

## **Evaluating of the Relationship between Wages and Labour Productivity in Lithuania: Territorial and Sectoral Approaches**

**Zita Tamasauskiene, Aiste Stankaityte**

*Siauliai University, Faculty of Social Sciences*

*E-mail: zita.tamasauskiene@smf.su.lt, aiste.stankaityte@gmail.com*

### **Abstract**

Wages and labour productivity are important economic indicators and their relationship has been analysed not only by economists but also by employers and politicians. Relationship between wages and labour productivity is important for every region or economic sector since the standard of living and distribution of incomes between labour and capital depend upon it.

The paper presents evaluation of the relationship between wages and labour productivity in Lithuania by regions and economic sectors. The results of performed analysis show that regional dissimilarities of labour productivity are greater than of wages. The correlation coefficient of wages and labour productivity analysed by regions and economic activities in 2005-2010 showed that dissimilarities of wages were higher than of labour productivity.

**Keywords:** wages, labour productivity, dissimilarities, Lithuania.

### **Introduction**

Wages are the main source of living for the employee, makes the biggest part of his incomes and has a decisive effect on his and family standard of living. Labour productivity is one of the indicators that shows how efficiently labour force is performing. Growth of labour productivity means that a bigger amount of goods has been produced during a period of time in a business or the whole country. When society becomes richer the standard of living is rising, part of labour force produces not only consumption goods but investment products which raise labour productivity. By rising labour productivity businesses pay higher dividends to shareholders, expand their activities, raise wages. Relationship of labour productivity and wages has always been an essential economic and legal concern. The Convergence Report of the ECB (2008) highlights that growth of real wages in line with labour productivity is a necessary precondition for long macroeconomic stability. A close relationship between these two variables helps the country maintain competitiveness, hedge against inflation, reduce the risk of the wage-price spiral.

From the point of view of the neo-classical

theory, labour productivity and its increase are the main factors that determine wages and their growth. Wages are under the influence of many other external and internal factors, depend on the level of socio-economic development of the region, the standard of living there, qualifications, competences of employees, etc. Therefore, while analysing the relationship between wages and labour productivity in the country differences by territories and economic sectors (specificity, characteristics of a business, qualifications of employees, etc.) must be analyzed. The relationship between wages and labour productivity is important since the standard of living and distribution of incomes between labour and capital depend upon it. If wages are growing faster than labour productivity, labour force receives greater part of national incomes therefore incentives to invest in capital decrease. As a result, technological development in the sector slows down and during a long period conditions the both, labour productivity and wages, decrease. Regionally such a situation determines businesses lower interest in investment in these regions, also reduces development opportunities of such regions. When growth of average wages is slower than of GDP per capita the share of wages usually declines (Global wage report (2008/09)). It causes decrease of investment in human capital. Regionally such a situation conditions migration of educated labour force to more developed regions and further backwardness of these regions. Economic sectors may encounter shortage of labour force of some qualifications

Labour productivity increases due to the development of skills of human resources, use of more advanced equipment and technologies, in this way labour productivity grows continuously, labour productivity rises and results in increased wages. This paper investigates the problem of dissimilarities of wages and labour productivity by regions and economic activities in Lithuania. These dissimilarities are conditioned by various factors, therefore, when the level of labour productivity is the same wage rates

may differ in different regions or economy sectors due to the degree of market monopolisation, the character of labour, investment into human capital, etc..

**Aim** having analysed theoretical approaches to the relationship between wages and labour productivity, the methodology of evaluation this relationship, to evaluate the relationship between wages and labour productivity in Lithuania by regions and economy sectors.

**Tasks:**

- To reveal a theoretical approach to the relationship of wages and labour productivity.
- To validate the methodology of evaluation of the relationship between wages and labour productivity by regions and economy sectors.
- To analyse the dynamics of changes of wages and labour productivity.
- To evaluate the relationship between wages and labour productivity and dissimilarities by regions and economy sectors.

**Research methods:**

- Analysis of scientific literature on the relationship between wages and labour productivity, development of the methodology of evaluation of dissimilarities by regions and economy sectors, system, comparative analysis.
- Empirical research on the relationship between wages and labour productivity in Lithuania, dissimilarities by regions and economy sectors, descriptive statistics, comparative analysis.

Research results showed that during 2005-2010 dissimilarities between wages and labour productivity in the country varied by regions and economy sectors.

The greatest match between wages and labour productivity was in Kaunas, Telšiai, Klaipėda and Šiauliai counties. Wages mostly exceeded labour productivity in Tauragė county, i.e. paid wages were relatively higher compared to labour productivity. The greatest negative match between wages and labour productivity was in Vilnius county, i.e. paid wages were relatively lower compared to labour productivity.

The greatest match between wages and labour productivity by economy sectors was in *water supply, sewerage, waste management and regeneration, construction, accommodation and catering services* as well as *administration*. Wages mostly exceeded labour productivity in *finance and insurance, health care, social work, education, agriculture, fishery and forestry*. Labour productivity exceeded wages in *electricity and gas, heat supply and air conditioning and real estate*.

## **Theoretical approaches to relationship between wages and labour productivity**

According to the neo-classical theory, wage is determined by relating it to labour productivity. Increase of labour productivity stimulates economic growth. Employees are paid more, consumers enjoy cheaper and higher quality products and business owners receive higher profits from invested savings.

From a macroeconomic perspective the relationship between wages and labour productivity may condition negative processes. It is likely that when average wages grow faster than labour productivity that stimulates inflation. Negative inflation processes also may occur when, due to a lack of labour force, employers increase wages, expand businesses and prices rise; under these conditions growth of labour productivity does not compensate the pace of wage growth. If a lack of labour force is short-term, inflation risk rises, if long-term – the development of economy slows down. Businesses face the following situation: if labour productivity is growing faster than wages, expenditure for production decreases. Decreased expenditure for production increases earned profit, consequently, when increase of wages and labour productivity is balanced that results in greater profitability. Increased labour productivity may bring benefit to employees because businesses will be able to pay higher wages not increasing production costs.

Labour productivity is one of the main indicators of country economic growth. It is expressed as the total added value per worked hours (Žvinklys, Vabalas, 2008). Wage is the main source of incomes for labour force and its rate has a direct impact on the standard of living. A higher wage rate is in the countries that grow rich faster. Even if the country is rich big but its economic growth has been slowing down for a long period we should not expect high wage rates there. Consequently, according to Smith (2004), generous pay for work is a natural result of country's economic growth and ensures its future development.

