ЕКОНОМІЧНА ТЕОРІЯ

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LABOUR PRODUCTIVITY AND ITS ASSESSMENT

Labour market is one of the most important factors of economic growth, which is mainly determined by labour productivity. Disparity between wage and growth of labour productivity prevents the economies of the Eastern European countries from growing. Despite the radical economic reforms in Eastern Europe, one can still observe high unemployment rate, low labour productivity, deterioration in the quality of labour. New institutions in the labour market are designed to strengthen and adopt formal institutions, promote stable demand for labour and income policy. The article focuses on a critical analysis of theoretical approaches to labour productivity and empirical assessment of productive efficiency in Kharkiv region.

State policy on supporting training and education affects the future opportunities for individuals and the ability of firms to enter new markets and adopt new technologies. It is also supposed to facilitate the allocation of labour by its productivity rate as well as help employees to cope with mobility.

Improving the regional investment attractiveness goes hand in hand with enhancing human capital. A skilled workforce is essential for firms to adopt new and more productive technologies, and a better investment climate enhances the returns of investment in education. As firms are offered more opportunities and better access to new technologies, the demand for more skilled workers increases and the firms have stronger incentives to get engaged in growth-enhancing activities, which raise both individual and social returns to education.

From the investment climate perspective, the main issues are how labour market interventions influence the opportunities and incentives for firms to invest in a productive way, to create jobs and expand operations. Regulations might reduce incentives for attracting new investments, adjusting the organization of work, taking advantage of new technologies, or hiring more employees.

Keywords: labour productivity, total factor productivity, productive efficiency.
JEL Classification: O10, O11, O18, O25.

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ПРОДУКТИВНІСТЬ ПРАЦІ ТА ЇЇ ОЦІНКА

Ринок праці є одним із найважливіших факторів економічного зростання, який визначається головним чином продуктивністю праці. Диспропорція між заробітною платою та зростанням продуктивності праці перешкоджає економічному зростанню в країнах Східної Європи. Незважаючи на радикальні економічні реформи у Східній Європі, все ще можна спостерігати високий рівень безробіття, низьку продуктивність праці, погіршення якості праці. Створення нових інститутів на ринку праці спрямоване на посилення та прийняття формальних інститутів, сприяння стабільному попиту на робочу силу та політику отримання доходів. Робота присвячена критичному аналізу теоретичних підходів до продуктивності праці та емпіричної оцінки продуктивної ефективності у Харківській області.

Державна політика підтримки освіти та навчання впливає на майбутні можливості для окремих людей та здатність фірм вийти на нові ринки та впроваджувати нові технології. Це також повинно сприяти розподілу робочої сили за найбільш продуктивним способом використання, а також допомагати працівникам справлятися з мобільністю.

Покращення регіональної інвестиційної привабливості йде рука об руку з посиленням людського капіталу. Кваліфікована робоча сила має важливе значення для компаній, які використовують нові та

більш продуктивні технології, а кращий інвестиційний клімат підвищує прибутки від інвестицій в освіту. Оскільки фірмам пропонуються більше можливостей та кращого доступу до нових технологій, попит на більш кваліфікованих робітників зростає, а фірми мають сильніші стимули для участі у діяльності, яка спрямована на зростання, що підвищує як індивідуальні, так і соціальні віддачі від освіти.

З точки зору інвестиційного клімату основними питаннями є те, як інтервенції на ринку праці впливають на можливості та стимули для фірм інвестувати продуктивно, створювати робочі місця та розширювати операції. Регламент може зменшити стимули для стимулювання нових інвестицій, регулювання організації роботи, використання нових технологій або наймання нових працівників.

Ключові слова: продуктивність праці, загальна факторна продуктивність, продуктивна ефективність.

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ПРОИЗВОДИТЕЛЬНОСТЬ ТРУДА И ЕЕ ОЦЕНКА

Рынок труда является одним из важнейших факторов экономического роста, который в основном определяется производительностью труда. Неравномерность роста заработной платы и производительности труда препятствует экономическому росту в странах Восточной Европы. Несмотря на радикальные экономические реформы в Восточной Европе, все еще можно наблюдать высокий уровень безработицы, низкую производительность труда, ухудшение качества труда. Создание новых институтов на рынке труда, направленных на укрепление и принятие формальных институтов, стимулирование стабильной политики спроса на рабочую силу и доходов. Статья посвящена критическому анализу теоретических подходов к производительности труда и эмпирической оценке эффективности производства в Харьковской области.

