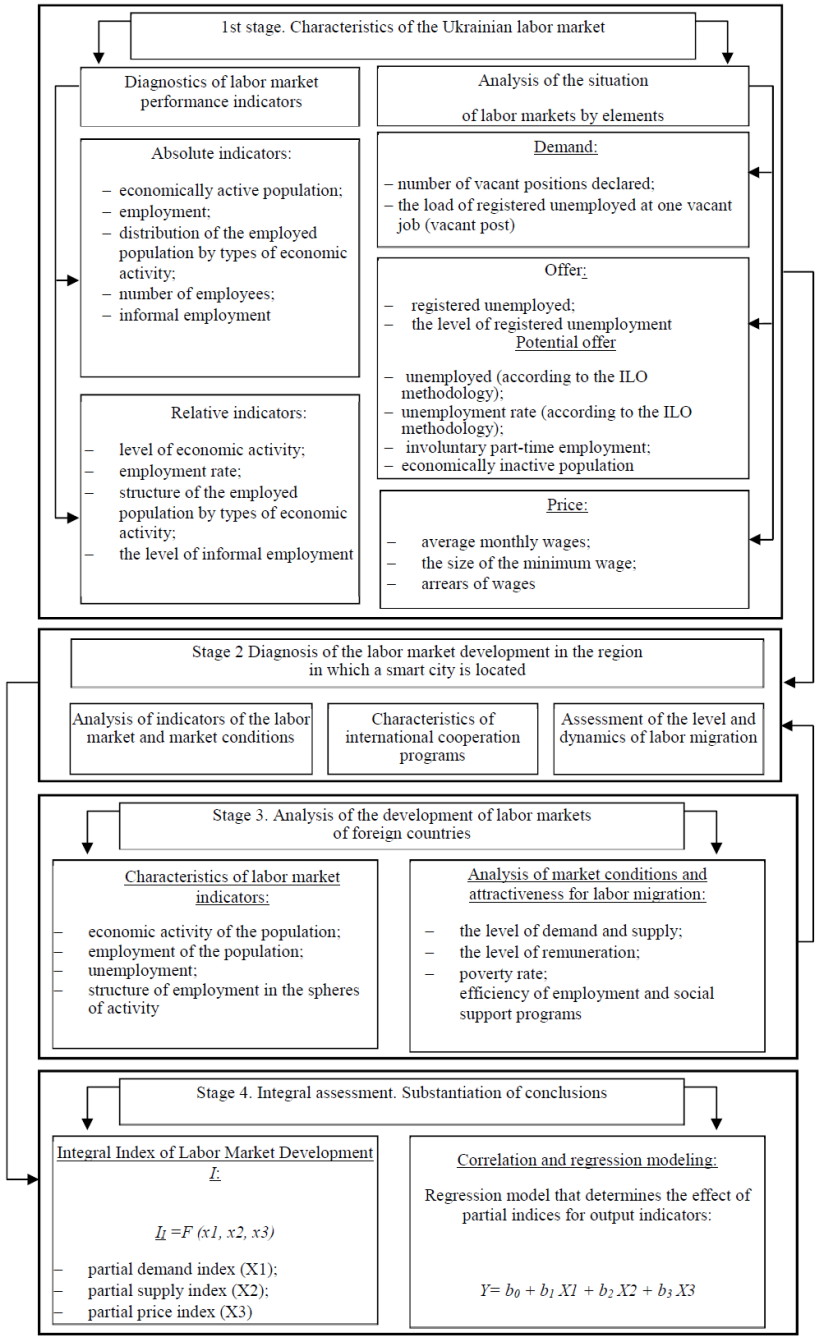
Fig. 1 Methodology of analysis the development of the regional labor market