In the business economy, there are many factors why enterprises must take into account inflation, labour productivity and changes in real wages. Some scientists determined that real wages are closely related to labour productivity. Mankiw (2003) evaluated the relationship between wages and labour productivity as an attempt to maximize profit. A decision to hire an additional labour force is based on the impact of additional labour force on profit. Considering labour costs and the revenues from hiring one more worker a marginal productivity of the unit of labour with must be taken into account. Moreover, wages will be higher in those economic sectors where labour productivity

is higher. Evaluating the relationship between wages and labour productivity in a short period in regard to economic sectors, growth of labour productivity in a particular economic sector will increase demand for labour force what will stimulate wage increase. In a long period it is difficult to maintain such wage excess because more employees will choose the sector where higher wages are paid. When labour supply increases, wages in a particular sector may correspond to average wages. Theoretically in a long period, due to changes in supply of labour force, wage rates will change, employment will grow in those sectors where labour productivity is higher.

Bruce (2002) and Huizinga, Broer (2004) found that the neo-classical theory with regard to the relationship between labour productivity and wages is wrong. Firstly, they say that no correspondence between output per worker and revenue per worker is necessary. If production demand starts decreasing in a particular sector, market prices must decrease as well and this will reduce incomes earned by one employee in the company disregarding a likely growth of labour productivity. Furthermore, greater labour productivity will stimulate decrease in prices because higher labour productivity will increase production in a particular sector, and, according to the principle of supply and demand, when supply increases prices will decrease. Such price decrease will also decrease incomes per employee. Secondly, even if incomes per employee grow in the sector where labour productivity is higher, in a long period growth of wages will not be consistent because growth of labour supply will stimulate migration of labour force from sectors where labour productivity is lower, consequently, that will have a negative impact on wages. The authors state that, while evaluating the relationship between wages and labour productivity in regard to economic sectors, it may be determined only in a short period. For example, Bruce's (2002) research in Canada showed that in 1961-1995, despite a relative growth of labour productivity in its economy, relative wages remained unchanged. Huizinga, Broer (2004), referring to the example in the Netherlands, stated that only in a short period growth of wages will increase labour productivity but in a long period it will have no impact. The study of Klein (2012) revealed that absence of a strong relationship between wages and labour productivity in some countries may be explained by macroeconomic and/or institutional factors. These factors tended to create a barrier between the two variables, thus implying that gains from labour productivity do not fully result in increase of real wages (or vice versa) in a short or long term.

Other foreign scientists determined a direct relationship between labour productivity and wages

(Wakeford, 2004). Higher increase of wages provides an opportunity to reduce labour costs and stimulates greater work efficiency to avoid redundancies. This positive relationship was also hypothesised because higher real wages put pressure on labour costs and stimulate businesses to substitute capital by labour force, thereby increasing marginal labour productivity. Gordon (1997) emphasised substitution of labour force by capital in response to inexorable increase of real wages as the main driver of economic growth.

The relationship between inflation, real wages and labour productivity was widely analysed by foreign scientists (Hondroyannis and Papapetrou, 1997, Bildirici and Alp, 2008). Kumar, Webber Don, Geoff (2012) explained the relationship between real wages, inflation and labour productivity in Australia by referring to co-integration tests, Granger causality and structural changes. Obtained results showed that when employee wages increase by 1%, labour productivity in that sector will increase from 0.5 up to 0.8%.

Mora, Lopez-Tamayo, Surinach (2005) investigated the relationship between wages and labour productivity in 11 European countries in 1981-2001 and determined that the gap between nominal wages and labour costs decreased, however, they did not determine a similar decrease of the gap between wages and labour productivity. Lopez-Villavicencio and Silva (2010) analysed macroeconomic data of OECD countries between 1985 and 2007 and found that wage increase exceeded productivity growth of permanent workers, meanwhile for temporary workers it was opposite.

Narayan and Smyth (2009), using the co-integration technique, investigated the relationship between inflation, real wages and growth of labour productivity in the Great Seven Countries in 1960-2004. They found a positive statistically meaningful relationship between real wages and productivity growth. Verbic, Kuzmin (2009) explored the relationship between wages and labour productivity in Slovenia in 1998-2007. They confirmed the hypothesis of high dependence of wages on labour productivity, what indicates a stimulating role of wages producing market traded goods and services. Sidhu (2010) found that labour productivity had a strong influence on determining wages in the Indian economy. A 1% increase of labour productivity will lead to about 0.39% increase of wage rates in the Indian economy. Tang, Chor Foon (2012) empirically investigated the impact of real **wages** on **labour productivity** in the Malaysian manufacturing sector using annual data from 1980 to 2009. They found a quadratic relationship (i.e. inverted U-shaped curve)

between **labour productivity** and real **wages** instead of a linear relationship.

Many other scientists investigated the relationship between labour productivity and wages in different countries. For example, Strauss and Wohar (2004) investigated a long term relationship between inflation, real wages and labour productivity in 459 US manufacturing companies in 1956–1996 and found that during long inflation Granger causality resulted in productivity, while a bi-directional Granger causality ran between real wages and productivity. Goschin, Danciu, Gruiescu (2008) investigated the relationship between wages and labour productivity in Romania in 2000-2005.

To sum up, it may be stated that society allocates part of its national product to pay for people's work and in this way gets feedback in the form of labour productivity. According to Gervienė and Raškinis, labour productivity is one of the most effective opportunities to compensate decrease of labour force supply. Moreover, from a microeconomic point of view the employee who receives higher wages is stimulated to be more productive because job loss means loss of higher incomes.

### Research methodology

The aim of this part of the paper is to present the methodology to be used to evaluate the relationship between wages and labour productivity by regions and economic sectors. The ratio of wages by regions and economic sectors will be compared to the average in the country. A bigger difference between these ratios will show a greater imbalance. Because wages and labour productivity by regions and economic sectors will be evaluated by comparing with the averages in the country, the coefficient of structural changes might be used as the methodological basis and the indicator evaluating the extent of dissimilarities. The coefficient will measure the average deviation in a particular period. The formula is the following:

$$CS = \sqrt{\frac{\sum_{i=1}^n \left( \frac{x_i^t}{\sum_{i=1}^n x_i^t} - \frac{x_i^0}{\sum_{i=1}^n x_i^0} \right)^2}{n}}$$

$W_{ij}$  are – wages in i region (sector j)

$W_m$  – average wages in the country

The ratio of these values is  $W_{ij}/W_m$ . If the ratio is 1, there is no dissimilarity between wages in the region i (sector j) and in the country; if the ratio is higher than 1, wages in the region i (sector j) are

higher than the average in the country (the higher the ratio, the bigger dissimilarity is); if the ratio is lower than 1, wages in the region i (sector j) are lower than the average in the country (the lower the ratio, the bigger dissimilarity is).