Государственная политика поддержки образования и профессиональной подготовки влияет на будущие возможности для людей и способность фирм выходить на новые рынки и внедрять новые технологии. Он также должен облегчить распределение рабочей силы в соответствии с ее наиболее продуктивным использованием, помогая трудящимся справляться с мобильностью.

Повышение региональной инвестиционной привлекательности идет рука об руку с укреплением человеческого капитала. Квалифицированная рабочая сила имеет важное значение для фирм для принятия новых и более производительных технологий, а лучший инвестиционный климат повышает отдачу от инвестиций в образование. Поскольку фирмам предлагается больше возможностей и более широкий доступ к новым технологиям, спрос на более квалифицированных рабочих увеличивается, и у фирм есть более сильные стимулы для участия в деятельности, направленной на рост, которая повышает как индивидуальную, так и социальную отдачу от образования.

С точки зрения инвестиционного климата основными вопросами являются то, как вмешательства на рынке труда влияют на возможности и стимулы для фирм инвестировать в производственный процесс, создавать рабочие места и расширять операции. Регламент может уменьшить стимулы для стимулирования новых инвестиций, корректировать организацию работы, использовать новые технологии или нанимать больше работников.

Ключевые слова: производительность труда, общая производительность факторов производства, эффективность производства.

JEL Classification: O10, O11, O18, O25.

Statement of the problem. The article describes diverse approaches to labour productivity and suggests policy recommendations for productive efficiency improvement. Productive efficiency can be achieved in case the productive inputs' physical capital and labour are allocated efficiently. Firms provide profit maximization, using technological and managerial achievements.

The analysis of potential long-run outcomes on productivity growth shows that transition countries have diverse rates, consequences and effects in some regions in Eastern Europe. Higher wage rates lead to aggregate demand growth. The investment rate growth with total productivity improvements could reinforce country's current account position. Economic consequences of globalization illustrate the increase of international competition for labour intensive products, and trade expansion with different product qualities in industry. The number of unskilled workers is growing in East Europe. High unemployment rates in high income countries are combined with a high share of concealed unemployment in East Europe, it causes challenges for government interventions in labour markets. One could mention the role of the government as a political

institution, which should influence market forces by providing adjustments in the institutional framework. Transnational corporations (TNCs) entrance into domestic market stimulates development of production, creates new working places, brings new management of organizations, and improves welfare of workers.

Analysis of recent studies and publications.

The problem of relation between quality and cost of labour has been a subject of a lot of scientific works by economists in high income and transitional countries. The existence of various approaches that take into account in different ways production and service sector in labour productivity estimation, requires deep theoretical research and its practical application. The restructuring processes effect labour markets, and study of labour market developments. Changing skill structures, job characteristics demonstrate a cautious upturn in economic activities in Central, Eastern and Southeastern countries (CESEE) countries. This region has maintained its cost competitiveness, despite surging wages and occasional labour shortages, by benefiting from considerable productivity improvements (UNCTAD, WIR, 2017). The definition of labour productivity is based on its determination as a whole, and at the level of branches, companies, individual workers, products and etc. The labour productivity could be defined as rate of output per worker (or a group of workers) per unit of time as compared with an established standard or expected rate of output.

The productivity labour estimation is calculated as the volume of production per worker, the volume of net production or the number of details per worked hours (in East European countries).

Bulkley and Van Alstyne (Bulkley, Van Alstyne, 2004, p. 5) define productivity increase as an outward shift of feasible production with the same resources, which is the difference between the rate of growth of real product and the rate of growth of real factor input. The rates of growth of real product and real factor input are defined, in turn, as weighted averages of the rates of growth of individual products and factors. Productivity increase is differentiated from substitution of factors due to changes in the relative prices of inputs, which is identified when moving along the production function.

