



LABOUR PRODUCTIVITY OF MANUFACTURING ANALYSES IN EUROPEAN UNION

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Abstract

The aim of the article is to analyse labour productivity key indicators of manufacturing or working efficiency of European Union (EU). We will analyse labour productivity by turnover and gross value added per person employed of manufacturing total and partly by manufacturing activities, sectors (it is 24), but also GDP per capita and investment per person employed. Taking into account this publication and the previous works of the authors, we made the conclusions and suggestions.

Keywords: labour productivity, manufacturing, European Union.

Scientific novelty: analyze labour productivity of manufacturing of EU.

1. Methodology and theoretical bases

The techniques and labour market survey definitions used by the authors have been specified in OECD [1] and Eurostat [2]. Labour productivity is defined as GDP per hour worked. The measures of labour productivity are presented as indices and as rates of change. [1] Labour productivity per hour worked is calculated as real output (deflated GDP measured in chain-linked volumes, reference year 2005) per unit of labour input (measured by the total number of hours worked). Measuring labour productivity per hour worked provides a better picture of productivity developments in the economy than labour productivity per person employed, as it eliminates differences in the full time/part time composition of the workforce across countries and years. [3] Formulas of productivity measures [4-5]

Labour productivity per person employed (on the basis of value added) – indicates how much value added is generated on average per person employed (is calculated as value added divided by the number of persons employed). [4] GDP is an indicator for a nation's economic situation and a measure of the economic activity. It reflects the total value of all goods and services produced. Expressing GDP in PPS (purchasing power standards) eliminates differences in price levels between countries, and calculations on a per head basis allows for the comparison of economies significantly different in absolute size. [6] GDP per capita in constant prices constant prices GDP is found and the ratio of the average population. Often used in constant prices GDP as an indicator of the wealth of nations, as it reflects the average real income in this country.

GDP per person employed is intended to give an overall impression of the productivity of national economies expressed in relation to the EU average. The volume index of GDP per capita in PPS is expressed in relation to the EU average set to equal 100. Basic figures are expressed in PPS, i.e. a common currency that eliminates the differences in price levels between countries allowing meaningful volume comparisons of GDP between countries. The index, calculated from PPS figures and expressed with respect to EU = 100, is intended for cross-country comparisons rather than for temporal comparisons. [7]

The theoretical bases of labour productivity have been brought in more detail in the authors book [8 -10], in authors' earlier works [11 - 25] and in the works of other authors [26 - 27]. All figures are the authors' illustration.

2. Development and background of manufacturing

As industry has been the basis of their wealth, then we will analyse the main indicators of industrial development.

Manufacturing is the production of goods for use or sale using labour and machines, tools, chemical and biological processing, or formulation. The term may refer to a range of human activity, from handicraft to high tech, but is most commonly applied to industrial production, in which raw materials are transformed into finished goods on a large scale. [28]

2. 1. History and development of world manufacturing

In its earliest form, manufacturing was usually carried out by a single skilled artisan with assistants. Training was by apprenticeship. In much of the pre-industrial world, the guild system protected the privileges and trade secrets of urban artisans. Before the Industrial Revolution, most manufacturing occurred in rural areas, where household-based manufacturing served as a supplemental subsistence strategy to agriculture (and continues to do so in places). Entrepreneurs organized a number of manufacturing households into a single enterprise through the putting-out system. Toll manufacturing is an arrangement whereby a first firm with

specialized equipment processes raw materials or semi-finished goods for a second firm. [8, 28]

2. 2. Structural business statistics introduced

Based on structural business statistics, there are a total of 24 *activities* (sectors). [8, 29] Specifically, these are in the tables.

Statistical classification of economic activities in the European Community, abbreviated as **NACE**, is the nomenclature of economic activities in the EU. NACE is a four-digit classification providing the framework for collecting and presenting a large range of statistical data according to economic activity in the fields of economic statistics and in other statistical domains developed within the *European statistical system* (ESS).

Revised classification NACE Rev. 2 was started in 2007. The first reference year for NACE Rev. 2 compatible statistics is 2008, after which NACE Rev. 2 will be consistently applied to all relevant statistical domains. [8, 29]

This article presents an overview of the EU manufacturing sector, which is included in NACE Rev. 2 Section C. [8, 29]

3. Gross domestic product at market prices

For an introduction, let us look at the background the **GDP** (gross domestic product) at market prices and **GDP per capita**.

Table 1. Current prices, billion PPS of EU-28, million [30]

2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
11,602	12,26	12,994	13,068	12,312	12,828	13,201	13,463	13,577	14,043	14,796	14,904

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It was in 2016 largest by current prices in Germany, 3134 billion; in UK, 2367 billion; France, 2229 billion and in Italy 1672 billion EUR. Largest by PPS prices was in Germany, 2955 billion; in UK, 2068 billion; in France, 2029 billion; in Italy 1699 billion and in Spain, 1238 billion PPS.

Germany is by GDP (PPS) 1.5 times stronger than the UK. In the years 2007-2014 France was stronger than the UK, but the difference between UK and France in 2015 was 59 million euros (0.003%) and in 2016 = 39.33 billion euros (1.902%).