$P_{ij}$  – labour productivity in the region i (sector j)

$P_m$  – average labour productivity in the country

The ratio of these values is  $P_{ij}/P_m$ . If the ratio is 1, so there is no dissimilarity between labour productivity in the region i (sector j) and in the country; if the ratio is higher than 1, labour productivity in the region i (sector j) is higher than the average in the country (the higher the ratio, the bigger dissimilarity is); if the ratio is lower than 1, labour productivity in the region I (sector j) is lower than the average in the country (the lower the ratio, the bigger the dissimilarity is).

If  $\frac{P_{i,j}}{P_m} = \frac{W_{i,j}}{W_m}$  we may state that wages in the

region i (sector j) correspond to the level of labour

productivity; if  $\frac{P_{i,j}}{P_m} < \frac{W_{i,j}}{W_m}$  – wages in the region i

(sector j) are higher than labour productivity in the

region i (sector j); if  $\frac{P_{i,j}}{P_m} > \frac{W_{i,j}}{W_m}$  – wages in the

region i (sector j) are lower than the level of labour productivity in the region i (sector j). The bigger dissimilarity between  $W_{ij}/W_m$  and  $P_{ij}/P_m$ , the absolute value (disregarding bigger or smaller excess of wages

in comparison to labour productivity)  $\left| \frac{P_{i,j}}{P_m} - \frac{W_{i,j}}{W_m} \right|$ ,

greater dissimilarities in the region i (sector j) exist between the level of wages and the level of labour productivity. In order to evaluate dissimilarities between wages and labour productivity by regions the following formula was used:

$$CD_{i,j} = \sqrt{\frac{\sum_{i,j=1}^n \left( \frac{P_{i,j}}{P_m} - \frac{W_{i,j}}{W_m} \right)^2}{n}}$$

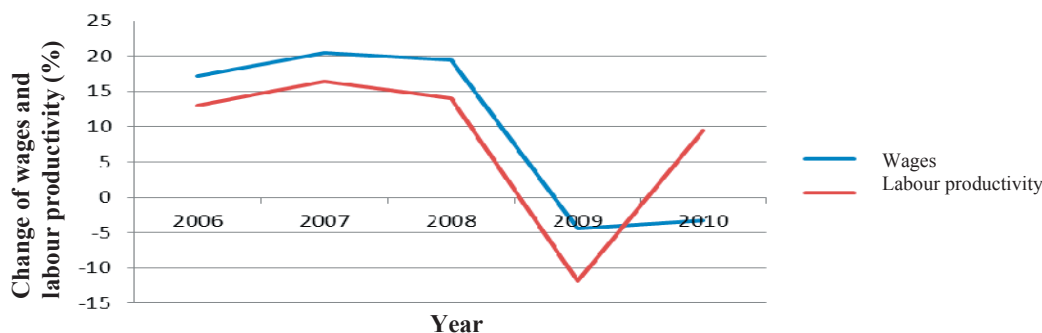
This coefficient was calculated  $[0; \sqrt{2n}]$ , where n – number of regions (sectors) in the country. A higher value of this coefficient shows that higher dissimilarities between wages and labour productivity in the country exist by regions (economic sectors) (Goschin et al., 2008).

Data of the Lithuanian Statistics Department

were used to perform analysis of the average monthly gross wages (W) and the labour productivity regarding the prices for the period (P)) by regions and economic activities (classification of EVRK 2 of Statistics Department).

### Dynamics of wages and labour productivity

The dynamics of labour force costs and the created added value per employee (hereinafter labour productivity) was analysed. Figure 1 presents changes in average monthly gross wages and labour productivity in 2006–2010.



**Fig. 1.** Change (%) in average monthly gross wages and labour productivity, 2005–2010

Source: own calculation, based on the data of the Statistics Department.

In 2006–2007 growth of wages was bigger than labour productivity. Businesses raised wages at the expense of profit or proportionally increased the price of goods and services. But wages cannot be raised permanently, they must be related to growth of productivity. In 2009 both analysed indicators decreased but in 2009–2010 labour productivity started growing. Although labour productivity

increased but did not compensate decrease of wages in 2008–2009, therefore in 2009–2010 wages slightly decreased (see Fig.1).

It is very important to analyze the relationship between wages and labour productivity by regions; that shows their socio-economic cohesion. Data on average monthly gross wages and labour productivity in 2005–2010 by regions are provided in Table 1.

Table 1

### Change (%) of average monthly gross wages and labour productivity by regions, 2005-2010

	2006		2007		2008		2009		2010	
	W	P	W	P	W	P	W	P	W	P
Republic of Lithuania	17,24	12,97	20,45	16,44	19,42	14,04	-4,46	-11,87	-3,31	9,46
Alytus county	17,07	13,01	22,71	16,55	21,69	7,47	-6,3	-16,57	-3,64	13,59
Kaunas county	18,46	8,80	21,81	15,93	19,88	17,38	-4,27	-13,53	-4,15	9,82
Klaipėda county	17,36	13,61	19,74	16,40	19,77	12,45	-2,74	-7,09	-3,26	8,64
Marijampolė county	19,38	13,63	18,83	3,62	22,39	20,43	-5,01	-9,63	-1,7	10,67
Panevėžys county	14,99	9,54	19,79	6,05	21,77	9,87	-3,43	-9,26	-4,23	18,36
Šiauliai county	18,11	13,05	20,9	19,95	21,56	5,24	-5,05	-9,80	-3,47	16,82
Tauragė county	17,95	17,68	20,65	19,67	22,9	36,63	-1,34	-20,26	-2,6	12,24
Telšiai county	14,74	7,36	21,23	15,63	15,44	23,15	-6,74	-13,79	-4,39	14,54
Utena county	12,84	3,52	16,7	8,83	20,05	25,05	-3,96	-16,02	-6,63	11,11
Vilnius county	16,61	15,86	19,72	19,67	18,02	11,81	-4,82	-11,46	-2,32	3,51

W – average monthly gross wages (Lt); P – labour productivity per year (thousand Lt.)

Source: own calculation, based on the data of the Statistics Department.

It may be stated that in 2010 average monthly gross wages were highest in Vilnius and Klaipėda counties (2278 Lt and 1989 Lt. Respectively; lowest – in Tauragė county (1573 Lt), Marijampolė county (1623 Lt) and Šiauliai county (1669 Lt). In 2009 and 2010 wages decreased but still remained higher than in 2007.