The main difference of labor productivity measurement in the USA from that in East European countries approach is that the analysis includes both production and service spheres. The production value increase is created on $3/4$ by labor and on $1/4$ by capital. It means the product rise is three times bigger via labor than by capital (Samuelson, Nordhouse, 1995).

It should be emphasized, that there are two main approaches to labour productivity estimation dealing with the narrow and broad definition. Sink (Sink, 1985) suggests seven indices for labor productivity assessment which effect company's performance. They include the following: efficiency, quality, labor environment, innovations and profit. The suggested approach is based on the measurement of specific indices for labor productivity efficiency. Little (Little, 1981) argues that labour productivity could be calculated through only one index. In case of this approach application, labor productivity is defined as a broad category. The main motivation mechanism of good company's performance is considered to be profit maximization.

Statement of the objectives of the article.

The goal of the paper is a critical analysis of theoretical approaches to labour productivity and empirical assessment of productive efficiency in Kharkiv region. The comparison of diverse effects of labour productivity on economic development shows that Central Eastern and Southeastern Europe countries (CESEE) have significant potential for economic growth, wage increase, and improvement of the living standards level.

Presentation of the basic materials

Labor productivity measurement depends on internal technological organization of the company and market conditions. Scientists assert the interdependence of labour and capital for efficient organization of company's economic performance. Market fluctuations affect company's performance which has average labour productivity index. In case of labour productivity rise, the market factors' effects would be reduced. Schadler et all (Schadler et all, 2006) estimates that between 1995 and 2004 in Central and Eastern European countries the increase in total factor productivity has accounted for between 50% and 75% of the average GDP growth. Technological change was slow or declining in many of the former soviet republics while contributing positively to productivity changes in almost all CEECs (Cungu, Swinnen, 2003).

The problem in East European countries deals with high level of unemployment. As a result of the destruction of the former Soviet Union and forming of Commonwealth of Independent States (CIS) completely new industrial cycles of production have been created. They include the change of labor distribution in different branches, regions and summons shortage of working places. Decrease of labor productivity, absence of labour motivation, high level of unofficial unemployment are the basic characteristics of labor market in CIS countries. The situation is deteriorated because of collective farms collapse and appearance of a high share of unemployed population in agrarian sector of economy. This process is accompanied by the tendency of marginalization of agrarian population. Unemployment is largely dependent on structural retrogression, leading to decrease of the level of workers' qualification (Nosova, 2013). In June 2017 Ukraine's labour productivity has improved by 5.78 %, compared with 3.56 % growth in the previous quarter. Ukraine's labour productivity growth data is updated quarterly, and is available from March 2003 to June 2017, averaging at 3.94 %. The data reaches an all-time high of 13.03 % in March 2004 and a record low of -16.74 % in March 2009. CEIC calculates labour productivity growth, using quarterly real GDP and quarterly employment. The comparison of average rate of labor productivity per one worker per hour in industry shows 5 USD in Ukraine in 2016, where in Poland it is 16 USD. This highlights the problems of comparability of diverse economic approaches to calculations, as well as the existence of labor inefficiency in various sectors of the economy.

The labour productivity increase could be provided by minimization of labor costs per worker. Social economic factors affect the labor productivity. They include the level of qualification and professional knowledge, skills, competence, responsibility and professional suitability. Technological factors determine the level of technique. They are characterized by modernization of methods, ideas, technology, automatic equipment use and new materials, as well as efficient energy use. Organizational factors define the quality of labour force and equipment and include production system improvement, new progressive forms of labor application, labor motivation system. Labour productivity reserves could be estimated via the following indices: quality use of labor force, efficient technique and technology, labor organization.

According to the State Statistics Service data in Ukraine, at the start of 2007, 1.6 million of working population – people aged from 15 to 70 years – were looking for work. Studying of this data shows, that the real unemployment rate in Ukraine is the same as in EU – 7.3%. For example, in Poland, where massive amount of Ukrainians went to work, the percentage of unemployed is 13% of the economically active population.

The market situation remains tense and is characterized by a decrease in demand for labor in Ukraine. The main trends in the labor market could be defined by extremely low employment rate. The employment rate is 56.9%, with 57.6% in urban areas and 55.5% – in rural ones. Employment rates among men are higher than among women – 62.5% and 51.9%, respectively. Despite depressed growth of unemployment, the unemployment rate remains high, especially among young people. Industrial production indices decrease to 87 % in 2015 in comparison with 89.9 % in the previous year in Ukraine (Ukraine in figures 2016, 2016, p. 236).

