Analysis of Manufacturing of the European Union Superpowers Countries

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ABSTRACT

The purpose of this publication is to analyse of manufacturing of the European Union (EU) superpowers countries. Engineers work is the basis for effective industrial production. As one of the Europe superpower countries United Kingdom (UK) leaves (Brexit) the EU, it is important to analyze how it affects the EU economy. The UK is one of the strongest industrialized nations in the world. Which strongly affects not only the UK, but also whole the EU economy and politics. Often called advanced economies or rich countries to industrialized countries. As industry has been the basis of their wealth then we will analyse the main indicators of industrial development. This publication aim is to analyze the dynamics of manufacturing key indicators, production and value added. In order to assess the economic strength of the UK, we will conduct a comparative analysis with other major the EU powers, in particular Germany. It shows how much the EU manufacturing loses as the UK leaves. The emphasis is on the analysis of economic reasons. The analysis showed that both the EU and the UK would lose a great deal with this departure, not only in manufacturing and the economy, but also in other areas of life related to it. The UK is leaving the EU, but most countries are bound by NATO.

Keywords: *European Union, United Kingdom, Brexit, manufacturing, production, turnover, value added.*

Scientific novelty: *analysis trends of key indicators dynamics of manufacturing.*

INTRODUCTION

As industry has been the basis of their wealth, then we will analyse the main indicators of industrial development. The competence of engineers and their creative achievements are the basis of efficient industrial production.

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. [1]

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. [1 - 2]

METHODOLOGY AND THEORETICAL BASES

The methodology is based on international organizations (Eurostat [5 - 6], CIA [7], WB [8], OECD [9]), others authors [13 – 23; 40 - 44] and the authors books [2 - 4], but also partly the authors of the methodology used in previous publications [24 - 39]. The techniques definitions used by authors have been specified in Eurostat [10 - 11].

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. [45]

Production value measures the amount actually produced by the unit, based on sales, including

changes in stocks and the resale of goods and services. The production value is defined as turnover, plus or minus the changes in stocks of finished products, work in progress and goods and services purchased for resale, minus the purchases of goods and services for resale, plus capitalised production, plus other operating income (excluding subsidies). Income and expenditure classified as financial or extra-ordinary in company accounts is excluded from production value. [46]

Value added represents the difference between the value of what is produced and intermediate consumption entering the production, less subsidies on production and costs, taxes and levies. [47]

Turnover is the total of all sales (excluding VAT) of goods and services carried out by the enterprises of a given sector during the reference period. [47]

Source data based on structural business statistics 24 *activities* of the EU. [11] *Statistical classification of economic activities in the European Community*, abbreviated as NACE, is the nomenclature of economic activities in the EU. This article presents an overview of the EU manufacturing sector, which is included in NACE Rev. 2 Section C. [12]

The theoretical bases of key indicators have been brought in more detail in the authors book [2 - 4], in authors' earlier works [24 - 39] and in the works of other authors [12 – 22; 40 - 44].

All figures are the authors' illustration.

GROSS DOMESTIC PRODUCT

For an introduction, let us look at the background the **GDP** (gross domestic product) at market prices and PPS of superpower countries in EUR and USD.

Table1. *GDP at current prices, billion euros [45]*

	2005	**2008**	**2009**	**2011**	**2015**	**2017**	**2018**
Germany	2300	2562	2460	2703	3049	3277	3386
Spain	930	1116	1079	1070	1081	1166	1207
France	1771	1992	1939	2059	2198	2292	2349
Italy	1489	1632	1572	1637	1652	1724	1754
UK	2027	1984	1716	1883	2612	2338	2390

