

Availability of Skilled Workforce for the Romanian Manufacturing Industry

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Abstract

The article deals with the analysis of labor force necessary for the manufacturing industry, made using relevant indicators - the employment, the evolution of the average number of employees in the component manufacturing activities, the public expenditures with education, the share of the population by educational attainment levels, the share of graduates by education levels and specialization profiles. The overall conclusion of the analysis is that there is a significant gap between the educational offer of the national education system and the demand for skilled workforce in the labor market specific to manufacturing sector

Keywords: *workforce; skilled workforce; employment; economically active population; average number of employees; educational offer*

JEL Classification: *J21; J24; J82*

Introduction

The existence of a workforce with profiles and qualification levels corresponding to the requirements of productive activities in the economy of a country is a condition of its economic development. The quality of the workforce, determined by the set of knowledge, abilities and behaviors that characterize it, means, in other terms, its capacity to be able to continuously adapt to the dynamic requirements of technological progress and new forms of organization of production and work processes, to permanently improve productivity and achieve higher levels of efficiency.

Training the workforce to acquire the qualifications required on the labor market should be achieved according to the forecasted demands. Normally, the foreseeable structural changes in the economy provide the milestones needed to establish a realistic education policy, effectively linked to the dynamics of the labor market, capable of providing an educational offer appropriate to the development of the economy and society.

Labor Force in the Manufacturing Industry

In Romania, after the centralized economy regime, the transition to a market economy and the deep deindustrialization of the economy have produced profound changes in the labor market, of the structure of labor supply and demand, which have reverberated into productive activity in all branches of the economy. In manufacturing, the employment and the average number of employees - ANE evolved according to the figures in the following graph.

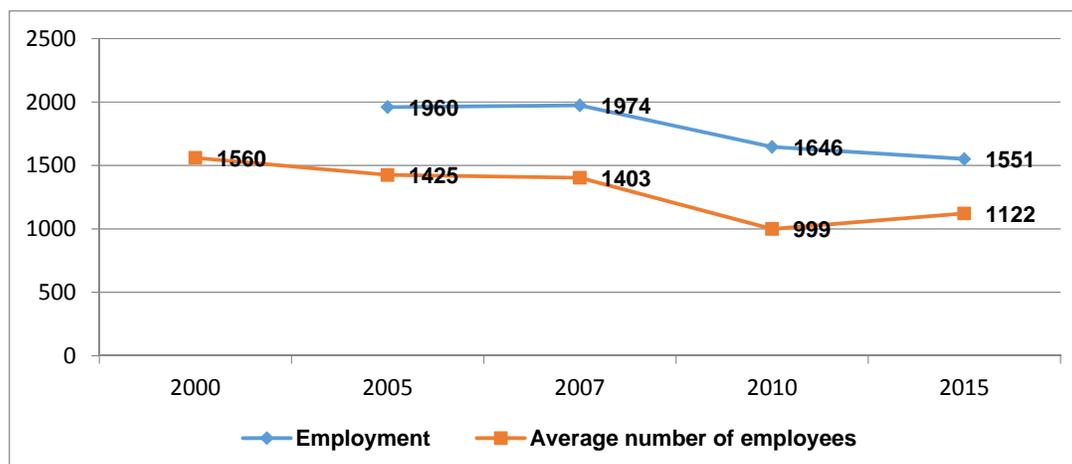


Fig. 1. Employment and ANE in the manufacturing industry, 2000...2015 (thousand persons)

Note: *Employment* represents, according to the methodology of "Household labor force survey", all persons aged 15 years and over, who carried out an economic activity producing goods and services of at least one hour during the reference period (the week previous to the recording) in order to get income as salaries, payment in kind or other benefits.

Average number of employees represents a simple arithmetic mean resulted from the daily employees number, including from the weekly rest days, legal holidays and other non-working days divided to the total calendar days of the year (365 days). Employees who were not employed in full time are included in average number of employees proportionally with the working time from the labor contract.

Source: National Institute of Statistics. Romanian Statistical Yearbook, 3. Labour market, different issues

The decrease in the manufacturing industry workforce, a direct reflection of the deindustrialization of the economy, occurred approximately in the rate of reduction of the value of industrial production, the difference has been brought about by the variation in labor productivity. The steep decline in the ANE, registered in 2007-2010, by 28.8%, caused, among other things, by the global financial and economic crisis, was partially recovered until 2015, when it was only 71, 9% of the level achieved in 2000.

On the manufacturing industry, the evolution of the ANE, which broadly followed the structural changes in the total VAB produced in this industry, is shown in the following table.