Dissimilarities of wages in the regions were cause by their geographical position, number of businesses, competitiveness of labour force. High wages were paid in Vilnius, Klaipėda, Utena, Telšiai and Kaunas counties because employees have high qualifications, specific businesses concentrate in these counties: former power plant (Utena county),

refinery (Telšiai county), seaport (Klaipėda county). Not many competitive businesses are located in Marijampolė and Tauragė counties, labour force is of lower qualification there.

In 2009 labour productivity decreased in all regions. In 2009 labour productivity mostly decreased in Tauragė county, labour productivity was lowest there: small businesses dominate, production is of low competitiveness because many businesses use old technologies what increases labour costs and decreases labour productivity, companies lack employees with high or average qualifications, skilled employees and youth migrate to cities or emigrate. Although labour productivity was lowest in Tauragė

county, it grew most in 2008 and reached 36.63%.

Analysis of change tendencies in wages and labour productivity by regions shows that in 2005–2010 the highest wages were paid in Vilnius county, 1.15 times higher than the average in the country, labour productivity was 1.37 times higher than the average in the country; the lowest wages were paid in Tauragė county, 1.30 times lower than the average in the country, labour productivity was 1.83 times lower than the average in the country.

Data on average monthly gross wages and labour productivity in 2005–2010 by economic sectors are provided in Table 2.

Table 2

**Change (%) of average monthly gross wages and the labour productivity by economic activity, 2005-2010**

Economic activity	2006		2007		2008		2009		2010	
	W	P	W	P	W	P	W	P	W	P
Total	17,24	12,72	20,45	15,25	19,42	13,75	-4,46	-11,63	-3,31	8,72
Agriculture, forestry and fishing	16,65	14,94	25,11	25,42	22,25	38,29	-7,09	-42,02	-1,86	32,02
Mining and quarrying	14,84	-16,08	19,66	-12,77	19,83	43,01	-11,92	-23,58	-4,54	19,26
Manufacturing	18,55	10,49	24,08	8,08	17,84	10,57	-3,75	-9,56	-1,18	25,2
Electricity, gas, steam and air conditioning supply	11,78	-7,67	13,68	15,87	15,11	4,78	1,51	16,87	-0,41	21,52
Water supply; sewerage; waste management and remediation activities	14,65	37,9	23,91	6,13	18,54	-2,39	-5,13	11,43	0,36	26,92
Construction	28,08	23,26	30,17	21,59	11,52	16,9	-23,37	-33,92	-7,2	21,65
Wholesale and retail trade; repair of motor vehicles and motorcycles	16,76	2,02	25,31	13,49	18,1	13,64	-6,93	-10,31	-3,53	10,81
Transportation and storage	12,43	12,52	17,53	7,75	19,99	15,78	-5	-2,3	0,6	12,41
Accommodation and catering service activities	13,11	-8,25	24,88	30,94	20,21	-5,49	-7,08	-2,91	-3,72	-5,69
Information and communication	6,5	12,48	13,76	-2,96	17,22	-9,84	4,93	0,92	0,74	-4,42
Financial and insurance activities	12,85	43,35	16,33	7,23	14,9	23,75	-3,24	-47,62	-5,58	7,45
Real estate activities	20,02	-3,93	19,23	52,1	21,27	-0,95	-8,58	-10,12	-5,37	-19,4
Professional, scientific and technical activities	20,72	-10	12,45	24,89	18,43	-9,73	-6,17	-1,18	-2,81	-13,96
Administrative and support service activities	11,31	-8,79	20	56,94	20,14	0,36	-7,15	-17,09	-1,18	-2,6
Public, administration and defence; compulsory social security	14,63	22,97	8,87	-0,16	23,2	22,8	-9,55	-7,68	-5,87	-2,77
Education	13,25	24,49	16,64	4,1	27,36	21,26	8,13	10,39	-5,39	-9,71
Human health and social work activities	28,97	17,13	20,49	26,89	20,62	29,74	-1,73	1,72	-4,48	-5,35
Arts, entertainment and recreation	15,88	4,21	13,7	7,74	18,7	11,56	-1,52	-5,88	-5,21	11,31
Other service activities	18,34	-9,09	13,14	-1,57	17,04	-46,02	-3,27	5,17	-3,26	-1,05

W – average monthly gross wages (Lt); P – labour productivity per year (thousand Lt.)

Source: own composition, based on the data of the Statistics Department.

In 2010 average monthly gross wages by economic activity grew in 2008 and 2009, decreased in 2010, slightly grew (0.6%) in *transport, storage and communication*.

In 2008 and 2009 average monthly gross wages decreased in all economic activities except for *education, electricity, gas and water supply, information and communication*. In 2009 and 2010 average monthly gross wages decreased in all economic activities except for *transportation and storage, water supply, sewerage, waste management and regeneration, information and communication*. In 2007 wages especially grew (20.45%). In 2008 the pace of growth of wages was slower (19.4%).

The highest wages were paid in *finances and insurance*. In 2007 wages started growing, in 2008 they were highest (4133 Lt): specialists with high qualifications were employed in this activity. The lowest wages were paid in *accommodation and catering services*: relatively young persons were employed, jobs did not require many employees with high qualifications, the greatest part of employees was women, jobs were seasonal. Low wages were paid in *agriculture, hunting and forestry, wholesale and retail trade*. In 2009 the greatest decrease of wages was in *construction* (23.37%), in 2009 they decreased by 568 Lt.: less permission were issued to build houses and apartments than in 2008 (27% and 53% respectively), demand for labour force decreased, wages decreased.

In 2009 labour productivity mostly decreased in *financial and insurance services* (47.62%), *agriculture, hunting and forestry* (47.62%), *construction* (33.92%). In 2005–2010 labour productivity rose in all sectors except for *mining and quarrying, information and communication, professional, scientific and technical services*. Labour productivity mostly grew in *water supply,*

*sewerage and waste management and regeneration*. In 2005–2010 labour productivity mostly grew in the energy sector: *electricity, gas, steam supply and air conditioning* (59.20%). Employees in the energy sector made up about 14% of all employees, the value of long-term assets of the energy companies made up about 25% of the total value of state assets, expenditure for import of energy sources was highest, so we may state that these reasons influenced speedy and greater growth of average labour productivity.