According to the State Statistics Service in Ukraine, real GDP declined by 6.8% in 2014 and by 17.2% in the first quarter of 2015. As a result, the unemployment rate in Ukraine rose from 7.6 % in the first quarter of 2014 to 9.6 % a year later. In the regions directly affected by the military crisis, the unemployment rate increased from 9.1 to 14.4 % in Donetsk oblast and from 8.4 to 15.3 % in Lugansk oblast. Altogether, it is estimated that up to two million workplaces were lost since the start of the crisis.

The total factor productivity has increased two times in Ukraine in 2001-2007, and it should be noted that the main contribution was the growth of labor productivity (62.2%), and productivity of capital – 30.6% (Mogila et al., 2009, p.7). Ukraine is not only struggling with an overall economic recession, but also with a process of economic transformation. Both processes have led to an imbalance of the labour market resulting in unemployment rising, higher inactivity rates and increasing of quantitative and qualitative gaps with regard to supply and demand in the labor market. Scientists consider that one of the obstacles of successful economic reforming are undervalued costs of labour force per worker in Ukraine. Scientists consider the low level of minimum wage to be one of the causes of tension in Ukraine.

The main factors contributing to the growth of total factor productivity are structural reforms in the economy, as well as a decrease in the share of shadow economy. Reform of the labor market

includes liberalization of labor legislation which expands employment and creates more jobs. Labor Code should regulate narrow section of the relationship between employer and employee and provide balance of the interests of employers and employees.

International economic shocks and increasing intensity of international economic competition effect the overall production reduction related employment in practically all the countries. The assessment of the supply-side vs. demand-side conditions on the level and the growth rate of production confirms the increasing pressure of capital and product markets (Scharpf, Schmidt, 2000, p. 315). The neoclassical approach considers efficient collective bargaining should occur at the firm level, so that highly differentiated wages can be matched with highly differentiated labour productivities, while price stability is maintained. Fadda (Fadda, 2016, p. 18) asserts, that "if a general reduction of working time were extended to all the economy, while different sectors have different rates of productivity increase, obviously this would cause either an exit from the market of the firms in the sector with lower (or nihil) productivity growth, or a change (which could be very substantial) in relative prices". Forslid et al. (Forslid et al., 2002) observe the short-term adjustment problems and in a less degree the long-term possibilities. Possible long-run outcomes analysis, such as productivity growth and investment shows that adding labour productivity effects of former Soviet Union countries to CESEE countries outcomes has negligible impact for all other regions comparing to the Former Soviet Union itself. The region's insignificant trade in manufacturing goods is the main reason of it.

The literature review highlights the growing problem of estimation/ assessment of labour productivity increase and labour market organization (Nosova, 2017). The comparison of supply-side and demand-side conditions and neoclassical approach illustrates multiple scenarios for economic development, highlights a range of problems relating to the threats, that CESEE countries face, and propose crucial changes via structural reforms in the economies.

Economic Model

Econometric estimation of economic efficiency is based on the application of traditional approach, which allow to obtain the maximum output under minimum production factors input. Economic efficiency defines efficiency of the total economy. Pilyavsky, Staat (Pilyavsky, Staat, 2008) analyze technical efficiency and efficiency change of 193 community hospitals and polyclinics across Ukraine and apply output-oriented model. The following measures – labour productivity, capital productivity ratio, materials-output ratio, production efficiency – are often used for its estimation.

The presence of significant differentiations between regions, division of regions into prosperous and unfavorable ones is the result of the directive policy of production location (Nosova, 2003). Regional development in Kharkiv oblast in 2016 compared to 2015 could be characterized by the following data. The industrial production has increased by 27%. Capital investment has risen to 49%. The average wage increase made up 20%. Foreign direct investments per capita have reached 613 USD in the region. Engineering and metal processing, food and light industry, agriculture were marked as attractive branches for foreign investors in Kharkiv region.