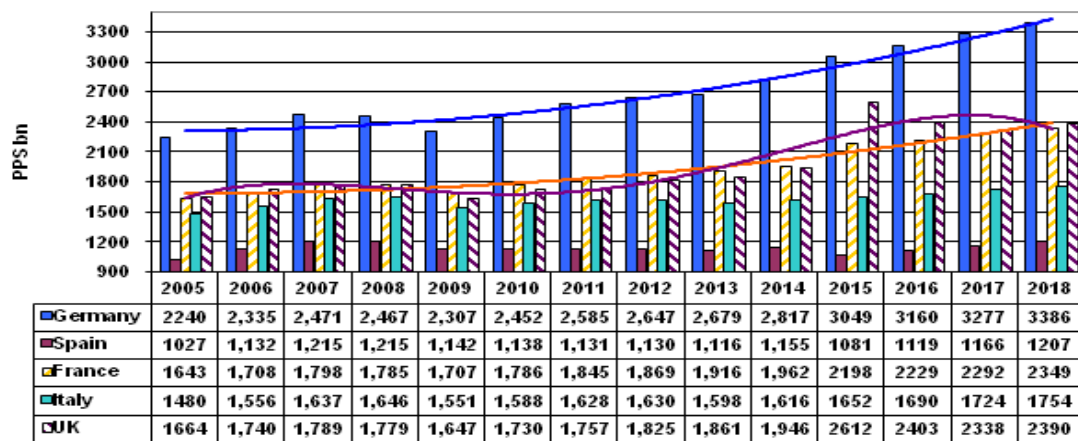|	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Germany	2240	2,335	2,471	2,467	2,307	2,452	2,585	2,647	2,679	2,817	3049	3160	3277	3386
Spain	1027	1,132	1,215	1,215	1,142	1,138	1,131	1,130	1,116	1,155	1081	1119	1166	1207
France	1643	1,708	1,798	1,785	1,707	1,786	1,845	1,869	1,916	1,962	2198	2229	2292	2349
Italy	1480	1,556	1,637	1,646	1,551	1,588	1,628	1,630	1,598	1,616	1652	1690	1724	1754
UK	1664	1,740	1,789	1,779	1,647	1,730	1,757	1,825	1,861	1,946	2612	2403	2338	2390

Fig1. *GDP at market prices, current prices, billion PPS [45]*

Relatively simple theoretical trend lines (2nd and 4th degree polynomials), which are very high R^2 indicate the period 2005-2018 both in Germany, France and the UK relative stable development of the economy, despite the 2009 downturn.

It was in 2018 largest by current prices in Germany, 3344 billion; in UK, 2419 bn; France, 2353 bn and in Italy 1765 bn EUR. Largest by PPS prices was in Germany, 3386 billion; in UK, 2390 bn; in France, 2349 bn; in Italy 1754 bn and in Spain, 1207 bn PPS.

Germany by GDP (PPS) is 1.5 times stronger than the UK and France. In the years 2007-2014 France was stronger than the UK, but the difference in current prices between UK (2641 bn) and France (2198 bn) in 2015 was 443 bn euros (16.77%) and in 2016 = 201 bn euros (8.25%). From 2015 by PPS and by current prices the UK was stronger France.

France, like Germany, has developed relatively stable GDP, characterized by simple theoretical trend lines (2nd degree polynomials), which are very high R^2. Theoretical trend lines (PPS) of

Germany and France run in parallel, but the difference was only 597 bn in 2005, but already 1037 bn in 2018. France only topped Germany 2005 level in 2017. Germany's level of GDP was in the EU (28) at 29.8% and it was 2.5 times highest then Italy and France, and over 2.8 times highest then the UK level.

In 2017 was GDP *per capita* in Germany 39,600; Spain 25,100; France 34,100; Italy 28,500 and the UK 35,300 euro. In 2015 it was in the UK 40,000 euro.

In 2018 these were in Germany 40,340; in Spain 25,730; in France 34,980; in Italy 29,220 and in UK 36,410 euro. In the case of the UK GDP per capita was the largest in the years 2005 - 2008 and in 2015. In other years, Germany was superior to the great powers.

GDP per capita of UK 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. [45]

Growth rate of GDP in 2018 was in Germany 1.5%, France 1.7%, Italy 0.8%, Spain 2.4% and UK 1.4%.
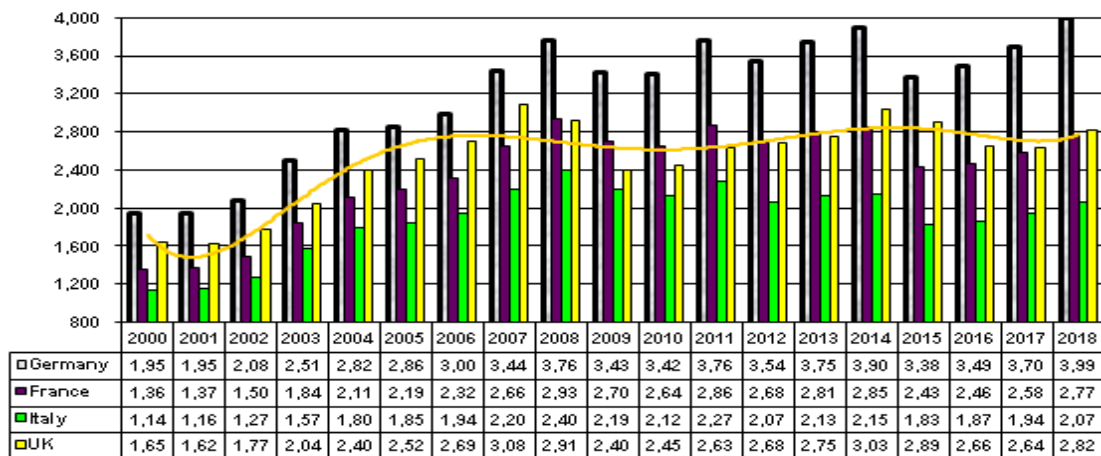