Analysis of change tendencies in wages and labour productivity by economic activity in 2005–2010 showed that wages in *financial and insurance* were 1.87 times higher than the average in the country, labour productivity – 1.97 times higher than the average in the country, thus wages were relatively highest and adequately evaluated; wages in *accommodation and catering services* were 1.87 times lower than the average in the country, labour productivity – 1.76 times lower than the average in the country, thus wages were comparatively lowest and adequately evaluated; wages in *wholesale and retail trade* were 1.14 times lower than the average in the country but labour productivity – 1.01 times higher than the average in the country, thus wages were not adequately evaluated.

### Relationship between wages and labour productivity by regions

An attempt was made to evaluate the relationship between wages and labour productivity by regions (see Table 3). In 2005 the coefficient of wages was 13.10%, labour productivity – 26.40%, in 2010–11.95% and 25.20% respectively. The highest variation in the coefficients was recorded in 2005 and in 2010; that means that differences between labour productivity were bigger than dissimilarities between wages.

Table 3

Differences between wages and labour productivity by regions, 2005–2010

Region	2005				2010			
	Wages, Lt (W <sub>i</sub> )	Labour productivity, thousand Lt (P <sub>i</sub> )	W <sub>i</sub> /W <sub>m</sub>	P <sub>i</sub> /P <sub>m</sub>	Wages, Lt (W <sub>i</sub> )	Labour productivity, thousand Lt (P <sub>i</sub> )	W <sub>i</sub> /W <sub>m</sub>	P <sub>i</sub> /P <sub>m</sub>
Alytus county	1072	35814,74	0,84	0,73	1692	48,05	0,85	0,68
Kaunas county	1192	48084,41	0,93	0,98	1892	67,60	0,95	0,96
Klaipėda county	1256	50710,43	0,98	1,04	1989	76,12	1,00	1,08
Marijampolė county	1001	32933,17	0,78	0,67	1623	46,70	0,82	0,66
Panevėžys county	1094	41899,16	0,86	0,86	1697	57,44	0,85	0,82
Šiauliai county	1049	36192,85	0,82	0,74	1669	54,43	0,84	0,77
Tauragė county	936	23195,25	0,73	0,47	1573	39,94	0,79	0,56

Telšiai county	1248	43338,70	0,98	0,89	1787	65,42	0,89	0,92
Utena county	1231	42818,12	0,96	0,88	1745	56,28	0,88	0,79
Vilnius county	1487	66851,37	1,17	1,37	2278	94,98	1,15	1,34

$W_i$  - Average monthly gross wages in the region (Lt);  $W_m$  – Average monthly gross wages in the country (Lt);  
 $P_i$  – average labour productivity per year in the region (thousand Lt);  $P_m$  – average labour productivity per year in the country (thousand Lt).

Source: own composition, based on the data of the Statistics Department

Differences between wages and labour productivity explain regional economic disparities in Lithuania. The correlation coefficient of wages and labour productivity was relatively low (ranged from 0 to 4.47), that means that difference between wages and labour productivity was not big, higher in 2010 than in 2005:  $CD_{2005}=0,126508$  (12,65%),  $CD_{2010}=0,128000$  (12,80%).

In 2005-2010 differences between wages and

labour productivity in the country changed unevenly, a general growth tendency was evident. Such tendency might be compared to the business cycle. The process of capital accumulation was not even due to the crisis, after the crisis investment or re-investment rose and that influenced differences between wages and labour productivity.

Figure 2 provides the coefficient correlation of wages and labour productivity by regions in 2010.

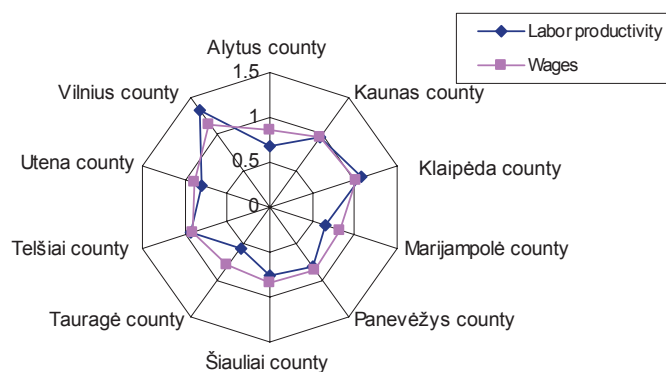


Fig. 2. Correlation coefficient of wages and labour productivity by regions, 2010

Source: own composition, based on the data of the Statistics Department

In 2010 wages and labour productivity correlated in Kaunas, Telšiai, Klaipėda and Šiauliai counties. Although average monthly gross wages were lowest in Telšiai county, SC “ORLEN Lietuva” was the business which created the biggest added value for many years.

In 2010 the highest correlation of wages and labour productivity was in Tauragė county, i.e. wages were relatively higher than labour productivity and lower than the average in the country: less direct foreign investment was attracted, export volumes were low because goods produced by small businesses in the periphery were less competitive, many businesses used old technology. Therefore, although wages increased, labour productivity decreased, companies lacked employees with high and medium qualifications, better qualified specialists, youth migrated to other cities or emigrated. Meanwhile negative correlation of wages and labour productivity

was in Vilnius county, i.e. paid wages were relatively lower than labour productivity. The county is most competitive, foreign investment is highest, the size of population is biggest, the number of employees with higher education is highest, business competition is highest there.

Regional differences between wages and labour productivity arise because of differences in foreign investment, concentration of qualified labour force. Differences between wages and labour productivity may be related to uneven regional economic and social development.

### Relationship between wages and labour productivity by economic activity

The relationship between wages and labour productivity by economic activity was evaluated (see Table 4).



