

Sectoral Specialization of the EU Member Countries

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Abstract

This paper deals with the sectoral specialization of the EU member countries, tackled in light of three standpoints – technology, required qualifications, and sectors growth intensity. A special attention is given to changes occurred in the Romania manufacturing industry's sectors, drawing conclusions about their concordance or incongruence with the trends which became manifest in the EU.

Key words: *specialization, manufacturing industry, industrial sector, technology, necessary qualification, sector growth intensity*

JEL Classification: *L16*

Introduction

The degree of a country specialization – topic tackled in our previous paper published in this journal – shows the extent to which its economy includes one or more economic sectors much more developed than others (namely the extent to which the economy development is concentrated in the respective sectors), while the sectoral specialization indicator expresses the value added carried out in each sector related to the value added carried out in the reference ensemble.

The analysis of sectoral specialization in the EU member countries allows outlining a comprehensive picture of the different development directions of the manufacturing industry in those countries, as well as identifying complementary areas of their manufacturing industries and the possibilities of mutually beneficial exploitation of complementarities.

Sectoral Specialization of the EU Member Countries depending on Three Benchmarks

Sectoral specialization profile at the level of the EU is significantly influenced by the sectoral specialization of the larger member countries, meaning that there are not marked differences between the two profiles. On the other hand, the sectoral specialization profile of the small member countries or those with a lower development level is significantly distanced from the whole EU profile, indicating their structuring by sectors depending, in an increasing measure, on comparative and competitive advantages they possess – endowment with natural resources,

traditions, location advantages (geographical position, cheap and suitable qualified workforce, favorable tax policy etc.).

Deepening the analysis of sectoral specialization which took place in the member countries in relation to certain relevant criteria reveals interesting new aspects of the directions, favorable or unfavorable, in which changes occurred, as well as the mechanisms that caused these changes. The reference criteria used in the European Commission document dealing with the issue of member countries sectoral specialization are technology, required qualifications, and sectors growth intensity (of economy, and especially, manufacturing industry). Grouping the member countries sectors on levels fixed for each benchmark stands for a taxonomic exercise extremely fertile in conclusions which can be drawn from the data interpreting with regard to different countries orientations in their sectoral specialization and, implicitly, possibilities to intensify the inter- and intra-industry exchanges between countries.

1. Reporting to the technology criterion

In today's "knowledge revolution", leading to crystallization and consolidation of a new type of knowledge-based economy, technology – that is, in fact, applied knowledge – is an important determinant of economic development and sectoral specialization relevant criterion. To determine the sectoral specialization according to this criterion was used grouping industries on four levels adopted by the OECD¹, the results of calculations being presented below.

Table 1. Share of manufacturing industry sectors from the EU member countries by technology levels, in 1995 and 2005 (%)

Country EU27	High technology		Medium-high technology		Medium- low technology		Low technology	
	1995	2005	1995	2005	1995	2005	1995	2005
Austria	9.9	10.1	24.4	29.0	27.9	29.6	37.7	31.3
Belgium	8.6	9.8	33.1	31.2	27.0	29.1	31.3	29.9
Cyprus	1.7	5.7	8.5	10.7	23.9	7.7	65.8	75.9
Czech Republic	4.9	6.3	26.1	34.9	32.3	31.0	36.8	27.8
Denmark	11,0	16,8	25,7	25,2	22,2	21,1	41,0	36,9
Estonia	5.2	4.7	15.9	14.6	16.6	19.5	62.3	61.1
Finland	10.8	22.4	21.8	21.8	20.4	22.9	47.0	32.9
France	13.2	13.5	25.6	26.6	26.5	27.9	34.7	32.0
Germany	8.7	11.8	42.5	44.7	23.7	22.5	25.1	21.0
Greece	4.3	5.4	11.1	10.2	22.6	33.6	61.9	50.9
Hungary	10.6	18.2	23.2	34.6	27.8	24.1	38.4	23.1
Ireland	n.a.	24.6	n.a.	33.3	10.3	7.2	37.2	34.9
Italy	8.1	8.9	25.2	26.6	28.3	29.8	38.3	34.7
Latvia	n.a.	4.1	n.a.	9.3	n.a.	19.0	74.3	67.6
Lithuania	5.6	5.4	12.2	12.1	16.6	31.8	65.6	50.8
Luxembourg	n.a.	n.a.	n.a.	n.a.	n.a.	47.9	26.1	32.0
Malta	n.a.	24.8	n.a.	10.7	n.a.	17.9	52.6	46.6
Netherlands	9.3	6.9	26.9	27.6	22.1	25.2	41.7	40.2
Poland	5.8	5.2	22.0	23.1	27.4	33.3	44.8	38.4
Portugal	5.7	5.2	15.1	16.7	23.7	23.9	55.4	54.2
Slovakia	n.a.	5.2	n.a.	26.5	n.a.	38.6	35.6	29.7
Slovenia	10.2	12.4	23.4	28.4	24.3	28.5	42.1	30.8
Spain	7.7	6.1	24.7	26.1	29.6	32.8	38.0	35.1
Sweden	15.1	20.9	30.5	30.9	21.0	20.8	33.4	27.5
United Kingdom	14.5	16.4	26.5	24.6	22.9	21.4	36.1	37.7
EU25	10.1	11.4	29.9	30.7	25.3	26.2	34.7	31.8