Fig2. *GDP at market prices of the Germany, UK, France and Italy. Current prices, billion USD [48]*

Polynomial of UK: $y = 0.0077x^6 - 0.4998x^5 + 12.463x^4 - 149.43x^3 + 860.46x^2 - 1929.6x + 2924.7$; $R^2 = 0.8955$

Figure2 shows a complex 6-degree polynomial, where R^2 is not very high. Usually GDP polynomials are much simpler and R^2 is 0.9 larger. This indicates an unstable economy of the UK.

They had two major periods of decline during the period under analysis, that is, in this century. Between of 2007 - 2009 the GDP declined 680 million USD or nearly a quarter (22%), and from 2014 to 2017 of 379 million USD or about one eighth (12.5%). The 2007 level has not yet been reached in 2018, missing a quarter of a trillion or 8.55%. Other super countries also had smaller fluctuations in GDP. Apart from Germany, their record level in 2018 was not reached.

The IMF forecasts that also in 2019 super countries below 2018 and France above 2018 in 2021 and Italy only in 2022. IMF predicts that also in 2019 super countries below 2018 and France above 2018 in 2021 and Italy only in 2022

Table2. *Development of GDP, bn current USD [50]*

	2017	2018	2019	2020	2021	2022	2023	2024
France	2,591.775	2,780.152	2,707.074	2,771.622	2,876.227	2,983.803	3,093.657	3,214.610
Germany	3,664.511	3,951.340	3,863.344	3,982.235	4,158.656	4,322.593	4,491.375	4,675.325
Italy	1,950.703	2,075.856	1,988.636	2,013.670	2,070.106	2,125.928	2,182.541	2,246.020

Table3. *GDP, top 8, 2018 [51]*

	GDP (billions $)			GDP (billions Int. $)			GDP per capita ($)		GDP per capita (Int. $)		GDP Growth	
	Nominal	Share (%)	Rank	PPP	Share (%)	Rank	Nominal	Rank	PPP	Rank	%	Rank
U.S.	20,494	23.89	1	20,494	15.02	2	62,641	9	62,641	12	2.857	102
China	13,608	15.86	2	25,362	18.58	1	9,771	68	18,210	65	6.600	16

Japan	4,971	5.79	3	5,485	4.02	4	39,287	26	43,349	27	0.788	166
Germany	3,997	4.66	4	4,505	3.30	5	48,196	17	54,327	18	1.425	151
UK	2,825	3.29	5	3,074	2.25	9	42,491	21	46,240	25	1.398	156
France	2,778	3.24	6	3,073	2.25	10	41,464	25	45,877	26	1.725	142
India	2,726	3.18	7	10,499	7.69	3	2,016	143	7,762	108	6.982	9
Italy	2,074	2.42	8	2,543	1.86	11	34,318	27	42,080	28	0.858	165

MANUFACTURING OF THE EU

Here we look at the impact of UK manufacturing to the EU. We will first observe the main quantitative indicators of manufacturing, their dynamics.

Table4. *Turnover by bn EUR. Manufacturing [45]*

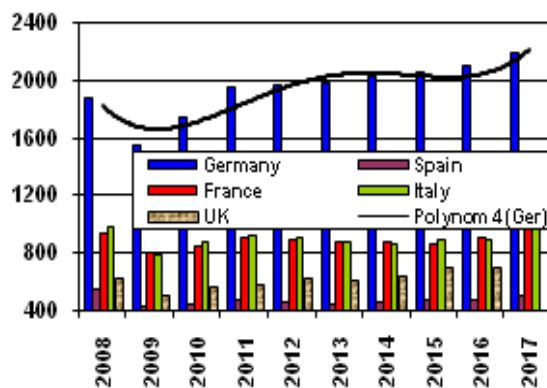|	**2008**	**2009**	**2011**	**2012**	**2014**	**2016**	**2017**
Germany	1,872	1,548	1,956	1,968	2,022	2,096	2,193
Spain	541	420	470	457	456	466	505
France	942	804	900	895	869	909	1,021
Italy	978	783	921	906	867	889	965
UK	631	503	591	633	642	702	:

Fig3. *Turnover of EU, in billion EUR [45]*

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 in 2008. 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

Over quartile of EU turnover (by NACE Rev. 2.) level was from Germany (28.3%). Level of Germany was over three times biggest then in France and Italy, three times if the United Kingdom and four times if Spain.