Table 4

## Differences between wages and labour productivity by economic activity, 2005–2010

Economic activity (j)	2005				2010			
	Wages Lt (Wj)	Labour productivity, thousand Lt (Pj)	Wj/Wm	Pj/Pm	Wages, Lt (Wj)	Labour productivity, thousand Lt (Pj)	Wj/Wm	Pj/Pm
Agriculture, forestry and fishing	973	15,4	0,76	0,34	1583	23,5	0,79	0,37
Mining and quarrying	1732	104,5	1,35	2,33	2398	99,7	1,21	1,57
Manufacturing	1170	51,5	0,92	1,15	1929	77	0,97	1,21
Electricity, gas, steam and air conditioning supply	1995	117,4	1,56	2,62	2950	186,9	1,48	2,94
Water supply; sewerage; waste management and remediation activities	1215	34,3	0,95	0,77	1948	69,3	0,98	1,09
Construction	1307	38,7	1,02	0,86	1728	54,5	0,87	0,86
Wholesale and retail trade; repair of motor vehicles and motorcycles	1110	49,4	0,87	1,10	1722	64,6	0,87	1,02
Transportation and storage	1223	71,1	0,96	1,59	1853	109,6	0,93	1,72
Accommodation and food service activities	732	30,3	0,57	0,68	1112	31,5	0,56	0,50
Information and communication	1999	132,2	1,57	2,95	3001	125,5	1,51	1,97
Financial and insurance activities	2740	84,9	2,15	1,89	3776	90,9	1,89	1,43
Real estate activities	1209	389,2	0,95	8,69	1815	408,3	0,91	6,42
Professional, scientific and technical activities	1723	75	1,35	1,67	2526	64,7	1,27	1,02
Administrative and support service activities	1141	38,7	0,89	0,86	1680	44,9	0,85	0,71
Public, administration and defence; compulsory social security	1996	51,8	1,56	1,15	2613	70,1	1,31	1,10
Education	1162	19,6	0,91	0,44	2000	30,7	1,00	0,48
Human health and social work activities	1139	18,1	0,89	0,40	2004	33,6	1,00	0,53
Arts, entertainment and recreation	1096	28,5	0,86	0,64	1600	37,4	0,80	0,59
Other service activities	1074	56,1	0,84	1,25	1575	28,2	0,79	0,44

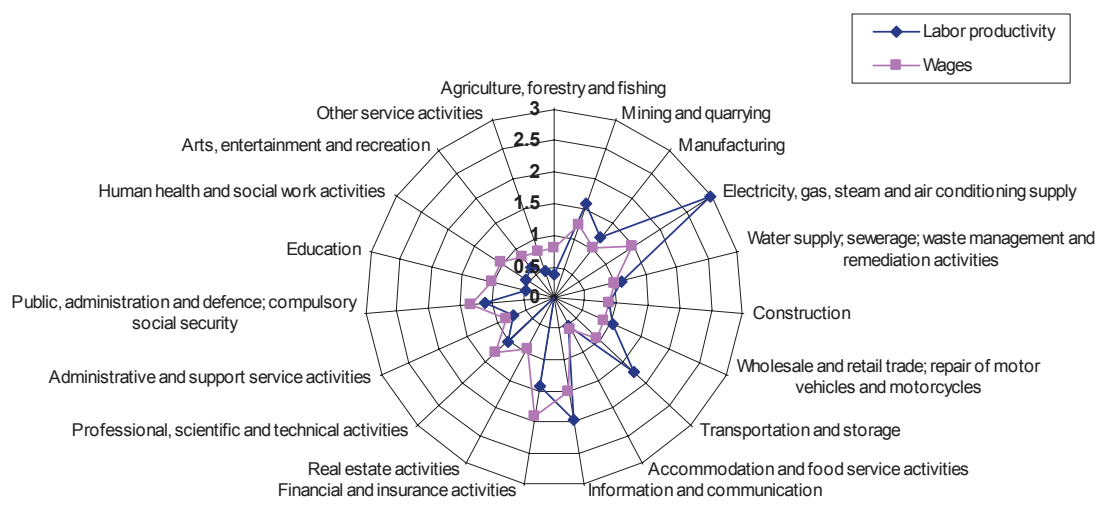
$W_i$  - Average gross monthly wages in a sector (Lt);  $W_m$  - Average monthly gross wages in a country (Lt);  
 $P_i$  - Average labour productivity in a sector per year (thousand Lt);  $P_m$  - Average labour productivity in a country per year (thousand Lt).

Source: own composition, based the data of the Statistics Department

It may be stated that differences between wages and labour productivity occurred because of different economic activity. In 2005 the correlation coefficient of wages and labour productivity by economic activity was 1.86, in 2010 – 1.35 (ranged from 0 up to 6.16); wages and labour productivity almost correlated, in 2005 the coefficient was higher than in 2010:  $CD_{2005}=1,85896$  (185.90%),  $CD_{2010}=1,35158$  (135.16%).

In 2005-2010 the correlation coefficient changed, wages and labour productivity changed unevenly in the country, mostly in 2007 due to uneven development of economic activity (construction, real estate), lesser–in 2010 due to the economic crisis, when wages decreased in all economic activities.

Figure 3 provides the correlation coefficient of wages and labour productivity by economic activity in 2010.



**Fig. 3.** Level of wages and labour productivity by economic activity, 2010  
*Source:* own composition, based on the data of the Statistics Department.

In 2005 and 2010 the highest correlation of wages and labour productivity was in *water supply, sewerage, waste management and regeneration, construction, accommodation and catering, administration and support service economic activities*.

Higher wages than labour productivity were paid in *financial and insurance activities, human health care and social work, education, agriculture, fishery and forestry*, it means that in 2005 and 2010 wages were relatively higher than labour productivity.

Higher wages than labour productivity were paid in *financial and insurance activities* was due to the development of these economic activities, employees with high qualifications, that the majority of businesses were of foreign capital and could offer higher wages.

In 2005 and 2010 labour productivity was higher than wages paid in *electricity, gas and air conditioning, real estate* economic activities, in 2005—in *mining and quarrying* and *information and communication economic activities*. That was due to business globalisation, direct investment in new technologies, forms of activities.

### Conclusions

Scientists determined a direct relationship between wages and labour productivity: better paid employees do not want to lose jobs and work more productively. It was assumed that higher wages increase labour costs, business expenditures therefore businesses seek to increase marginal productivity. Labour productivity helps compensate decrease of labour force supply.

In 2006–2007 wages were higher than labour productivity, in 2009–2010 labour productivity rose

but wages did not reach the level of 2008–2009, even slightly decreased.

In 2005–2010 wages and labour productivity were highest in Vilnius county: wages—1.15 times higher than the average in the country, labour productivity—1.37 times higher than the average in the country. In 2005–2010 wages and labour productivity were lowest in Tauragė county: wages—1.30 times lower than the average in the country, labour productivity—1.83 times lower than the average in the country.

In 2005–2010 wages and labour productivity were highest in *financial and insurance* economic activity: wages—1.87 times higher than the average in the country, labour productivity—1.97 times higher than the average in the country. In 2005–2010 wages and labour productivity were lowest in *accommodation and catering services* economic activity: wages—1.87 lower than the average in the country, labour activity—1.76 times lower than the average in the country. That leads to the conclusion that wages and labour productivity correlated in these economic activities.