Note: Bulgaria and Romania are not present in the table because of missing data

Source: European Union Industrial Structure 2009. Performance and Competitiveness. European Commission, Enterprise and Industry, Brussels, 2010, pag. 67. Calculations using EUKLEMS data

¹ See OECD. Revision of High-Technology Sector and Product Classification, Paris, 1997

The figures shown in the table spotlight that the share of high-tech sectors increased to varying degrees in most member countries for which data were available in the two reference years; exceptions were Estonia, Lithuania, Netherlands, Poland, Portugal and Spain, the presence of some of these countries among those that share fell was surprising. The most significant increases in the shares were registered in the Nordic countries (Finland - 11.6 percentage points, Denmark and Sweden - by 5.8 pp) – known for their strong orientation towards high technology industries, with products incorporating high value added - and Hungary - by 7.6 pp, Germany - 3.1 pp, UK - 1.9 pp and the Czech Republic - 1.4 pp. Across the EU25, the share of high-tech sectors increased by 1.3 pp.

At the other extreme of technological levels register - low technology - , there were varying degrees of weight reduction in sectors characterized by such technologies, excepting two countries – Cyprus and again very surprising, the United Kingdom.

In the medium high and low technology area, changes in weights occurred in different directions in the member countries, being difficult to identify the dominant trends. One can note, however, significant increases in the share of sectors characterized by medium high technology by Hungary – by 11.4 p.p., and Austria – 4.6 p.p., which highlights their efforts to modernize the structure of manufacturing industry and to attain a higher level of competitiveness; in fact, these countries are among those with major reductions of low technology sectors weight – Hungary by 15.3 p.p., Austria by 6.4, p.p.

Of the former communist countries, Hungary and the Czech Republic prove to be those who managed to achieve more significant beneficial changes in the technological modernization of their manufacturing industry. They are joined by Slovenia, which, also, managed to increase its share of technology sectors framed in the first three levels to the detriment of those corresponding to the forth level, and Poland which, although registered diminishing weight of high technology sectors, slightly increased the weight of low technology sectors.

Our approach to determine missing data in the Table 1 led to approximate figures presented in the following table (the approximate level is determined by some changes brought about by the efforts to put the economic sectors classification in Romania in line with the NACE system). Reporting to 2005 was to ensure comparability with the figures shown in the Table 1, considering that changes in the manufacturing industry structure after that year, although notable, had not the necessary amplitude to significantly change the structural configuration, which presents a certain inertia.

Table 2. Share of the Romanian manufacturing industry sectors by technology level, in 1995 and 2005 (%)

High technology		Medium-high technology		Medium-low technology		Low technology	
1995	2005	1995	2005	1995	2005	1995	2005
7,0	4,1	20,9	24,0	21,0	22,8	51,1	49,1

Source: Processing by the author of the data from the Romanian Statistical Yearbook 2000 and 2009, INS, Bucharest, 2001 and 2010

The figures in the table shows that many changes have taken place between the two reference years, some positive and some negative, with adverse effects on the state of technological modernization of the manufacturing industry.