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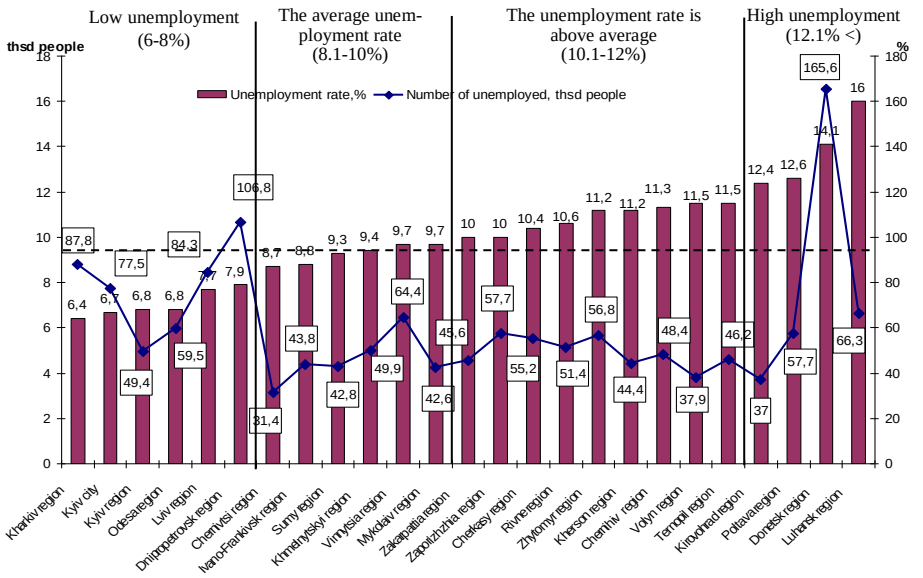
It should be noted that such indicators as the level of economic activity of the population, employment, unemployment, labor turnover are used for analysis of the state of the labor market. In this case, it is important to assess the level of economic activity of the population, since it reflects volumes of labor supply in the labor market, the structure of employment of the population.

The analysis of the economic activity of the population of Ukraine for the period of 2010-2016 shows a significant decline in its level starting in 2014 and reaching its highest value of 62.2% in 2016. There were identified negative trends in reducing the proportion of youth in the structure of economically active population.

As regards the dynamics of employment indicators for the period of 2011-2016, the following periods are defined: 2011-2013 - increase of employment from 58.4% to 60.2%; 2014-2016 - the drop in employment from 56.6% to 56.3%. It was identified the suboptimal structure of employment, the reasons for which is called low wages, labor market imbalances, in particular the discrepancy between the requirements of employers and the qualifications of potential employees. These negative trends were the consequences of the economic crisis in the country and unjustified measures of the state policy of regulation, which indicates the presence of unfavorable prerequisites for the formation of smart cities in Ukraine.

The development of labor markets is accompanied by an increase in the scale of unemployment, due to the presence of crisis phenomena in the economy, the reduction of aggregate demand for labor, structural shifts and labor movement. In 2016, the largest number of unemployed was in the Donetsk and Dnipropetrovsk regions (Fig. 2).

Fig. 2 Unemployment of population in Ukraine in 2016



* Compiled by authors based on data of the State Statistics Service of Ukraine.

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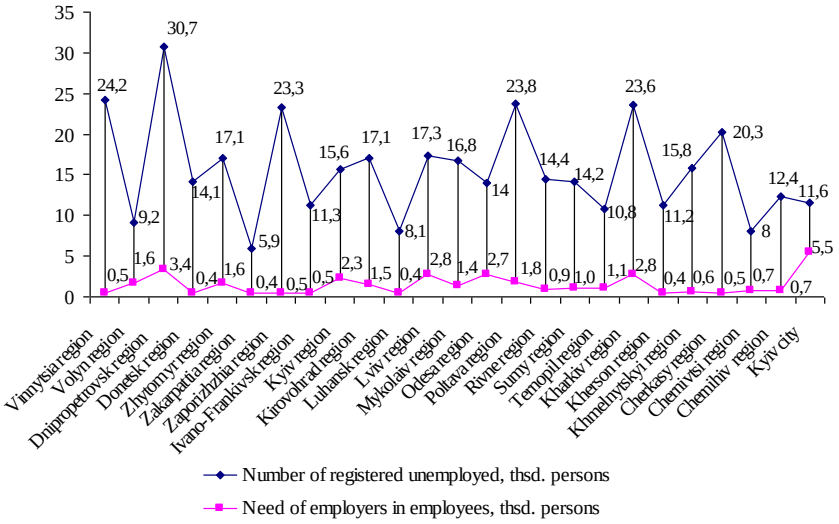
According to the results of the analysis, there was a discrepancy between the demand for labor force and its offer, which limits the possibilities of employment of the unemployed and satisfaction of the needs of employers in the employees. As a result, the number of registered unemployed significantly exceeds the amount of declared vacancies (Fig. 3).