Table 1. ANE in manufacturing activities, 2000....2015 (thousand persons)

	2000	2005	2007	2010	2015
Manufacturing industry	1560	1425	1403	999	1122
Food and beverages	169	166	182		
Food				137	147
Beverages				21	19
Tobacco	4	2	2	1	2
Textiles	95	67	58	25	35
Wearing apparel	261	259	215	138	140
Leather and footwear	85	93	87	58	62
Manufacture of wood and of products of wood	70	72	72	47	53

Table 1 (cont.)

Pulp, paper and paper products	17	12	14	9	11
Publishing houses, poygraphy and recording reproducible registrations	20	28	34	14	15
Crude oil processing, coal coking and nuclear fuel treatment	22	14	12	6	4
Chemicals and chemical products	73	49	47	28	24
Basic pharmaceutical products and pharmaceutical preparations				8	9
Rubber and plastic products	33	37	44	37	52
Construction materials and other non-metallic mineral products	85	60	56	38	39
Metallurgy	95	57	50	34	29
Metallic construction and metallic products	68	85	97	73	75
Machinery and equipment (except electrical and optical equipment)	150	104	91		
IT and office means	2	3	3		
Electric machinery and appliances	51	73	87		
Radio, TV and communication equipment	11	8	11		
Medical, precision, optical, watchmaking instruments and apparatus	14	14	15		
Computers, electronic and optical products				20	29
Electrical equipment				32	40
Machinery and equipment n.e.c.				49	48
Means of road transport	71	56	59	107	161
Other transport equipment	61	57	58	29	31
Furniture and other industrial activities n.e.c.	95	99	97		
Furniture				54	61
Other industrial activities n.e.c.				9	14
Waste recovering	8	10	12		
Repair, maintenance and installation of machinery and equipment				25	22

Source: NIS. Romanian Statistical Yearbook 2011, Table 3.11., and 2016, Table 3.13.

The overwhelming majority of manufacturing activities reduced, in varying but significant proportions, the workforce used. The only activities in which ANE increased during the analyzed period were Rubber and plastics products, Metallic construction and metal products, Means of road transport, which also increased their weight in total VAB achieved by the manufacturing industry as a whole.

ANE reductions in other activities were sometimes dramatic (for example, the number in 2015 compared to 2000 was 18.2% in the Crude oil processing sector, 30.5% in Metallurgy, 32.9% in Chemicals and chemical products etc.), which generates legitimate concerns about the prospects for the continuation of many manufacturing activities under appropriate conditions of endowment with the necessary workforce.

Educational Offer

These concerns increased because of the evolution of the national education and training system offer, where many qualifications on education levels were severely restricted during the period considered or even disappeared, as it will be shown below. The reasons of this unfavorable development for the future of the economy and society are the low level of education expenditure, the lack of judicious policies as for the destination of this expenditure, the lack of adaptation of the educational offer to the real demand on the labor market, the old-fashioned content of the curricula, reduced exigency in educational institutions of all grades.

To illustrate the low level of expenditure on education in Romania, the chart in the following figure shows the public expenditure on education / pupil or student in 2014, in some EU member countries, from which results that our country records the lowest level of expenditure between countries compared, at worrying distance from the levels of the other Central and Eastern European countries.