Among positive changes are recorded growths, in the respective period, by 3.1 percentage points, of medium-high technology sectors share, and by 1.8 p.p. those of medium-low technology. Increases, although far from desired levels, are, however, welcome.

Disappointing is the reduction by 2.9 p.p. of the share of sectors characterized by high technology, that is, those whose weight increased significantly in most countries on the brink or have already made steps in building the knowledge society. These are the sectors that produce

goods and services with considerable value added, with a strong effect on modernization of other industries and branches of the economy. The decrease by 2.0 p.p. of the share of low technology sectors is welcome, but it is still too small compared to the stringent requirements of modernization of the Romanian industry, and the level reached in 2005 is still very high, making the positive side of reduction to lose much of its relevance.

The precarious situation shown by the weight of the Romanian industrial sectors comprised in the extreme groups of four technological levels appears in its real size when compared to the situation in other European Union countries, presented in Table 1.

4.1% share of high technology sectors in Romania, in 2005, was with that in Latvia, the lowest in the Union, and the 49.1% share of low-technology sectors was, by the same year, among the highest (except for Cyprus, Greece, Baltic States and Portugal). In addition, one does not omit the reality that some sectors assigned to the low technology level (Textiles and textile products, Leather and footwear, Wood and wood products) is facing strong competition on international markets coming from producers in countries with clear comparative advantages (endowment with natural resources, cheap labor), especially in Southeast Asia, which calls into question the competitiveness of respective sectors goods and services.

The situation is significantly better in terms of sectors assigned to median levels of technology - medium-high technology and medium-low technology -, the Romanian manufacturing industry having weights closer to the EU25 average and above the achievements of some of the countries, some reputed for their modern industry (for example, in 2005, to the medium-high technology, over Finland, and to medium-low technology, over Denmark and Germany).

Such realities should be mandatory reference guidelines in setting industrial policy of Romania, which focus on developing some of the sectors assigned to these two benchmarks, namely those sectors that have existing and potential competitive advantages - tradition, technical expertise, availability of resources (Chemical products and substances, Oil processing, coal coking and nuclear fuel, Machinery and equipment n.e.c., Electrical machinery and apparatus n.e.c., Motor vehicles etc.).

An argument for sustained development of these sectors in the Romanian industry is that other countries put on their growth more emphasis than high-tech sectors; for example Germany, one of the major industrial powers of the world, has the weight of high-tech sectors at the EU25 average, but very high the weight of medium-high technology sectors, those in which it is fully found the vocation of technical renowned German spirit.

2. Reporting to the necessary qualifications criterion

Considering how the manufacturing industry sectors are assigned to the four levels of their necessary workforce qualification, according to the OECD classification, reveals the existence of similarities with the classification of sectors by their level of technology, according to the same classification, but also some marked differences. Similarities refer to the sectors of Computers and office machines, Radio, TV and communications equipment, Food, beverages and tobacco products, Textiles and textile products, Leather and footwear, Working n.e.c., Recycling, while the differences relate to the rest of the sectors . For example, the Oil processing, coal coking and nuclear fuel treatment sector is placed in the medium-low technology and high qualifications levels, Chemicals sector is considered of medium-high technology and requires highly qualified workforce, the Rubber and plastics products sector is assigned to the medium-low technology level and low qualifications level etc. Differences between the framings of the same sectors on levels corresponding to the two benchmarks are determined by the organization of work and production processes, and the degree of automation of the latter; for example, in some sectors of high technology production processes are more automated and work processes consist, predominantly, in operation simple, repetitive, which requires skilled labor at lower levels of the appropriate technological criteria (the case of such

sectors as Medical, precision and optical instruments, Machinery and equipment n.e.c., Electrical machinery and apparatus n.e.c., Motor vehicles).

The share of manufacturing industry component sectors of the European Union member countries, falling on the four levels of qualifications listed by the OECD, is shown in the table below.