To investigate production efficiency, we apply ordinary least square estimation (OLS) and analyze the basic parameters.

The choice of selected model variables is based on the standard Cobb-Douglas production function use:

$$Y = AK^{\alpha}L^{\beta}$$

(1)

where Y – total production;
L – labour input;
K – capital input;
A – total factor productivity;
α, β – the constant elasticities of labour and capital.

The production function specification is used for explanation of the minimum input requirements for production designated quantities of the output on the basis of available technology. We assume, that gross regional product (GRP) is associated with the total production in Kharkiv region. The employment rate defines labour in Kharkiv region. Industrial production index and fixed capital investment index determine capital in Kharkiv region. We've applied annual data of economic performances in Kharkiv region. Using MS Excel for 22 structural (cross-section) observations in

2015 and 24 observations in 2016 we've found residuals correlation regression (Nosova, Gorbachuk, Pilyavsky, 2017). The results highlighted in bold in the observations, mentioned below, mark the highest average for the respective areas.

$$RIPC = RIP \div PP, \tag{2}$$

where RIPC – realized industrial products per capita (UAH);
RIP – realized industrial products (UAH);
PP – permanent population (persons).

We apply in the following model of Cobb-Douglas production function

$$\ln RIPC = a \ln AW + b \ln CE + c \tag{3},$$

where AW – annual wage (thousand UAH);
CIE – capital investment per employee (thousand UAH);
a, b, c – valued parameters.

The selected bold values of the economic results show deviations above the average.

Table 1

Economic results of econometric modelling (2015)

Place/ Region	AW	CIE	lnAW	lnCIE	RIPC	ln RIPC	AW	FDI
Period	2015	2015	2015	2015	2015	2015	2015	2015.01
Kharkiv region	44364	3917			38206			1728755
City of Kharkiv	**46080**	**4624**	10,74	8,44	**37298**	10,53	**0,09**	**1426302**
City of Izum	36732	457	10,51	6,13	6345	8,76	−0,22	99
City of Kupyansk	**44196**	1077	10,70	6,98	23027	10,04	**0,30**	18
City of Lozova	**44556**	**4688**	10,70	8,45	17468	9,77	−0,60	1282
City of Lyubotin	**41460**	2587	10,63	7,86	14138	9,56	−0,40	
City of Pervomaisky	31332	1955	10,35	7,58	25332	10,14	**0,92**	
City of Chuguev	33588	1342	10,42	7,20	16934	9,74	**0,52**	2982
Districts:								
Balakliya	**57144**	1710	10,95	7,44	**184163**	12,12	**1,62**	2714
Bogodukhivskyi	33888	1570	10,43	7,36	17472	9,77	**0,47**	
Valkivsky	33936	1153	10,43	7,05	3516	8,17	−1,01	1287
Vovchansky	38124	**3488**	10,55	8,16	13106	9,48	−0,41	1389
Dvorichansky	32868	**3142**	10,40	8,05	3144	8,05	−1,46	42
Dergachivskyй	**46980**	**6212**	10,76	8,73	**60375**	11,01	**0,41**	36125
Zmiyivskyi	**46944**	1653	10,76	7,41	27017	10,20	**0,15**	472
Kegichevsky	32160	2946	10,38	7,99	1038	6,95	−2,50	
Krasnogradsky	**53964**	2393	10,90	7,78	7257	8,89	−1,63	
Krasnokutskyi	31356	**5395**	10,35	8,59	**81528**	11,31	**1,67**	
Novovodolazhskyi	33828	1863	10,43	7,53	**129807**	11,77	**2,41**	
Pechenezhsky	35076	2380	10,47	7,77	7934	8,98	−0,57	6113
Kharkivskyi	35280	**3955**	10,47	8,28	**61720**	11,03	**1,26**	**129127**
Chuguevsky	**39492**	**7999**	10,58	8,99	**43180**	10,67	**0,36**	109943
Shevchenko	36924	**3094**	10,52	8,04	4405	8,39	−1,38	594
Average	39359	2986	10,57	7,81	35736	9,79	0,00	78113

Source: Author's approach

The economic leader of Kharkiv oblast is Dergachivskyi district, followed by Balakliya, Zmiyvskyi, Chuguevskyi districts, Kharkivskyi, Kupyanskyi, for which the annual wage was positive (production was relatively efficient) (see Table 2), and the annual wage was above the average one.