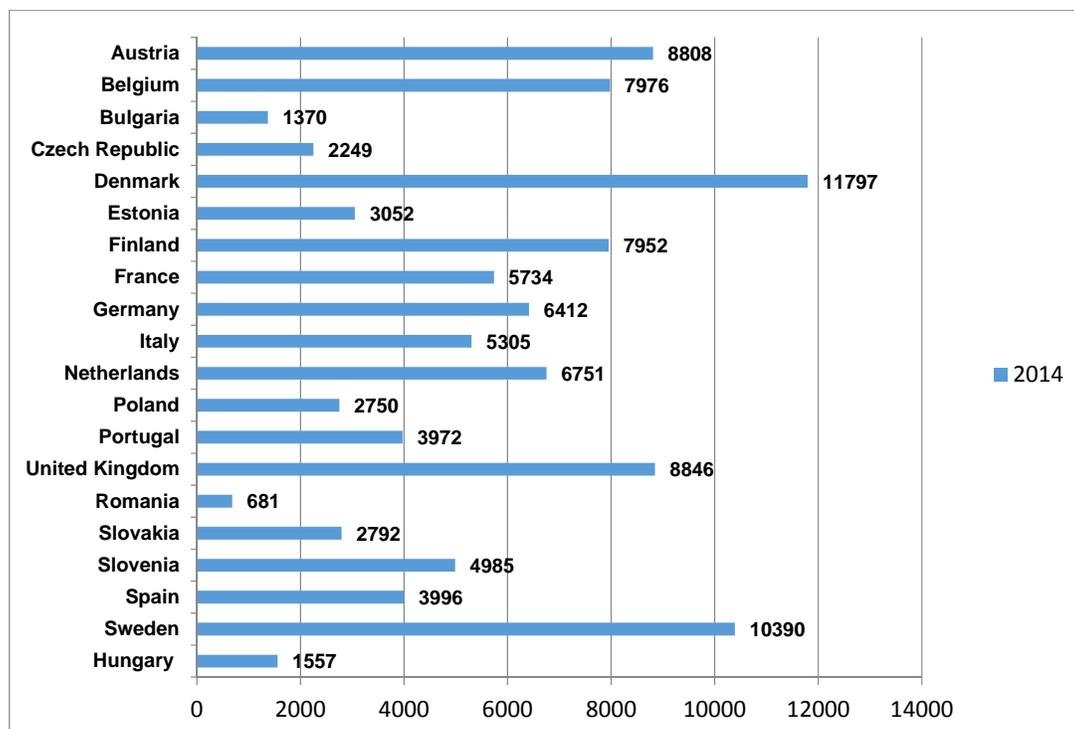


Fig. 2. Public expenditure on education per pupil/student, full-time equivalent (FTE), in some member countries, 2014 (euro)

Source: EUROSTAT. Public expenditure on education per pupil/student based on FTE by education level and programme orientation [educ_uae_fine09]

In 2014, the last for which EUROSTAT provides these data, the expenditure level in Romania accounted for 49.7% of Bulgaria's and 5.8% of Denmark's, to illustrate only the extremes of the expenditure range shown in figure. In the light of these figures, it is evident the wrong policy of the Romanian government authorities, of all political colors, of neglecting education and training, vital in the modern society for economic development, the expansion and deepening of "knowledge" society and the raising of the standard of living of the population. The share of the population by education level also shows significant differences between Romania and the countries compared, as shown by the figures in the following table.

Table 2. Share of population by educational attainment levels, in some member countries, 2016 (%)

	15-54 years			55-74 years		
	Low (ISCED 0-2)	Medium (ISCED 3-4)	High (ISCED 5-6)	Low (ISCED 0-2)	Medium (ISCED 3-4)	High (ISCED 5-6)
EU28	20.5	46.2	33.4	36.3	43.1	20.6
Belgium	20.4	38.9	40.7	42.8	31.6	25.6
Bulgaria	16.9	54.0	29.1	26.0	52.9	21.1
Czech Republic	5.4	69.4	25.2	12.1	73.7	14.2
Denmark	16.9	42.5	40.6	29.7	43.2	27.1
Estonia	10.6	49.6	39.7	17.1	48.3	34.6

Table 2 (cont.)

Finland	9.7	45.0	45.3	26.2	40.2	33.6
France	17.7	43.7	38.7	38.9	40.2	20.9
Germany	13.2	57.8	29.0	16.0	58.6	25.4
Hungary	14.9	59.2	25.9	26.1	57.0	16.8
Italy	36.2	44.4	19.4	59.5	29.7	10.8
Netherlands	19.3	41.9	38.8	39.1	36.1	24.8
Poland	6.8	59.3	33.9	19.3	66.6	14.1
Portugal	46.4	26.3	27.3	79.4	9.7	10.9
Romania	20.9	59.2	19.8	41.5	50.1	8.5
Slovakia	6.6	69.0	24.4	16.2	70.3	13.6
Slovenia	9.7	55.7	34.6	23.3	58.1	18.5
Spain	37.4	23.5	39.2	64.9	15.3	19.8
Sweden	12.6	43.2	44.2	27.3	43.6	29.1
United Kingdom	18.6	36.7	44.7	29.3	38.0	32.7

Source: EUROSTAT. Educational attainment statistics. File: Share of the population by level of educational attainment, by selected age group and country

For the EU28 and in all countries compared, the older generations (55-74 years) have the structure of the population by levels of education net unfavorable compared to that of younger generations (15-54 years), especially at low and high educational levels. It is worth noting the appreciable performance of some countries in the 15-54 age group - Denmark, Estonia, Finland, Poland, Slovakia and Slovenia - whose populations with medium and high attainment education have shares more than 90% of the total population.