Table 3. The share of manufacturing sector in the EU countries on levels of qualifications, in 1995 and 2005

Country	High qualifications		Medium-high qualifications		Medium-low qualifications		Low qualifications	
	1995	2005	1995	2005	1995	2005	1995	2005
Austria	34,0	35,9	14,6	14,4	32,0	30,8	19,4	18,9
Belgium	43.8	46.1	15.3	15.7	25.5	25.5	15.3	12.6
Cyprus	34.5	40.2	12.3	13.2	27.1	26.2	26.1	20.3
Czech Republic	28.8	29.0	15.6	15.0	30.7	32.7	24.8	23.3
Denmark	36.3	37.6	17.9	18.7	28.7	27.7	17.2	16.1
Estonia	31.6	33.0	14.4	15.3	30.6	33.4	23.4	18.3
Finland	33.2	36.5	18.1	18.4	31.7	31.1	17.0	14.0
France	43.2	46.6	15.9	16.1	24.8	23.2	16.2	14.0
Germany	39.3	41.8	14.7	17.0	28.9	25.0	17.1	16.2
Greece	34.1	34.2	12.3	13.3	25.4	28.3	28.2	24.2
Ireland	39.7	43.5	13.6	15.7	22.6	26.4	24.1	14.5
Italy	35.9	38.6	12.5	15.4	30.5	28.8	21.1	17.2
Latvia	28.4	31.9	20.0	16.7	26.1	35.0	25.5	16.4
Lituania	26.3	27.6	12.5	14.3	33.0	37.2	28.1	20.9
Luxembourg	49.3	55.0	11.7	14.1	23.9	21.5	15.1	9.5
Malta	32.7	36.5	15.9	16.4	26.0	23.4	25.5	23.7
Netherlands	39.6	41.7	15.1	16.8	26.9	25.4	18.4	16.1
Poland	26.7	32.2	10.9	12.6	35.0	33.9	27.5	21.3
Portugal	35.8	38.7	13.1	15.2	27.9	26.8	23.2	19.3
United Kingdom	37.8	41.6	16.2	16.7	26.7	25.3	19.3	16.4
Slovakia	31.6	31.0	14.5	12.5	31.6	35.7	22.3	20.8
Slovenia	34.3	37.2	12.6	13.6	29.9	30.6	23.2	18.7
Spain	32.6	33.4	13.2	13.2	27.2	30.4	27.0	22.9
Sweden	37.0	39.4	19.1	20.3	28.4	26.9	15.5	13.4
Hungary	35.7	41.8	12.7	13.5	25.6	25.6	25.9	19.1
EU25	37.8	39.9	14.7	15.8	28.0	27.0	19.5	17.3

Note: Bulgaria and Romania are not present in table because of lack of data

Source: European Union Industrial Structure 2009. Performance and Competitiveness. European Commission, Enterprise and Industry, Brussels, 2010, pag. 65. Calculations using EUKLEMS data

The figures in the table indicate the same change of center of gravity of the distribution sectors towards medium high and high qualifications, as the Technology criterion, change produced between 1995-2007, both at the EU25 and most of member countries level.

Countries with the largest share in 2005 of sectors characterized by high qualifications were Luxembourg, France, Belgium, Ireland, Hungary, Netherlands, United Kingdom, and those who have registered the largest increase in this share between 1995 - 2007 were Hungary, Luxembourg, Cyprus. The only country that registered, in the mentioned period, the weight decrease of sectors assigned to this first group by the qualification level was Slovakia (0.6 percentage points).

At the level of medium-high qualifications, most member countries increased the sectors share (exceptions: Austria, Czech Republic, Latvia, Slovakia), while at the level of medium-low qualifications most reduced that share (exceptions: Czech Republic, Estonia, Greece, Ireland,

Lithuania, Latvia, Slovenia, Slovakia). Lastly, as far as the low qualifications are concerned, all countries reduced the share of sectors assigned to this level, as a result of structural adjustments achieved in their manufacturing industry, oriented towards the sectors which reduce superior levels of labor force qualification.

Similarly to the attempt made at the previous classification to fill in the missing data regarding the labor force qualification criterion, the undertaken demarche has resulted in some figures which considerably differ from those shown in the Table 3 for the EU member countries, excepting Bulgaria and Romania, imposing their treatment with large reserves and, therefore, their non-acceptance. Large differences explanation lies, perhaps, in the existence of some methodological inconsistencies in calculating these shares.

In spite of the unavailability of reliable data, one can however appreciate that the share of Romanian manufacturing industry sectors that require highly skilled workforce is sensibly below the EU average, being among the lowest, the share of sectors characterized by medium-high and medium-low skills of the workforce is increased, closing to the EU average, and the share of sectors with low qualifications is very high, well above the average, according to the large share of low technology sectors described above.