The correlation coefficient was higher in 2010 than in 2005. Wages and labour productivity correlated in Kaunas, Telšiai, Klaipėda and Šiauliai counties. The lowest correlation of wages and labour productivity was in Tauragė county, i.e. paid wages were relatively higher than labour productivity. Negative correlation of wages and labour productivity was in Vilnius county, i.e. paid wages were relatively lower than labour productivity.

Wages and labour productivity correlated less in 2005 than in 2010 by economic activity. The highest correlation of wages and labour productivity was in *water supply, sewerage, waste management*

and regeneration, construction, accommodation and catering services, administrative and services economic activities. Wages were higher than labour productivity in finance and insurance, health care and social work, education, agricultural, fishery, forestry economic activities. Labour productivity was higher than wages in electricity, gas, steam supply and air conditioning and real estate economic activities.

## References

- Bildirici, M., Alp, E. A. (2008). The relationship between wages and productivity: Tar unit root and Tar cointegration approach. *International Journal of Applied Econometrics and Quantitative Studies*, 5, 93–110.
- Bruce, C. (2002). The Connection between Labour Productivity and Wages, *Economica LTD, The Expert Witness*, 7 (2), 68–74.
- European Central Bank. (2008). *Convergence Report, May*. Frankfurt am Main, Germany.
- Gervienė, S., Raškinis, D. (2008). Darbo jėgos trūkumas Lietuvoje ir galimi šios problemos sprendimo būdai. *Lietuvos ekonomikos apžvalga*, 1, 25–40.
- Global wages report 2008/09. *Minimum wages and collective bargaining*. Towards policy coherence. Available online at: <[http://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/documents/publication/wcms\\_100786.pdf](http://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/documents/publication/wcms_100786.pdf)>.
- Gordon, R. J. (1997). Productivity, wages and prices inside and outside of manufacturing in the US, Japan and Europe. *European Economic Review*, 31, 685–739.
- Goschin, Z., Danciu, A. R., Gruiescu, M. (2008). *The connection between labour productivity and wage in Romania*. Territorial and sectoral approaches. Available online at: <<http://steconomice.uoradea.ro/anale/volume/2008/v2-economy-and-business-administration/029.pdf>>.
- Hondroyannis, G., Papapetrou, E. (1997). Seasonality cointegration and the inflation, productivity and wages growth relationship in Greece. *Social Science Journal*, 34, 235–47.
- Huizinga, F., Broer, P. (2004). Wage moderation and labour productivity. Netherlands Bureau for Economic Policy Analysis, *series CPB Discussion Papers*, 28, 28–34.
- Klein, N. (2012). Real wage, labor productivity, and employment trends in south Africa: a closer look. *IMF Working Paper*, 12/92, 1–27.
- Kumar, S., Webber Don, J., Geoff, P. (2012). *Real wages, inflation and labour productivity in Australia*. *Applied Economics, Taylor and Francis Journals*, 44 (23), 2945–2954.
- Lopez-Villavicencio, A., Silva, J. (2010). *Employment protection and the non-linear relationship between the wage-productivity gap and unemployment*. Working paper CEPN-CNRS: University of Paris Nord.
- Mankiw, G. (2003). *Macroeconomics, Fifth edition*. Worth Publishers.
- Mora, T., Lopez-Tamayo, J., Surinach, J. (2005). Are wages and productivity converging simultaneously in euro-area countries? *Applied Economics*, 37, 2001–2008.
- Narayan, P. K., Smyth, R. (2009). The effect of inflation and real wages on productivity: new evidence from a panel of G7 countries. *Applied Economics*, 41, 1285–1291.
- Sidhu, H. (2010). Productivity led wage disparity in the Indian industry. *Indian Journal of Industrial Relations*, 45 (3), 350–366.
- Smith, A. (2004). *Tautų turtas*. Vilnius: Margi raštai.
- Statistikos departamentas. Available online at: <<http://www.stat.gov.lt/lt/>>.
- Strauss, J., Wohar, M. (2004). The linkage between prices, wages and labour productivity: A panel study of manufacturing industries. *Southern Economic Journal*, 70, 920–941.
- Tang Chor Foon. (2012). The non-monotonic effect of real wages on labour productivity: New evidence from the manufacturing sector in Malaysia. *International Journal of Social Economics*, 39 (6), 391–399.
- Verbic, M., Kuzmin, F. (2009). Coefficient of structural concordance and an example of its application: labour productivity and wages in Slovenia. *Panoeconomicus*, 56 (2), 227–240.
- Wakeford, J. (2004). The productivity-wages relationship in South Africa: an empirical investigation. *Development South Africa*, 21, 109–132.
- Žvinklys, J., Vabalas, E. (2008). Našumo rodiklių vertinimas. *Mokėsčių žinios*, 17 (580).

Tamasauskiene, Z., Stankaityte, A.

## Priklausomybės tarp darbo užmokesčio ir darbo našumo Lietuvoje vertinimas: teritoriniai ir sektoriai aspektai

Santrauka

Darbuotojui darbo užmokestis – pagrindinis pragyvenimo šaltinis, pagrindinė jo pajamų dalis, individo IR jo šeimos materialinės padėties gerinimo priemonė. Darbo našumas – vienas rodiklių, atspindinčių darbo jėgos panaudo-

jimo efektyvumą. Augant darbo našumui, didėja per tą patį laiką pagamintos produkcijos apimtis atskiroje įmonėje ir visoje šalyje. Darbo jėgos kainą lemia socialinis ir ekonominis regiono išsivystymo lygis, pragyvenimo lygis, dar-

buotojų profesinė kvalifikacija, kompetencija ir kt. Todėl, analizuojant darbo užmokesčio ir darbo našumo sąveiką šalyje, būtina atsižvelgti į teritorinius ir ūkio sektorių (atspindinčių darbo specifiką, darbuotojų profesinę kvalifikaciją ir kt. aplinkybes, būdingas atskiriems ūkio sektoriams) skirtumus. Darbo užmokesčio ir darbo našumo sąveika yra svarbi, kadangi nuo jos priklauso pragyvenimo lygis ir pajamų tarp darbo ir kapitalo pasiskirstymas. Jei darbo užmokestis daug didesniu tempu nei darbo našumas, darbo jėgai tenka didesnė nacionalinių pajamų dalis, todėl šiame sektoriuje mažėja paskatos investuoti į kapitalą. Dėl šios priežasties lėtėja šio sektoriaus technologinis vystymasis, o tai ilguoju laikotarpiu lemia ir darbo našumo, ir kartu darbo užmokesčio mažėjimą. Regioniniu aspektu tokia situacija lemia mažesnį verslo suinteresuotumą investuoti šiuose regionuose ir mažesnes tokio regiono vystymosi galimybes. Darbo užmokesčiui didėjant mažesniu tempu nei darbo našumas, kapitalui tenkanti pajamų dalis nacionalinėse pajamose didėja greičiau nei darbui tenkanti dalis. Tai sukelia investicijų į žmogiškąjį kapitalą mažėjimą. Regioniniu aspektu tokia situacija nulemia išsilavinusios darbo jėgos išvykimą į labiau išsivysčiusius regionus ir tolesnį tokių regionų atsilikimą. Ūkio sektoriai gali susidurti su atitinkamos kvalifikacijos darbo jėgos trūkumu.