Turnover level of Germany is more than double that of France and Italy, three times as large as the United Kingdom and more than four times as large as Spain.

Turnover of EU superpowers manufacturing declined in 2009 and only Germany already surpassed pre-crisis 2008 levels in 2011. Three years later it surpassed the UK and only in 2017 France 2008 level. Turnover of major EU countries manufacturing declined in 2009 and only Germany already exceeded the pre-crisis 2008 level in 2011. Three years later, it surpassed the UK and only in 2017 France surpassed that level.
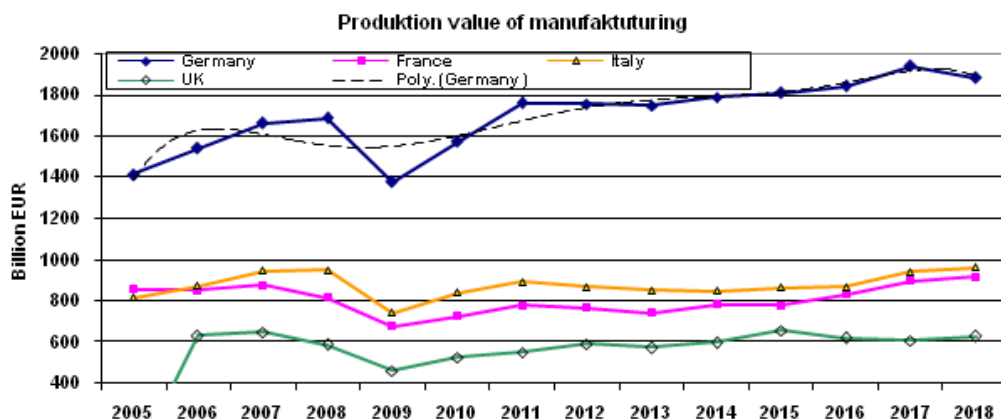

Fig4. *Production value of enterprises of EU countries [45]*

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. On 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 2017 largest *production of manufacturing* was in Germany 1937 billion, in Italy 943 bn, in France 895 bn and in UK 610 bn EUR, but in 2018 its were 1880 bn, 962 bn, 917 bn and 628 bn euro. If 2015 =100, then 2019 M09 they were 100.3, 105.0 and 103.7.

Germany surpassed 2008 levels in two years (2011); 2007 levels surpassed the UK in 2015 and France in 2016, Italy nearly 2017.

The differences in *value added* are basically the same as other industry key indicators. Germany level was in EU (28) 29.8% and it was 2.5 times highest then Italy and France and over 2.8 times highest then UK level.

In 2015 largest *value added at factor cost of enterprises of manufacturing* was in Germany 535 billion, in UK 222 bn, in Italy 213 bn, in France 208 bn and in Spain 102 bn EUR. In 2017 they were 592 bn, 194 bn, 241 bn, 240 bn and 111 bn EUR.
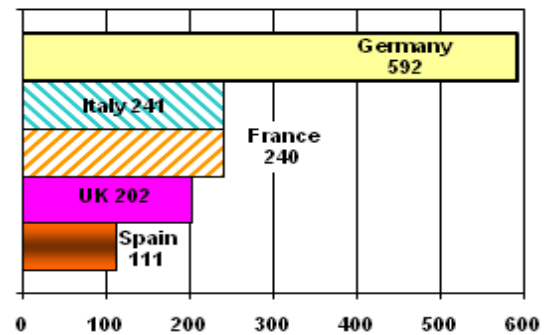
Fig5. *Value added bn EUR. 2017 [49]*