3. Reporting to the sectors growth intensity criterion

Growth rate over a sufficiently long period of the manufacturing sectors is telling on their previous evolution, but it does not provide clues on their future evolution, their ability to maintain some growth rates or, on the contrary, to steadily restrain their productive activity.

During 1995-2007, a long enough period so that the trends are telling, the sectors of the EU manufacturing industry had displayed evolution rates on five levels of intensity growth, according to the situation presented in the following table.

Table 4. Grouping the EU manufacturing sectors, depending on the pace of their development in the period 1995-2007

Growth intensity	Sectors	Growth pace
High	Electrical and optical equipment	6,5
	Chemicals	4,2
Medium-high	Transport equipment	3,0
	Rubber and plastic products	2,9
	Basic metals and metallic products	2,7
	Machinery and equipment n.e.c.	2,5
Growth average	TOTAL	2,5
Medium-low	Products from non-metallic minerals	1,9
	Other manufacturing	1,7
	Pulp, paper and paper products. Publishing and printing	1,5
Low	Wood and wood products	1,4
	Food, beverages and tobacco	1,1
	Oil processing	0,4
Negative	Textiles and textile products	- 1,2
	Leather and footwear	- 3,4

Source: Data from European Union Industrial Structure 2009. Performance and Competitiveness. European Commission, Enterprise and Industry, Brussels, 2010, p. 70. Calculations using EUROSTAT data

According to grouping sectors presented in the table, sectorial growth profile in the EU member countries is highlighted by figures in the table below.

Table 5. Share in GDP of the EU member countries of sectors depending on their growth intensity in 1995 and 2007 (%)

Country	High		Medium-high		Medium-low		Low		Negative	
	1995	2007	1995	2007	1995	2007	1995	2007	1995	2007
EU27	35.3	38.8	19.5	18.3	16.7	17.0	26.2	24.3	2.2	1.6
Austria	30,5	34.4	20.0	21.4	18.2	17.6	29.9	25.7	1.4	1.0
Belgium	39.2	41.5	19.0	19.1	13.7	13.8	26.7	24.9	1.4	0.8
Bulgaria	30.0	35.5	11.0	15.0	7.8	10.1	46.2	33.5	4.9	6.0
Czech Republic	30.7	32.4	20.6	26.1	13.1	13.3	31.4	26.1	4.2	2.1
Cyprus	29.7	35.7	15.1	14.4	19.3	17.4	33.5	31.8	2.3	0.8
Denmark	33.1	36.3	19.2	16.6	19.7	19.2	26.3	23.6	1.7	4.3
Finland	33.4	38.3	17.2	18.1	21.9	18.6	26.4	24.3	1.1	0.7
France	39.3	42.2	17.0	15.1	16.3	16.8	26.2	25.2	1.1	0.7
Germany	37.5	41.0	21.2	22.2	16.1	16.5	23.9	19.6	1.3	0.6
Greece	29.6	30.4	17.1	18.6	18.2	18.5	32.6	30.9	2.6	1.6
Ireland	37.1	45.3	12.8	12.6	16.9	15.5	31.1	25.7	2.1	0.8
Italy	33.1	38.3	22.0	19.0	15.9	16.2	25.0	24.1	3.9	2.4
Latvia	33.9	34.2	19.3	23.6	10.9	11.6	33.8	29.2	2.1	1.5
Lithuania	23.8	31.4	19.0	20.6	10.6	10.7	41.6	33.8	3.9	2.3
Luxembourg	48.9	56.7	17.8	14.8	12.1	10.9	19.8	17.0	1.3	0.6
Malta	31.8	37.8	18.7	14.3	20.9	25.0	25.2	20.9	3.5	2.0
Netherlands	35.5	38.3	17.7	17.1	16.5	16.9	26.9	24.4	3.3	3.3
Poland	n.a.	27.7	n.a.	25.2	n.a.	12.9	n.a.	30.7	n.a.	3.6
Portugal	28.9	30.6	17.8	16.5	15.8	18.1	32.2	31.5	5.3	3.2
United Kingdom	37.1	41.5	18.5	16.2	16.8	18.0	23.8	21.6	3.7	2.6
Romania	26.6	28.9	17.5	18.2	10.3	11.8	40.7	37.3	5.0	3.9
Slovakia	33.2	29.1	21.2	25.6	11.6	10.5	31.1	32.2	3.0	1.6
Slovenia	32.2	35.7	20.0	22.0	16.0	14.3	27.6	26.2	4.2	1.8
Spain	29.6	30.3	17.8	16.7	20.6	21.0	29.7	30.8	2.4	1.2
Sweden	35.8	37.8	20.3	19.8	19.2	19.6	24.0	22.0	0.7	0.8
Hungary	33.3	37.3	17.4	20.2	13.3	12.8	33.5	28.9	2.5	0.8