Fig. 3 The disproportion between the demand for labor force and its supply in Ukraine in 2016



* Compiled by authors based on data of the State Statistics Service of Ukraine.

Neighborhood with more economically developed countries, which form the demand for labor resources with a better offer of working conditions and earnings, could provoke labor outflow abroad, increase the level of illegal employment and covert unemployment. At the same time, foreign economic relations can be used to ensure efficient employment of the population, prevent mass unemployment and achieve a balanced market conjuncture.

The effectiveness of the functioning of the labor market is achieved by balancing the three main market forces:

1. Demand for labor reflects unemployment rate, the number of job vacancies, the ratio between the number of unemployed and the necessity for employers in the employees.
2. Labour supply accumulates data on the level of unemployment and the dynamics of their change.
3. The value of labor becomes a form of remuneration and integrates the system of indicators of minimum wages, its average values in general and in terms of occupations, its real and nominal size in statics and dynamics in a number of years.

Therefore, to assess the development of labor markets, we propose a slightly modified mathematical model based on indicators that characterize the main

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elements of the labor market: demand for labor, labor supply and the price of wages. In order to construct a model, there is a need for a system of indicators of the state of the labor market, which should be aimed at statistical support and the provision of urban development processes, to be relatively technically simple and at the same time to perform the necessary tasks. Based on the proposed methodological approach, a rating assessment of the labor markets of the regions of Ukraine was carried out in terms of demand, supply and labor costs. This enabled the realization of scoring and identify the five groups of regions in terms of the level of development of the labor market (perspective, higher than average, lower than average, unsatisfactory, critical) (Table. 1).

Table 1. Results of calculation of partial and integral indexes of labor market development

Region	Partial indexes characterizing the labor market elements			Integral index of labor market development	Assessment of the labor market	
	demand	offer	price		Score assessment	Qualitative assessment
Kyiv city	0,707	0,985	0,878	0,866	12	Perspective
Kharkiv region	0,792	0,901	0,428	0,699	9	
Kyiv region	0,525	0,813	0,595	0,647	8	
Odesa region	0,591	0,779	0,575	0,644	8	
Volyn region	0,783	0,336	0,613	0,607	**7**	Higher than average
Dnipropetrovsk region	0,573	0,794	0,470	0,607	7	
Lviv region	0,482	0,699	0,566	0,586	7	
Chernivtsi region	0,275	0,645	0,681	0,582	7	
Vinnytsia region	0,355	0,599	0,670	0,576	7	
Mykolaiv region	0,446	0,633	0,580	0,562	7	
Zhytomyr region	0,505	0,490	0,630	0,558	6	Lower than average
Kirovohrad region	0,692	0,313	0,571	0,552	6	
Zakarpattia region	0,161	0,521	0,689	0,537	6	
Ivano-Frankivsk region	0,135	0,595	0,638	0,530	6	
Cherkasy region	0,309	0,545	0,617	0,525	6	
Kherson region	0,168	0,486	0,681	0,524	6	
Rivne region	0,299	0,562	0,596	0,518	6	
Ternopil region	0,431	0,351	0,636	0,512	6	
Sumy region	0,347	0,630	0,490	0,501	5	Unsatisfactory
Khmelnytskyi region	0,222	0,535	0,598	0,499	5	
Zaporizhzhia region	0,244	0,561	0,568	0,495	5	
Poltava region	0,506	0,314	0,571	0,491	5	
Chernihiv region	0,315	0,473	0,584	0,488	5	
Luhansk region	0,302	0,322	0,588	0,451	4	Critical
Donetsk region	0,221	0,140	0,318	0,251	1	