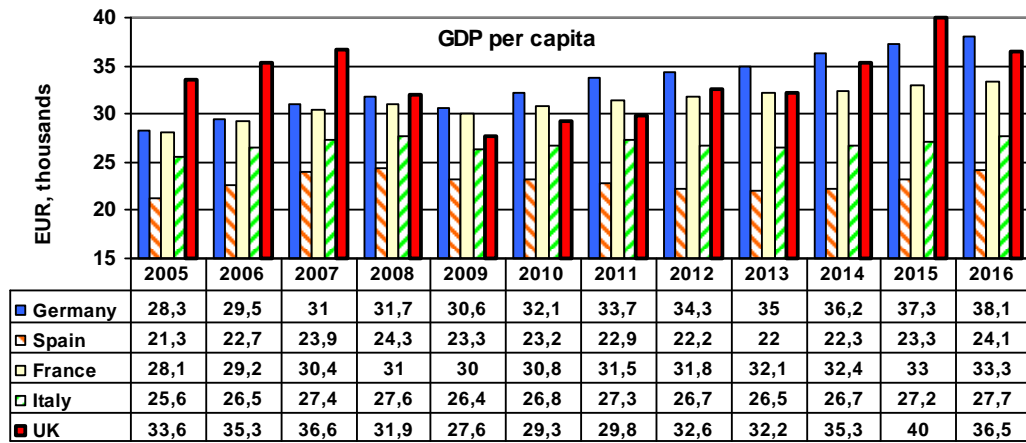


Figure 1. GDP at market prices. Current prices, euro per capita [31]

In the case of the EU's great powers, UK GDP per capita was the largest in the years 2005 - 2008 and 2015. In other years, Germany was superior to the great powers.

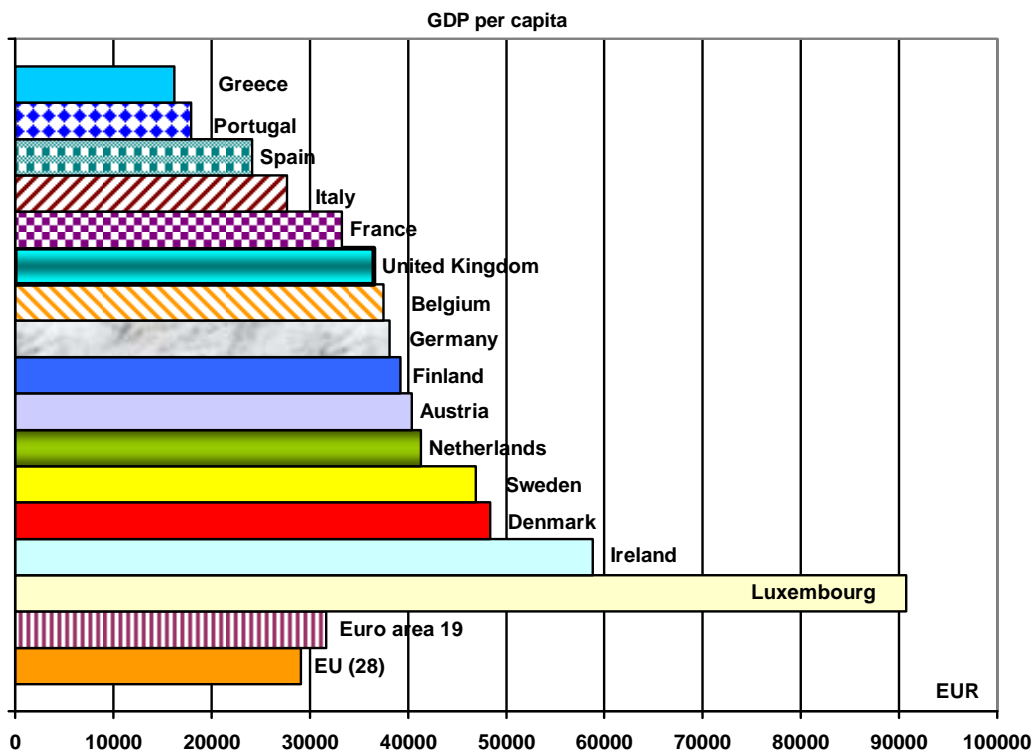


Figure 2. GDP at market prices, euro per capita, 2016 [31]

GDP per capita of UK (36,500) is larger than France, Italy and Spain, but less than Germany, other Central European and Nordic countries; 1.6 times smaller than Ireland. The average of the new EU member states and the EU-28 (29.100) GDP per capita is lower than the UK. The UK was ranked 10th in the 2016 EU ranking.

4. Manufacturing of EU

We will first observe the main total quantitative indicators of manufacturing, their changes.

In 2016 largest **turnover or gross premiums written** of manufacturing were in Germany 1951 billion; Italy 898 billion, France 852 billion, UK 683 billion and Spain, 466 billion EUR.