Table 2

Economic results of econometric modelling (2016)

Place/ Region	AW	CIE	lnAW	lnCIE	RIPC	ln RIPC	AW	FDI
Period	2016	2016	2016	2016	2016	2016	2016	2016.10
Kharkiv region	53376	5846			48637			1649355
City of Kharkiv	**55260**	**7391**	10,92	8,91	42965	10,67	**0,40**	**1415676**
City of Izum	44376	516	10,70	6,25	7890	8,97	−0,45	62
City of Kupyansk	**52212**	1687	10,86	7,43	25697	10,15	**0,19**	11
City of Lozova	**54324**	1566	10,90	7,36	10227	9,23	−0,82	409
City of Lyubotin	**50100**	1075	10,82	6,98	12912	9,47	−0,34	
City of Pervomaisky	36192	3686	10,50	8,21	33458	10,42	**1,28**	
City of Chuguev	39732	1739	10,59	7,46	11105	9,32	**0,03**	
Districts:								
Balakliya	**71784**	2024	11,18	7,61	**414152**	12,93	**2,17**	
Bogodukhivskyi	40848	3632	10,62	8,20	23176	10,05	**0,61**	
Borivsky	35988	**6027**	10,49	8,70	2845	7,95	−1,23	
Valkivsky	41268	2078	10,63	7,64	5533	8,62	−0,78	1064
Vovchansky	45552	**7342**	10,73	8,90	14919	9,61	−0,18	1112
Dvorichansky	37968	3645	10,54	8,20	2485	7,82	−1,44	
Dergachivskyi	**58032**	5802	10,97	8,67	**70839**	11,17	**0,81**	31653
Zmiyivskyi	**56568**	2401	10,94	7,78	43328	10,68	**0,48**	
Kegichevsky	36588	**6557**	10,51	8,79	10353	9,25	**0,01**	
Krasnogradsky	**70284**	2996	11,16	8,01	8626	9,06	−1,70	
Krasnokutsky	38352	**6274**	10,55	8,74	**107361**	11,58	**2,24**	
Kypaynskyi	45804	**5804**	10,73	8,67	500	6,21	−3,56	
Novovodolazhskyi	40872	2941	10,62	7,99	**125209**	11,74	**2,32**	
Pechenezhsky	**48432**	6183	10,79	8,73	6813	8,83	−1,09	6561
Kharkivskyi	42624	5193	10,66	8,56	**50069**	10,82	**1,24**	**110687**
Chuguevsky	45360	**6988**	10,72	8,85	42114	10,65	**0,88**	**72536**
Shevchenko	43164	**6066**	10,67	8,71	5158	8,55	−1,08	
Average	47154	4151	10,74	8,14	44906	9,74	0,00	68324

Source: Author's approach

Krasnokutsky, Kharkiv, Novovodolazhskyi districts had higher (average) efficiency and RPPD; Pervomaisky, Chuguev, Bogodukhivskyi and Kegichivsky districts had higher efficiency at lower wage, capital investment, realized industrial products per capita. Each of the selected 14 districts, except for five ones (Kharkiv, Kupyansk, Dergachivskyi, Kharkiv, Chuguevskyi districts), has no FDI. Therefore, for Kharkiv region the basic directions of regional policy are modern high-tech sectors development, based on the corporatization of state-owned enterprises, attraction of international financial flows and integration into world markets of goods and services

Conclusion

The undertaken research shows strong dependence of gross regional product from the following parameters: realised industrial products per capita, capital investment per employee and annual wage. The existing economic differences in Kharkiv districts demonstrate less heterogeneity and more homogeneity between developed and lagging regions.

Our results anticipate, that special regional policy may be effective for regional inequalities smoothing. The regional policy should include the following directions:

• selection priority investment areas for foreign investors in order to stimulate increase in labour productivity;

• creation of the mechanism for business deregulation, liberalization of business activity and competitive environment development;

• application of effective instruments for financing investment projects;

• stimulation of efficiency increase of FDI allocation, and high returns on investments in regions.

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