Romania has made clear progress in the field of education and training of the population, highlighted by the large differences in the share of the medium and high-educated population between 55-74 years (58.6%) and 15-54 years generations (70.1%), determined by the intensification of educational efforts in the last decades of the last century. In Romania, the share of 15-54 year population with low education is at the level of the European average; the share of medium educated population is above the same average by 10 percentage points, and the share of population with high education is the lowest compared to other countries and represents only 59.3% of the European average.

Statistics on the number of graduates by level of education, presented in the following table, show changes in its structure that are generally in line with those shown in the previous table.

Table 3. Shares of graduate number by level of education, 2000....2015 (%)

	1999/2000	2004/2005	2006/2007	2009/2010	2014/2015
Secondary education	44.7	36.7	32.3	28.3	33.5
High school education	27.4	24.6	27.6	29.1	34.1
Vocational and apprenticeship education	11.0	21.1	19.7	12.7	2.1
Post high school and foremen education	6.2	2.6	1.9	2.7	6.4
Tertiary education	10.7	15.0	18.5	27.2	23.9

Source: own calculations based on data from the NIS. Romania's Statistical Yearbook 2001, Table 15.4, and 2006, 2008, 2011 Series, 2016, Table 8.4.

The most striking evolution of the shares presented in the table is that of graduates of vocational and apprenticeship education, which decreased over the period 2000-2015 more than five times. This is the effect of a measure taken in 2003 to eliminate vocational schools and replace them with arts and crafts schools in order to create an easier way to access school-leaving examination and higher education; the measure deprived the productive activity of workers whose occupations were indispensable for carrying it out, since the schools in question did not have sufficient practical training for the proper assimilation occupation of trades. The

inopportunity of the measure has been proven by the fact that it was canceled in 2009, but its profoundly negative effects continued to persist.

The increase in the share of high school graduates number was notable and beneficial for the general level of education of the population, but this quantitative evolution as well as that of the graduates of higher education was not coupled with a qualitative evolution, the preparation of a good part of the graduates of the two levels of education presenting more and more worrying gaps in the past three - four decades. This is the undesirable but natural outcome of maintaining obsolete educational programs focusing on the memorization and reproduction of knowledge and not on the development of skills and abilities, lack of motivation and interest for a good part of the teaching staff, lack of professional career perspective for many specialization profiles.

The analysis of the number of graduates of different education forms and profiles corresponding to the manufacturing activities, presented in the following table, also highlights the existence of many inconsistencies and negative evolutions, with unfavorable effects on productive activities, which negatively influence the prospects for further development of some of them.

Table 4. Number of graduates by level of education and profiles, 2000...2015

	1999/2000	2004/2005	2006/2007	2009/2010	2014/2015
Vocational schools (with manufacturing profiles)	20972	87663	72002	43675	3803
Engineering	6347	32262	27719	17882	1599
Electrotechnics and electronics	2392	16645	13618	8413	431
Oil	840	1197	578	508	52
Metallurgy	511	291	33	51	7
Industrial chemistry	1074	2095	1361	892	82
Construction materials	428	667	590	365	-
Wood exploitation and processing	2993	8579	7286	3982	513
Food industry	1605	6535	6396	4874	453
Light industry	4782	19422	14421	6708	666
Special vocational schools (with manufacturing profiles)	1915	1867	1721	1254	241
Engineering	353	388	387	278	44
Electrotechnics and electronics	-	-	6	-	-
Industrial chemistry	8	5	-	7	-
Construction materials	-	13	-	10	-
Wood exploitation and processing	422	352	336	327	38
Food industry	39	61	74	28	30
Light industry	1093	1048	918	604	129
Post high schools (with manufacturing profiles)	3249	1722	819	1381	3827
Engineering	239	183	124	223	586
Electrotechnics and electronics	275	40	23	110	331
Metallurgy	-	-	-	-	25
Industrial chemistry	193	16	-	40	284
Construction materials	-	-	-	15	-
Wood exploitation and processing	115	64	59	89	277
Food industry	499	454	173	378	522
Light industry	657	161	77	77	202
Informatics	1271	804	363	449	1600
Foremen schools (with manufacturing profiles)	2148	766	481	1479	1668
Engineering	1101	483	172	756	887
Electrotechnics and electronics	401	99	97	337	400
Mines Oil	-	-	-	107	118
Metallurgy	94	36	25	60	51