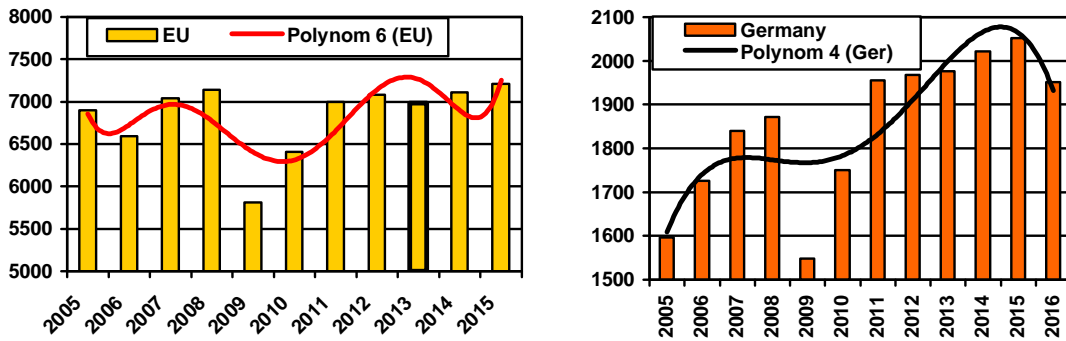


Figure 3. Turnover of EU and Germany, in billion EUR [32]

In 2009 the EU-27 decrease of the turnover was 1 336 billion EUR or about one-fifth. In the following year, while turnover increased, but in 2012 it was lower than in 2008. Thus, the turnover of the EU as a whole had not yet gone out of the economic crisis. It was only in 2013 exceeded strongly the level during the boom.

With biggest turnover in Germany was the same trend. In 2009 the decline was 17.3%.

In the following years, however, was a big gain, but still remained at the 2011 level of just under (0.33%) yet to 2008 levels.

In 2016 largest *production of manufacturing* was in Germany 1738 billion, in Italy 889 billion, in France 763 billion and in UK 683 billion EUR.

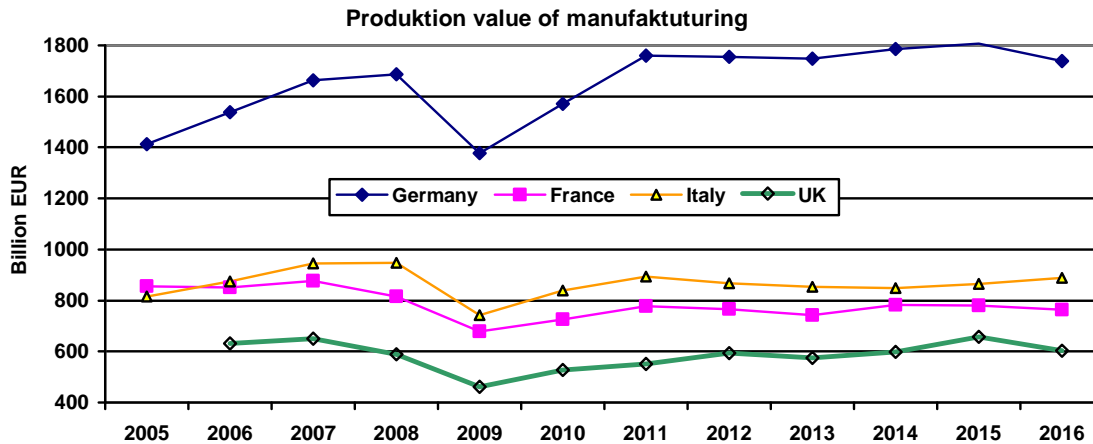


Figure 4. Production value of enterprises of EU countries [32]

The first decline of EU-27 production value of the manufacturing in test period has already in 2006 (-4.7%). Also, in 2008 was small decrease (-0.3%). In 2009, the EU annual decline was 1.3 trillion or 19.9%, and in 2012 it was not yet reached the level of 2008. In 2013 has already exceeded the 2007 level by 8.0%.

Basically, the same trend was also the big countries, with the exception of Germany. In Germany and Sweden was in 2009 also a large

decrease of production, but in 2011 exceeded strong pre-crisis levels. This trend applies from EU-15 countries also on Belgium, the Netherlands and Austria.

In 2016 largest *value added at factor cost of enterprises of manufacturing* were in Germany 535 billion, in UK 222 billion, in Italy 213 billion, in France 208 billion and in Spain 102 billion EUR.



Figure 5. Gross operating surplus of enterprises of EU, billion EUR [32]

In 2013, *gross operating surplus* of manufacturing of EU-28 was 16.4% and in 2014 8.0% less than of EU-27 in 2007.

In 2016 largest *gross operating surplus of enterprises of manufacturing* were in Germany 144 billion, UK 109 billion, Italy 81 billion, France 53 billion and Spain 40 billion EUR.