Darbo našumas didėja tobulėjant žmogaus darbo įgūdžiams ir naudojant geresnius įrengimus bei technologijas, dėl to darbo našumas turėtų nuolat augti, o augant darbo našumui, turėtų didėti ir darbo užmokestis. Šiame straipsnyje nagrinėjama problema – darbo užmokesčio ir darbo našumo skirtumai atskiruose Lietuvos regionuose bei sektoriuose. Šiuos skirtumus lemia įvairūs veiksniai, todėl, esant tam pačiam darbo našumo lygiui, atskiruose regionuose ar sektoriuose darbo užmokesčio lygis gali būti nevienodas, nes skiriasi rinkos monopolizacijos laipsnis, darbo pobūdis, investicijos į žmogiškąjį kapitalą ir t. t.

Apžvelgus darbo užmokesčio ir darbo našumo kitimo tendencijas teritoriniu aspektu, pastebėta, kad Vilniaus apskrityje, kur darbo užmokestis buvo didžiausias, 2005–2010 m. vidutiniškai 1,15 karto viršijo vidutinį mėnesinį viso ūkio bruto darbo užmokestį. Darbo našumas vidutiniškai 1,37 karto viršija vidutinį viso ūkio darbo našumą. Galima teigti, kad šiame regione atlygis už darbą yra pagrįstai didžiausias. Tauragės apskrityje, kur darbo užmokestis yra mažiausias, vidutinis mėnesinis bruto darbo užmokestis 2005–2010 m. yra mažesnis 1,30 karto už vidutinį šalies darbo užmokestį, o darbo našumas atitinkamu laikotarpiu šiame sektoriuje yra mažesnis 1,83 karto nei vidutinis šalies darbo našumas.

Apžvelgus darbo užmokesčio ir darbo našumo kitimo tendencijas pagal ekonomines veiklos sritis, pastebėta, kad *Finansų ir draudimo* sektoriuje, kur darbo užmokestis buvo didžiausias iš visų ekonominės veiklos rūšių, 2005–2010 m. vidutiniškai 1,87 karto viršijo vidutinį mėnesinį

viso ūkio bruto darbo užmokestį. Darbo našumas vidutiniškai 1,97 karto viršija vidutinį viso ūkio darbo našumą. Galima teigti, kad šiame sektoriuje atlygis už darbą yra pagrįstai didžiausias. *Apgyvendinimo ir maitinimo paslaugų* sektoriuje, kur darbo užmokestis yra mažiausias, vidutinis mėnesinis bruto darbo užmokestis 2005–2010 m. yra mažesnis 1,87 karto už vidutinį šalies darbo užmokestį, o darbo našumas atitinkamu laikotarpiu šiame sektoriuje yra mažesnis 1,76 karto nei vidutinis šalies darbo našumas. Galima daryti išvadą, kad darbo užmokestis šiame sektoriuje taip pat tinkamai įvertintas ir pagrįstai mažiausias, lyginant jį su kitais šalies ūkio sektoriais.

Skirtumai tarp darbo užmokesčio ir darbo našumo regioniniu ir ekonomikos sektorių požiūriu vertinami remiantis šiuo metodu: jei santykis tarp darbo užmokesčio regione (ūkio sektoriuje) su šalies vidurkiu yra didesnis (arba mažesnis), lyginant su darbo našumo santykiu regione (ūkio sektoriuje) ir šalies vidurkiu, vadinasi, skirtumai egzistuoja. Kuo šių santykių skirtumas didesnis, tuo neatitiktumas irgi yra didesnis.

Atliktos analizės rezultatai rodo, kad darbo našumo skirtumai tarp Lietuvos regionų yra didesni nei darbo užmokesčio. Skirtumus tarp darbo užmokesčio ir darbo našumo lygio Lietuvoje *teritoriniu* aspektu įvertinantis koeficientas 2010 m. lygus 0,128 ir buvo didesnis nei 2005 m. Atlikta analizė rodo, kad darbo užmokesčio ir darbo našumo lygis teritoriniu aspektu labiausiai atitinka Kauno, Telšių, Klaipėdos ir Šiaulių apskrityse. Didžiausias darbo užmokesčio perviršis, lyginant su darbo našumu, egzistuoja Tauragės apskrityje, t. y. šioje apskrityje mokamas darbo užmokestis sąlyginai didesnis, lyginant su darbo našumu. Vilniaus apskrityje egzistuoja neigiamas darbo užmokesčio perviršis, t. y. mokamas santykinis darbo užmokestis mažesnis nei darbo našumo lygis.

Gauti rezultatai taip pat atskleidžia, kad skirtumai tarp darbo užmokesčio ir darbo našumo lygio šalyje *sektoriniu* požiūriu yra didesni 2005 nei 2010 m. Darbo užmokesčio ir darbo našumo lygis sektoriniu aspektu labiausiai atitiko *Vandens tiekimo, nuotekų valymo, atliekų tvarkymo ir regeneravimo, Statybos, Apgyvendinimo ir maitinimo paslaugų veiklos* bei *Administravimo ir aptarnavimo veiklos sektoriuose*. Didžiausias darbo užmokesčio perviršis, lyginant su darbo našumu, stebimas *Finansų ir draudimo veiklos, Įmonių sveikatos priežiūros ir socialinio darbo, Švietimo* bei *Žemės ūkio, žuvininkystės ir miškininkystės sektoriuose*. Didžiausias darbo našumo perviršis buvo *Elektros, dujų, garo tiekimo ir oro kondicionavimo* bei *Nekilnojamojo turto operacijų* sektoriuose. Taigi šiuose sektoriuose darbo našumo lygis gerokai lenkia darbo užmokesčio lygį.

**Pagrindiniai žodžiai:** darbo užmokestis, darbo našumas, skirtumai, Lietuva.

The article has been reviewed.

Received in September 2012, accepted in February 2013.