Industrial chemistry	100	59	66	48	121
Construction materials	111	18	29	-	-
Wood exploitation and processing	85	26	63	85	-
Food industry	14	-	-	16	45
Light industry	242	45	29	70	46
Industrial high schools	47861	48956	54520	74001	50955
Technical tertiary education					
Industry	11480	16170	15242	21062	30071 *
Mines	195	111	112	97	7142 – ICT 22929 – Engineerin, manufaktur ng and construction s (Specializati on groups ISCED-F)
Oil - Geology	124	216	297	339	
Metallurgy and engineering	2995	3102	2571	2595	
Electric power and electrotechnics	6175	9131	8880	6661	
Chemical technology	795	824	876	608	
Wood and building materials industry	68	230	213	101	
Light industry	254	904	524	157	
Food industry	874	1652	1312	2469	
Engineering **	-	-	457	8035	

Note: * - starting with the academic year 2014/2015, tertiary education includes graduates with a diploma, graduates with a master's degree, graduates of post-graduate courses, doctoral and post-doctoral programs;

** - includes: economic engineering, environmental engineering, engineering sciences and industrial engineering.

Source: NIS. Romanian Statistical Yearbook 2011 Series, tables 8.9., 8.10. and 8.13.; 2016, tables 8.11. and 8.14.

The decrease in the number of graduates of vocational schools by 81.9%, the graduates of the special vocational schools by 87.4% and the graduates of the foremen schools by 22.3% from 2000 to 2015 is the result of the further decline of the manufacturing activities after 2000 and, especially, of the lack of consistency between the number of students and pupils to be taught and the number of applications for employment from economic units. In addition, the labor market was affected by the cessation of the vocational schools' functioning, which in 2005 recorded the highest number of graduates. If in certain specialization profiles corresponding to manufacturing activities the reduction of the number of graduates was in line with the decrease of industrial production, in other profiles the reduction of this number occurred despite the expansion, the maintenance at a constant level or the much less restricting of the industrial activities where these graduates were needed; it is the case, for example, of the Metallurgy or Industrial Chemistry specializations, to which the drastic reduction in the number of graduates of vocational schools was far superior to the reduction of the share of corresponding activities in the total VAB produced by the manufacturing industry.

At the levels of vocational schools, special vocational schools, post-high schools and foremen schools there were, during the period 2000-2015, some disruptions and steep ups and downs in the number of graduates, which indicates the lack of vision and continuity in the planning of the number of places in the respective education units, as well as of connection with the labor market demands.

Increases in the number of graduates were recorded, during the mentioned period, in the special post-high schools with manufacturing profile (by 17.8%), industrial high schools (by 6.5%) and tertiary education (2.6 times), which represent positive developments and increased capacity of the workforce with the respective levels of training to cover, to a greater extent, the demand for industrial units' jobs. These increases, coupled with the sometimes abrupt decrease in the number of graduates of the other levels of education referred to in the previous paragraph, prove, once again, the lack of realistic vision in the planning of the number of places in education, since the distribution of the number of graduates by qualification levels does not

respect the "normal pyramid" (reducing the number of graduates as they climb on the skill levels).

The appreciable increase in the number of graduates of technical tertiary education was not accompanied, unfortunately, by the qualitative improvement of their training, many graduates proving that they do not have the necessary knowledge and skills and did not acquire the behaviors required in the workplaces where they are employed.

Conclusions

- In the field of labor force, generally at the level of the society and, in particular, that of the manufacturing industry, the period 2000-2015 was marked by various developments which, together, present the picture of a worrying recoil consisting in the lack of a strategic vision of adequate human resources' training and in the decrease of average professional quality of this training. Logically, the deindustrialization of the economy has significantly reduced the demand for skilled labor in industrial specialties and has given the chance to better educate and train a lower number of people, better suited to the requirements of technological progress and entry into the age of the knowledge economy. The chance has not been capitalized, the national education and training system presenting deep deficiencies today, consisting of chronic underfunding, the outdated curricula that emphasizes memory rather than the acquisition of pragmatic knowledge and skills, the decreasing quality of teaching staff, the poor real estate and technical infrastructure;
- The reasons for the deficiencies of the national education and training system are the institutional instability, the impossibility of applying medium and long-term programs in the conditions of frequent changes of the leading cadres in the Ministry of National Education, the lack of a national strategy for the evolution of the system so as to increase its functionality and significantly improve its performance;
- The low or declining level of the majority of indicators that reflect, quantitatively and qualitatively, the preparation of the labor force and its adequacy to the real labor market demands from the productive activities, proves that at the level of the authorities - the Parliament and the Executive -, the education and training are not considered as essential pillars of the future evolution of society, in line with the global trends in this field. The widening of the gaps between the levels of these indicators registered in Romania and across the European Union makes it imperative to establish a strategy and policies aligned to European practices and destined to gradually reduce the mentioned malfunctions and to bring the national education and training system back to the normal and performing state.

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