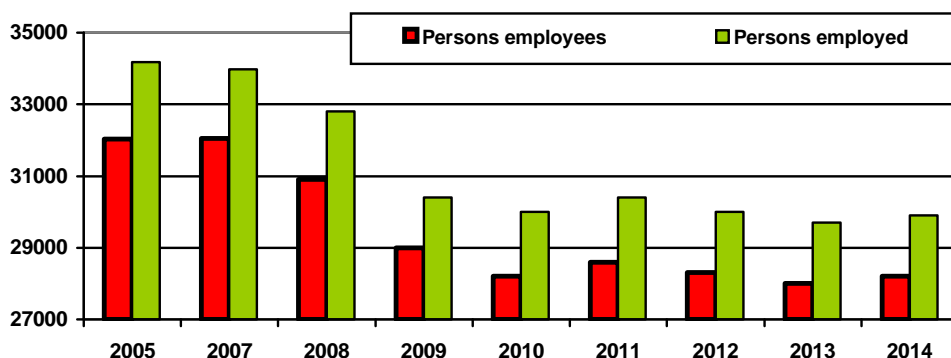


Figure 6. Number of persons employees and employed of EU, thousands [32]

The highest **number of persons employed** of the EU was in 2005. Next, it is decreased continuously in 2015 from 2005 was fall 12.1%. Number of persons employed of the EU is decreased over 4 million.

More than million workers of manufacturing companies are in eight the EU-28 members states, including Germany are

nearly three times more likely than the UK. In 2016 *number of persons employed of manufacturing* was in Germany 7273 thousand, in Italy 3680 thousand, in France 2903 thousand, in Poland 2576 thousand, in UK 2532 thousand, in Spain 1854 thousand, in Czech Republic 1294 thousand and in Romania 1209 thousand. [32]

5. Working efficiency or labour productivity

Table 2. Turnover per person employed of EU countries, thousands. [32]

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
EU (28)	:	:	:	:	:	:	231	236	235	238	:
EU (27)	202	200	207	:	200	210	232.	:	:	:	:
Belgium	:	:	:	450.	379.	441.	502.	515.	519.	518.	473.1
				9	4	5	5	9	7	1	
Bulgaria	26.1	30.8	35.6	40.1	34.2	41.1	47.3	50.5	52.2	52.3	53.4
Czech Rep	:	:	:	105.	94.7	110.	120.	120.	118.	121.	124.1
				2		9	4	7	9	7	
Denmark	:	:	:	243.	263.	290.	255.	275.	282.	286.	297.0

				5	1	0	5	4	3	8		
Germany	:	:	:	263.	231.	252.	274.	274.	273.	278.	282.1	
				6	1	8	1	4	6	1		
Estonia	48.4	56.2	65.0	69.7	62.9	82.0	100.	101.	106.	107.	106.3	
							2	3	6	6		
Ireland	:	:	:	497.	502.	587.	605.	625.	597.	616.	1116.	
				8	4	3	5	5	5	7	2	
Greece	:	:	:	155.	136.	149.	170.	187.	195.	202.	173.5	
				3	9	9	7	1	3	0		
Spain	:	:	:	224.	200.	221.	243.	253.	257.	264.	264.0	
				5	6	9	7	1	6	5		
France	:	:	:	:	:	273.	294.	295.	291.	288.	297.2	
						2	1	5	8	3		
Croatia	:	:	:	69.0	58.6	61.1	63.3	64.0	62.1	65.0	69.5	
Italy	:	:	:	221.	187.	217.	234.	235.	233.	237.	244.5	
				9	9	6	2	6	7	4		
Cyprus	:	:	:	110.	101.	104.	102.	100.	97.6	100.	101.2	
				0	0	7	8	1		6		
Latvia	31.6	38.5	46.5	49.7	46.1	53.5	61.2	67.4	64.3	62.3	62.9	
Lithuania	43.1	49.1	55.2	72.5	61.9	79.5	97.6	99.9	99.3	91.4	87.0	
Luxembourg	272.	304.	325.	331.	251.	366.	411.	408.	393.	394.	398.6	
	0	4	1	7	6	0	4	2	2	5		
Hungary	97.3	107.	121.	128.	112.	133.	143.	139.	141.	145.	147.0	
		4	3	5	4	0	4	3	1	4		
Netherlands	:	:	:	412.	349.	390.	445.	464.	452.	490.	484.8	
				3	3	9	3	1	7	6		
Austria	213.	230.	244.	257.	236.	257.	285.	285.	286.	284.	284.7	
	0	5	0	8	4	8	7	7	3	7		
Poland	67.6	75.6	85.7	98.2	80.9	98.0	110.	114.	115.	116.	116.3	
							9	9	3	0		
Portugal	87.0	95.6	103.	104.	96.7	109.	118.	121.	124.	123.	122.4	
			4	3		0	0	7	6	9		
Romania	25.1	31.1	39.0	45.0	40.2	48.8	53.7	53.5	56.3	58.4	61.0	
Slovenia	88.4	97.9	107.	111.	99.9	115.	126.	125.	126.	130.	133.1	
			6	3		9	1	2	3	8		
Slovakia	:	:	:	122.	114.	119.	131.	144.	149.	148.	152.2	
				0	4	4	3	1	4	7		
Finland	302.	351.	343.	355.	292.	333.	357.	364.	383.	374.	365.9	
	2	3	4	7	7	2	7	9	4	7		
Sweden	209.	227.	241.	255.	212.	272.	302.	332.	329.	327.	332.5	
	4	4	0	3	6	6	4	0	8	6		
UK	:	:	:	225.	195.	222.	235.	253.	246.	257.	281.6	
				9	1	6	3	9	1	8		