Table5. *Value added at factor cost of manufacturing in billion EUR [49]*

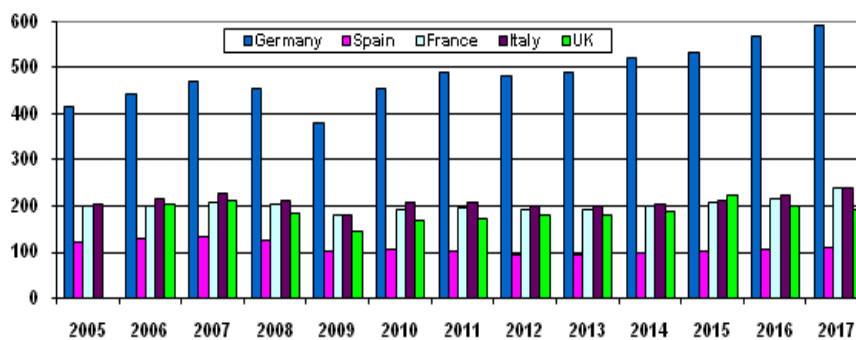|	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
EU - 28	:	:	:	:	:	:	1,660	1,630	1,630	1,710	1,850	1,912	2,020
Germany	414	443	469	454	381	456	490	482	491	520	535	570	592
Spain	122	130	133	127	101	106	104	96	93	98	102	105	111
France	202	201	207	203	180	194	195	193	193	201	208	214	240
Italy	204	214	227	212	180	206	208	199	199	204	213	225	241
UK	:	203	213	185	144	167	174	180	179	190	222	202	194

Fig6. *Value added at factor cost of manufacturing in billion EUR [49]*

In 2017 formed Germany level 29.3%, France and Italy 11.9%; UK 9.6% and Spain 5.5% of EU-28. Together, these top five countries accounted for 68.2% or over 2/3 of the total EU-28. However, Germany is more than three times larger than the UK.

The UK GVA years of retreat were in 2009 and in last period 2006 – 2008, the years of retreat were.

In 2018 was GVA share in the EU-28 of Germany 21.2%, UK 15.2% and France 14.7%.

U.S. was 20.8% stronger than the EU - 28 and the difference between the EU without the UK is 30.0%. China by GVA is dangerously approaching to the EU. As a result, the EU's competitiveness is declining. Following the announcement of Brexit, the GVA of the UK has decreased by 356 million USD or 13% and total EU 1.2 bn USD or 7% in the period 2014-2017. This is due to the long-standing uncertainty of Brexit and the resulting uncertainty.

It can only be added here that, at the same time, U.S. and China GVA grew by nearly two trillion USD or almost as much as the UK annual GVA (!).

This shows a relative decline in both the EU and UK manufacturing, despite the fact, that they both grew in 2018 compared to last year.

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 nearly 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 2015 *number of persons employed of manufacturing* were in Germany 7273 thousand, in Italy 3619 th, in France 2903 th, in Poland 2493 th, in UK 2498 th, in Spain 1769 th, in Czechia 1265 th and in Romania 1203 th. In 2017 were it in Germany 7410 thousand, in Italy 3744 th, in France 3104 th, in Poland 22655 th, in UK 2590 th, in Spain

1918 th, in Czechia 1319 th and in Romania 1216 th. [45]

REASONS FOR LEAVING THE UK

Why is one of the world's strongest industrialized countries leaving the EU? Here are just some of the major economic reasons. Let's look at a few years ago, which led to the economic situation Brexit.

Contributions to EU

The EU budget is used to finance the all-Union policy (agriculture, the development of transport networks, assistance to lagging regions, research and to support developing countries outside the EU) and the administrative apparatus of the EU. The administration takes ca 5% of the budget, for politics - ca 95%. The Commission's list of **net contributions** is based on a method which uses the individual countries' contributions in the form of own resources, such as VAT and GNI, as the basis for the calculations. How much each EU nation puts in the EU budget?

Table6. *Largest net contributions in 2015 [52]*

Billion EUR		% / GDP		EUR per capita	
Germany	14.3	NL	0.54	Sweden	226
UK	11.5	Sweden	0.48	NL	219
France	5.5	Germany	0.46	UK	178
NL	3.7	UK	0.46	Germany	176

In absolute volumes were on 2015the largest net contributors Germany and UK, but in relative terms the Netherlands (NL) and Sweden. The largest beneficiaries were Poland (9.5 bn), Czechia (5.7 bn), Romania (5.2 bn) and Greece (4.9 bn EUR).