* Calculated by authors.

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According to the results of the assessment, it has been established that most regions of Ukraine have minor differences and the level of development of their labor markets is estimated at 5-7 points out of 12. The worst situation is in the labor markets of Luhansk and Donetsk regions, which is caused by a military conflict on their territory (4 and 1 points respectively).

It was built a regression model to analyze the effects of demand, labor supply and cost of labor in the overall development of the labor market:

$$Y = 0{,}021 + 0{,}258\ X1 + 0{,}285\ X2 + 0{,}445\ X3, \quad (1)$$

where Y – integral index of labor market development;

X1 – labor demand;

X2 – labor supply;

X3 – the value of labor.

According to the simulation results, labor remuneration has the greatest impact. This proves the necessity to improve wage regulation as the most effective factor in the development of the labor market.

The analysis of the labor market in the European Union has shown a significant polarity of changes in unemployment rates in the context of individual countries. Almost in the half of EU member states (13 of 28) for the period 2006-2016 unemployment growth rate exceeded 1%. The most negative was the situation in Greece (where unemployment increased by 8.8%), Spain (7.4%) and Cyprus (5.5%). By contrast, employment growth has taken place in Poland, Germany and Slovakia.

An analysis of the European experience regarding the development of the labor market and the internal situation in the labor markets in Ukraine gives grounds to discover to a significant difference in the mechanisms for their regulation. It has been found that the labor market regulation system in the European Union has a programmatic purpose and is implemented on the basis of joint programs. The main targets for the development of the EU labor market are job creation, quality of work, labor productivity, decent wages, social security, professional and social skills, and compliance with legislation. The regulation of the labor market at the national level is carried out taking into account the particularities of individual EU member states.

Thus, the revealed problems of the functioning of the modern labor market create unfavorable preconditions for the providing development of smart cities in Ukraine. Taking into account the experience of regulating the EU labor market, the following targets for further development of the Ukrainian labor market can be identified in order to create favorable prospects for the providing development of smart cities: expanding the scope of employment and stimulating employers' interest in creating new jobs; raising the professional level and competitiveness of the economically active population; ensuring labor mobility and improving labor migration regulation; promotion of employment of citizens, who need social protection and are not able to compete on the labor market on an equal footing.

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Conclusions.

Based on the proposed methodological approach, the rating of Ukrainian labor markets according to demand, supply and labor cost indicators were made. It
make it possible to conduct a score assessment and identify the five groups of regions in terms of the level of development of the labor market (perspective, higher than average, lower than average, unsatisfactory, critical).
To analyze the effects of demand, labor supply and labor prices on the overall development of the labor market, a regression model was constructed. According to the results of the simulation, the labor remuneration has the greatest impact. This proves the need to improve wage regulation as the most effective factor in the development of the labor market.
Based on the study of the EU countries experience regarding the development of the labor market and the effective use of joint strategic programs for its regulation, with their coordination at the local, regional and national levels, the need to reduce the risks of labor migration and the level of shadow employment has been substantiated. The target directions for further development of the Ukrainian labor market for the development of smart cities in the context of deepening of European integration processes are determined.
The use of the improved methodology enables the relevant state institutions to identify problems and prospects for the development of the labor market, to identify priorities and targets for each of the regions, to specify measures aimed at equalizing the socio-economic status and creating favorable conditions for the development of smart cities.

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