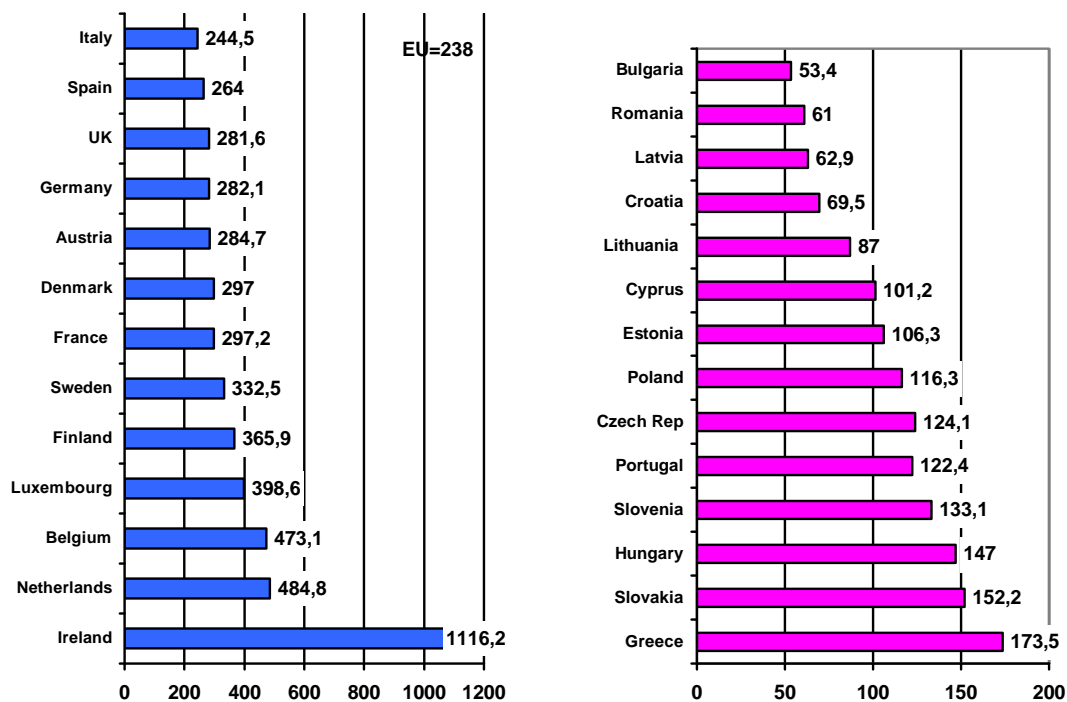


Figure 7. Turnover per person employed of EU countries. 2015 [32]

All countries had exceeded turnover per person employed after the crisis the level of 2008, except Cyprus. From 2005 it was grown two times in Bulgaria, Estonia, Latvia, Lithuania and Romania, and 1.7 times in Poland. In absolute terms, from 2008 to 2015, the highest turnover per person employed was Ireland, EUR 1116.2. At the same time, Ireland was more than twice as large as the Netherlands. The largest industrialized countries had higher productivity in France and Germany, the Nordic countries Finland and Sweden, the CEE countries Slovakia and the Baltic countries Estonia.

Turnover per person employed was higher in the medium-sized countries Ireland (1116.2), Netherlands (484.8), Belgium (473.1), and others. Great countries it is higher in Germany (282.1), but still more than 3 times smaller than Ireland. Smaller turnover per person employed was in new the EU Member States: Bulgaria (53.4), Romania (61.0), Latvia (62.9), Croatia (69.5) and in the old Member States Portugal (122.4). The differences were highly significant: the productivity of Ireland was 21 times higher than of Bulgaria.

In the new EU Member States in the last 10 years it has grown strongly, in the Baltic States, Bulgaria, Romania and Poland more than doubled. In the old Member States, where labour productivity was already relatively high, the increase was slower.

This is also the main reason why the wages in the new Member States are still several times lower than in the old - low productivity. High productivity was also found in the EFTA countries of Switzerland and Norway.

For a partial overview of the manufacture by sector has been taken as a basis the EU28 medium and Germany as the largest industrialized country in Europe in the 2016 period. We compare them with the country with the highest productivity data in this sector.

We see, that the most the greatest work efficiency manufacture sectors are in Netherlands. Germany and Ireland are not one of the leaders in the highest productivity of the manufacture sector. But of total is leader Germany, where is also high productivity, but not EU top-max.

Table 3. Turnover per person employed of EU countries, thousands [32]

Manufacture of ...	EU28	Germany	Top-max	State
beverages	:	293.4	671.4	Austria
paper and paper products	290	278.2	890.1	Finland
coke and refined petroleum products	3,391	4,816.1	6,484.6	Netherlands
chemicals and chemical products	468	491.8	1,069.3	Netherlands
basic pharmaceutical products and preparations	471	395.3	585.1	Sweden
basic metals	350	377.2	814.5	Finland
computer, electronic and optical products	266	266	1,546.2	Netherlands
electrical equipment	210	234.5	448.8	Netherlands
machinery and equipment n.e.c.	223	232.7	351.5	Belgium
motor vehicles, trailers and semi-trailers	423	543.1	601.5	UK
other transport equipment	284	317.5	416.1	Netherlands
Total	238	278.1	1,116.2	Ireland