Note: Estonia is not included because of missing data. Data for Bulgaria, France and Latvia refer to, respectively, 1998, 1999 și 2000, and no to 1995. For Poland, data refer to 2004

Source: Data from European Union Industrial Structure 2009. Performance and Competitiveness. European Commission, Enterprise and Industry, Publications Office of the European Union, Luxembourg, 2009, p. 70. Calculations using EUROSTAT data

The figures in the table shows that in all member countries the share in GDP of sectors with high growth rate has increased, with the sole exception of Slovakia, in the case of some countries -Ireland, Lithuania, Luxembourg - growth in the period being of over 7 percentage points. To this category of sectors intensity growth, Romania has, except Poland, the lowest share, very close to level registered by Slovakia.

At the other extreme, that of the share of sectors with negative growth, the highest rates recorded in increasing order in Portugal, Netherlands, Poland, Romania, Denmark, and Bulgaria, with levels significantly above the EU27 average. Among the countries with the lowest rates of declining sectors are Germany, Luxembourg, Finland, France, Hungary, Ireland, Sweden, whose economies are proving less likely to risk drastic restriction of some sectors.

If at the share of sectors with negative growth it is added that of the low-growth sectors, representing the most vulnerable zone of the member countries' economies, which has a significant negative influence upon their overall competitiveness, the worst performing

countries are Romania (41.2%), Bulgaria (39.4%), Lithuania (36.2%), Portugal (34.7%) and Poland (34.3%); in order to realistically assess the situation of these countries in terms of low and negative growth sectors share, we emphasize that in the EU27 the figure was 25.9%, and some countries have recorded very low levels – Luxembourg (18.1%), Germany (20.2%), Sweden (22.8%).

Conclusions

The major conclusion resulting from the changes that occurred in the last decade and a half in the manufacturing structure of the EU member countries, analyzed in relation to the three criteria mentioned above, is that the respective structure has undergone, with sensible variations from one country to another, notable transformations, especially in the sense of elevated sectors share increasing, those producing high added value, with high technological and skills levels, and high and medium-high sectoral growth rates. As regards the sectors with medium-low and low levels of the three benchmarks, their share has decreased significantly in most countries, as a result of measures to modernize their economies by gradually restricting traditional sectors, labor- and, some, energy intensive.

In light of the three criteria in terms of which it was analyzed, the Romanian manufacturing industry has vulnerabilities, unfortunately some expanding, due to the lack of a clear strategic vision for modernizing the economy, in general, and industry, in particular, as well as measures and actions necessary to eliminate the adverse effects of forced industrialization policy and economy extensive development, without reference to economic efficiency criterion. Vulnerabilities consist in modest growth of high and medium-high technology sectors (from 27.9% in 1995 to 28.1% in 2005), while the share of high technology sectors decreased during the same period (from 7.0% to 4.1%), unlike most other former communist countries that have experienced spectacular growth, and maintenance at a still high share of low technology and negative growth sectors.

These issues show that the Romanian manufacturing industry is still far from the specific model of industrialized countries, characterized by the predominance of modern sectors, carriers of technological progress, which requires highly skills and accomplish, therefore, high productivity and value added, ensuring the competitiveness growth and effective integration into the international flows of goods and services. The manufacturing industry did not experience profound structural changes imposed by the imperative to be modernized and increase its competitiveness, primarily by decreasing the share of material-, energy-, and labor-intensive sectors, and increasing that of technology-intensive, with high value-added and high technological radiation sectors.

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