External Trade of Goods

In 2018 the UK imports from EU were 301,329 mln; exports to EU 193,926 mln and trade balance with EU was -107,403 mln EUR. The UK share of imports by member state of EU was 13.6% and share of exports by Member State EU 11.1%. [53]
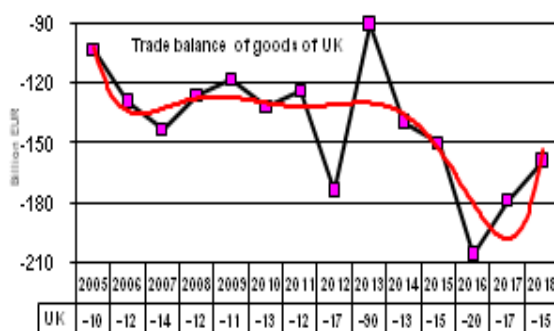
Total trade balance was in 2018 158.5 bn EUR. The deficit in the trade balance of goods in the UK is steadily increasing.

Exchange of Pound Sterling (GBP)

To last look **pound sterling (GBP, £)** exchange reference rates to EUR and USD.

In period from 2000 to 2018 **GBP/EUR**: min (29 Dec 2008) 1.0219; max (23 Oct 2000) 1.7361 and average rate 1.3368. GBP/EUR in 3 years from 15 May 2016 to 16 May 2018 was: min (29 Aug 2016) 1.0757; max (25 May 2016) 1.3171 and average 1.1552. [54]
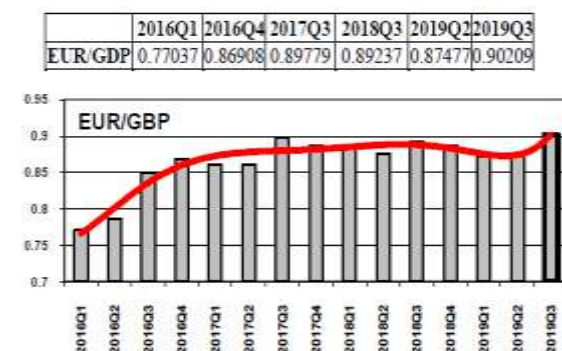

Fig7. *Trade balance of goods of UK [53]*

	2016Q1	2016Q4	2017Q3	2018Q3	2019Q2	2019Q3
EUR/GDP	0.77037	0.86908	0.89779	0.89237	0.87477	0.90209

Fig8. *EUR vs. GBP [54]*

Let's look at the beginning GBP vs. USD historical exchange. Mar 27, 1972 = 2.62; Sep 28, 1992 = 1.71; May 23, 2016 = 1.46. But already on Jul 04, 2016 it was 1.30 and Oct 10, 2016 = 1.22. Subsequently it increased on April 16, 2018 = 1.43, but then again fell on May 16, 2018 = 1.35. [55 - 56]

Forecast (May 2018) of GBP / USD exchange: Jan 2019 = 1.325; Jan 2020 = 1.426; Jan 2021 = 1.230; Jan 2022 = 1.194 [57]

These may be added to the previous analysis of the GDP and GVA.

What is the reason why, according to one, the GDP of the UK is decreasing and by the second increasing? We can find the answer by analysing at exchange rates. For clarity, we look at changes in the currency. The value of GDP has fallen heavily in recent years, particularly in relation to EUR. The UK economy is on the ninth place in the world. [25]

Take the basics this publication and the previous work of the authors [2, 24 - 43], we can make the following conclusions and suggestions.

CONCLUSIONS

- Germany is largest European economy, also by manufacturing, the EU economic motor, which depends on development of most economic indicators throughout of EU.

- 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%, decreased over 4 million persons.

- On the basis of the GDP and the external economy, the UK is not decisive for the EU.

- What is the reason why, according to one, the GDP of the UK is decreasing and by the EU increasing? We can find the answer by analysing at exchange rates. For clarity, we look at changes in the currency.

- The value of the GDP has fallen heavily in recent years, particularly in relation to EUR, the GBP dropped in USD and EUR after Brexit's decision.

- The UK, which is still one of the most important countries in the world, the economic downturn is likely to continue along the spiral, which also includes short-term ups.

- In conclusion, both the UK and the EU economies are weakening in the increasingly competitive world with the USA, China, Japan, India and other countries.

- The situation of global economy in recent years shows, what the superpowers states of EU have lost their leading position also to India, Russia, Brazil and Indonesia. At the same time, however, the UK was the second economic power in the EC. Think about, whether a fragmented Europe can stand alone against the new global economic powers?

- Already we can say that Brexit is economically bad for both.

- Britain will leave the EU, but the majority of European countries are still bound by the NATO and the future of bilateral agreements.

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