Table 4. Apparent labour productivity (Gross value added per person employed) of EU countries. [33]

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
EU (28)	:	:	:	:	:	:	54	54	55	57	62
EU (27)	49	:	51	:	:	52.8	55.0	:	:	:	:
Belgium	:	:	:	83.9	80.4	89.3	87.1	89.9	95.7	98.9	103.5
Bulgaria	5.0	5.3	7.0	6.7	6.7	7.7	8.6	8.9	9.1	9.9	11.4
Czech Rep	:	:	:	23.2	21.6	24.3	25.8	25.7	25.9	27.3	28.3
Denmark	:	:	:	74.5	80.1	89.0	73.9	79.0	82.9	82.5	89.3
Germany	:	:	:	63.9	57.0	65.8	68.7	67.2	67.9	71.5	73.6
Estonia	12.1	14.4	17.3	17.8	16.0	19.9	22.9	22.7	23.7	24.7	24.6
Ireland	:	:	:	159.3	166.8	189.6	200.0	207.9	196.6	194.1	441.7
Greece	:	:	:	39.5	42.2	41.9	40.2	38.1	35.6	35.2	35.3
Spain	:	:	:	52.6	48.1	52.7	53.9	53.0	53.6	56.6	57.6
France	:	:	:	:	:	62.5	63.8	63.9	64.2	66.7	71.7
Croatia	:	:	:	19.3	17.4	17.6	17.5	17.4	17.4	18.2	19.2
Italy	:	:	:	48.0	43.2	51.4	52.9	51.8	53.2	55.8	58.8
Cyprus	:	:	:	33.9	33.3	33.0	31.0	29.7	28.4	29.8	31.4
Latvia	8.8	10.8	13.5	13.4	11.3	14.2	14.5	15.9	15.6	16.1	17.4
Lithuania	9.7	9.9	12.2	11.6	11.5	14.0	15.6	15.0	14.5	15.8	19.1
Luxembourg	73.6	76.1	94.1	84.3	58.2	70.4	72.5	70.8	70.8	75.8	78.1
Hungary	21.1	22.0	24.2	25.5	23.3	26.7	28.1	26.9	28.0	29.3	30.6
Netherlands	:	:	:	78.8	73.6	83.7	87.2	87.2	84.8	87.1	93.1
Austria	67.0	71.6	75.8	73.8	68.0	75.5	79.7	78.4	76.9	79.3	82.6
Poland	19.5	17.4	19.9	22.3	18.8	20.6	22.6	22.2	23.2	23.8	24.8
Portugal	21.8	22.9	24.4	24.3	23.3	26.1	25.3	25.1	26.2	26.8	28.7
Romania	5.6	7.0	9.2	11.0	9.6	11.3	11.4	11.5	12.0	13.4	12.8
Slovenia	24.7	27.1	29.0	29.1	25.6	31.3	32.7	32.3	33.3	36.5	37.3
Slovakia	:	:	:	18.1	16.6	21.5	21.8	21.9	22.8	25.0	27.3
Finland	74.4	82.4	81.6	76.0	58.0	71.5	69.7	65.5	69.6	70.8	74.0
Sweden	59.8	64.2	67.5	66.8	57.9	77.4	80.4	81.2	82.8	83.2	90.1
United Kingdom	:	:	:	66.3	55.6	66.1	69.2	72.1	72.1	76.1	89.0

Pre-crisis level exceeded in 2012 all countries, with the exception Croatia, Cyprus, Greece and Finland. Large variations were not. In 2009 no declined labour productivity in Ireland, Sweden and the UK, but also in Baltic States.

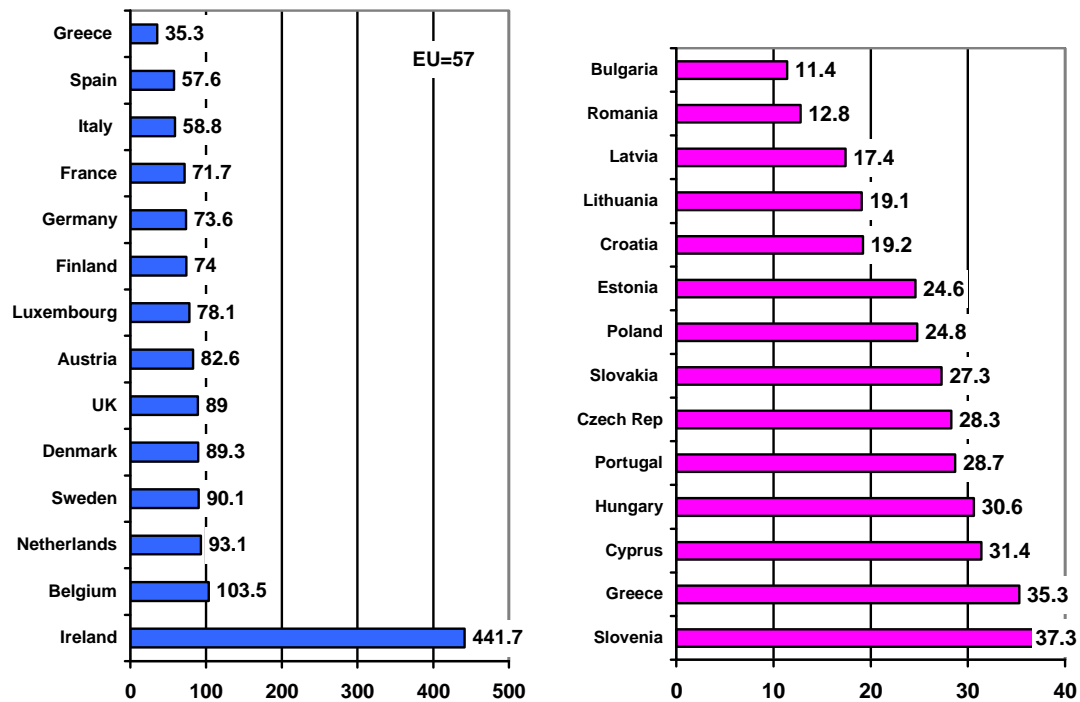


Figure 8. EU and EFTA countries apparent labour productivity (Gross value added per person employed). 2015 [33]

Apparent labour productivity (gross value added per person employed) was the highest in 2015 in Ireland (441.7), Belgium (103.5), Netherlands (93.1) and Sweden (90.1).

In new the European Union Member States was greater apparent labour productivity in 2015 from CEE-8 countries Slovenia (37.3) and from Baltic States Estonia (24.6). Among the new members, it was also relatively high in Cyprus (31.4).

Gross value added per person employed was lower in Bulgaria (11.4) and Romania

(12.8). The differences were very large, up to 39 times. Over the years, this gap has increased.

There were basically same trends as **gross value added per person employee**. It was the highest in 2015 in Ireland (457.9), Belgium (110.9), Sweden (99.6) and Netherlands (99.2). It was lower in Bulgaria (11.9) and Romania (12.9).

The differences were very large, 38 times.

The same comment that was *turnover per person employed* (Table 3) also applies to this for *apparent labour productivity* (Table 6).

Table 5. Apparent labour productivity of EU countries, thousands [33]

Manufacture of ...	EU28	Germany	Top-max	State
food products	46	41.8	77.5	UK
beverages	89	78.2	207.8	Netherlands
wood and of products of wood and cork	34	46.8	66.0	Austria
paper and paper products	71	71.2	151.6	Finland
coke and refined petroleum products	204	182.6	468.6	Greece
chemicals and chemical products	110	119.0	189.9	Netherlands
basic pharmaceutical products and preparations	159	124.6	336.2	Sweden
basic metals	67	72.6	110.4	Belgium
fabricated metal products, except machinery and equipment	47	56.4	73.6	Austria
computer, electronic and optical products	71	87.3	143.7	Netherlands

electrical equipment	60	76.7	99.4	Netherlands
machinery and equipment n.e.c.	68	76.8	104.5	Belgium
motor vehicles, trailers and semi-trailers	82	111.4	174.4	UK
other transport equipment	80	91.6	106.6	France
Total	57	73.6	441.7	Ireland

Table 6. Investment per person employed - million EUR. Manufacturing [33]

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
EU (28)	:	:	:	:	:	:	:	:	7.4	8.0	:
Belgium	:	:	:	14.3	13.3	14.1	20.0	16.2	15.2	17.9	22.9
Bulgaria	2.1	2.8	3.6	3.8	2.6	2.1	2.4	3.1	4.0	4.0	3.9
Czech Rep	:	:	:	6.4	4.1	4.3	5.0	5.4	5.4	5.8	6.1
Denmark	:	:	:	11.3	10.7	10.1	9.1	9.1	8.7	8.6	9.0
Germany	:	:	:	8.8	7.2	7.0	8.0	8.3	8.1	8.2	8.5
Estonia	3.9	4.9	5.1	4.3	3.0	3.7	5.5	5.4	4.9	5.9	5.8
Ireland	:	:	:	12.0	9.7	7.8	11.2	27.1	35.3	43.4	149.3
Greece	:	:	:	8.2	7.8	7.4	5.4	10.1	4.8	5.6	4.7
Spain	:	:	:	9.6	7.9	7.1	7.2	7.3	7.5	7.9	8.8
France	:	:	:	:	:	9.2	10.3	9.9	10.2	9.5	10.3
Croatia	:	:	:	4.0	3.1	2.7	2.9	2.8	2.7	2.8	3.4
Italy	:	:	:	8.7	7.4	7.7	6.5	6.7	6.6	7.0	7.3
Cyprus	:	:	:	7.8	8.2	7.2	4.2	3.6	2.2	2.1	2.9
Latvia	4.1	5.1	6.8	7.2	3.8	3.8	4.6	5.0	3.4	4.0	4.0
Lithuania	3.2	3.8	5.3	4.4	2.5	2.1	3.3	3.5	3.6	3.5	3.6
Luxembourg	9.7	12.6	15.0	14.3	9.8	14.7	10.9	11.1	11.1	10.7	13.1
Hungary	5.6	5.0	5.9	5.6	4.5	5.2	6.7	7.0	6.9	7.6	6.9
Netherlands	:	:	:	10.3	10.0	8.6	10.3	10.6	10.0	10.6	11.9
Austria	8.7	8.9	11.0	10.9	9.3	8.6	9.4	10.5	9.7	9.9	10.2
Poland	3.7	4.2	5.0	6.0	4.2	4.1	4.5	4.4	4.7	5.3	5.8
Portugal	4.6	5.5	6.1	7.2	6.7	5.9	5.7	4.6	5.0	5.3	5.8
Romania	2.7	4.2	6.4	6.3	4.5	4.3	4.9	5.4	4.1	4.3	4.8
Slovenia	6.6	7.3	7.0	7.5	5.7	5.5	6.7	6.4	6.3	6.9	6.8
Slovakia	:	:	:	7.2	5.9	5.4	5.8	6.0	6.3	6.8	7.6
Finland	9.3	9.3	11.2	9.8	8.0	6.8	7.5	8.7	7.6	7.7	10.9
Sweden	8.5	8.1	:	9.8	7.8	8.3	9.6	9.9	10.5	10.5	12.2
UK	:	:	:	6.4	5.1	5.5	6.7	7.3	6.8	9.3	11.7

Investment per person employed was greater in Ireland, Belgium, Netherlands, Luxembourg and Sweden.

In new European Union Member States was highest investment per person employed from CEE-8 countries Hungary, Slovenia and Slovakia, and from Baltic States Estonia and Latvia.

Investment per person employed was lower in Croatia and Bulgaria.

The differences were very large, up to 51 times: in Cyprus was it in 2015 2.9, in Bulgaria 3.9 and in Belgium in 2015 22.9, in Ireland 149.3 (!). However, if we compare the industrialized countries and leave the vertices aside, then the differences are much smaller.

These changes were large, especially small countries. In most countries, however, it was relatively stable. [33]

However, direct investment will depend on the company's work efficiency. Where there is little investment per person employed, there is also low productivity and, consequently, low wages.

Taking into account this publication and the previous work of the authors [5, 8 - 25], we can made the following conclusions and suggestions.

6. Conclusions and Suggestions

6.1. Conclusions

- Germany is largest European economy, also by manufacturing, the EU economic motor, which depends on development of most economic indicators throughout of EU.
- Companies came out of the economic crisis by a surge of hiring professionals, engineers and customer service staff.
- Companies were brought out of the economic crisis by the growth of labour productivity.
- The importance of large companies, especially those with 250 and more employees, was decisive.
- Countries economy has increased after the crisis. Whether economic growth achieved smaller number personnel, it means expense labour productivity?
- Number of persons employed of the EU from 2005 to 2015 was fall 12.1%, decreased over 4 million persons.
- Highest turnover per person employed was Ireland, Netherlands and Belgium. The largest industrialized countries had higher productivity in France and Germany, the Nordic countries Finland and Sweden, the CEE countries Slovakia and the Baltic countries Estonia.
- In the new EU Member States in the last 10 years it has grown strongly, in the Baltic States, Bulgaria, Romania and Poland more than doubled. In the old Member States, where labour productivity was already relatively high, the increase was slower.
- The greatest work efficiency manufacture sectors of the EU are in Netherlands.
- Apparent labour productivity (gross value added per person employed) was in 2015 the highest in Ireland, Belgium, Netherlands and Sweden. In new the EU Member States was it greater from CEE-8 countries Slovenia and from Baltic States Estonia.
- The differences of labour productivity in the EU were very large.
- Investment per person employed was the highest Switzerland and Norway. From EU countries was it greater in Ireland, Belgium, Netherlands, Luxembourg and Sweden.

- In new EU Member States was highest investment per person employed from CEE-8 countries Hungary, Slovenia and Slovakia, and from Baltic States Estonia and Latvia.
- These changes of investment per person employed were large, especially small countries. In most countries it was relatively stable. The differences were very large.

6.2. To increase labour productivity the following should be taken into account

1. Recommendations for employee

- 1.1 Objective factors (different innate abilities, talents, working and living conditions),
- 1.2 Subjective factors (self-realization, motivation, commitment, a desire to work better, ambition, education, qualification, a variety of mental and physical abilities, laziness, negligence, drunks, the courage to set high goals and the desire to strive for them).

2. Recommendations for the employer (company)

- 2.1 Objective factors [better organization of work, using more efficient machinery and equipment, innovation, improving working conditions (lighting, noise, humidity, temperature, air composition, etc.), natural conditions, material possibilities],
- 2.2 Subjective factors [moral (cheering, encouragement, etc.) and material incentives (salary, bonuses, bonus payments, etc.), creating conditions for up-skilling and retraining, the work environment (working collective, i.e. coworkers, etc.), not overly demanding, behaviour with the staff (guaranteeing human integrity, name-calling, etc.), taking internal tensions to the minimum, a desire to develop the company and increase its fame, the educational level and experiences (information capital) of the management leadership, the ambition of the company's management].

3. Several of the factors for raising mental and physical work productivity are different. Typically, an increase in the company's productivity depends more on the employees that do mental work (engineers, economists, etc.). It is important to establish an optimal relationship between the groups. The excellent drawings for a machine designed by an engineer will still usually be finished in metal by workers.

4. Each company, sector of the economy and region has its **peculiarities**, and taking these into account would increase labour efficiency.

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