

# **Investment and Energy Intensity as Determinant Factors of the EU and Romania Industrial Competitiveness**

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## **Abstract**

*This paper deals with the investment and energy intensity's influence on industrial competitiveness at the level of the EU as a whole and Romania. The comparison between the two entities on these influences highlights the existence of numerous congruities and, also, discrepancies, unfavorable to the Romanian manufacturing industry.*

**Key words:** *competitiveness, investment, foreign direct investment, energy intensity*

**JEL Classification:** *L16*

## **Introduction**

The investment and the energy intensity represent – along with labor, human capital, technology and innovation potential dealt with in a previous paper – another two factors which influence in a large measure the industrial competitiveness of a productive entity.

## **Investment Intensity**

Investment is able to bring about significant changes at the level of economy or its constitutive branches and, implicitly, modifications of the relationship among their constituent parts. Investments are oriented towards the sectors having the most promising prospects to ensure high and stable incomes, namely those characterized by high entry barriers and low exit barriers, in accordance with the Michael Porter's conception<sup>1</sup>. Fastly migrating towards the most attractive activities, the investment substantially contributes to forging industrial configuration and intensive development of profitable sectors, whose expansion is superior to that of the manufacturing industry as a whole.

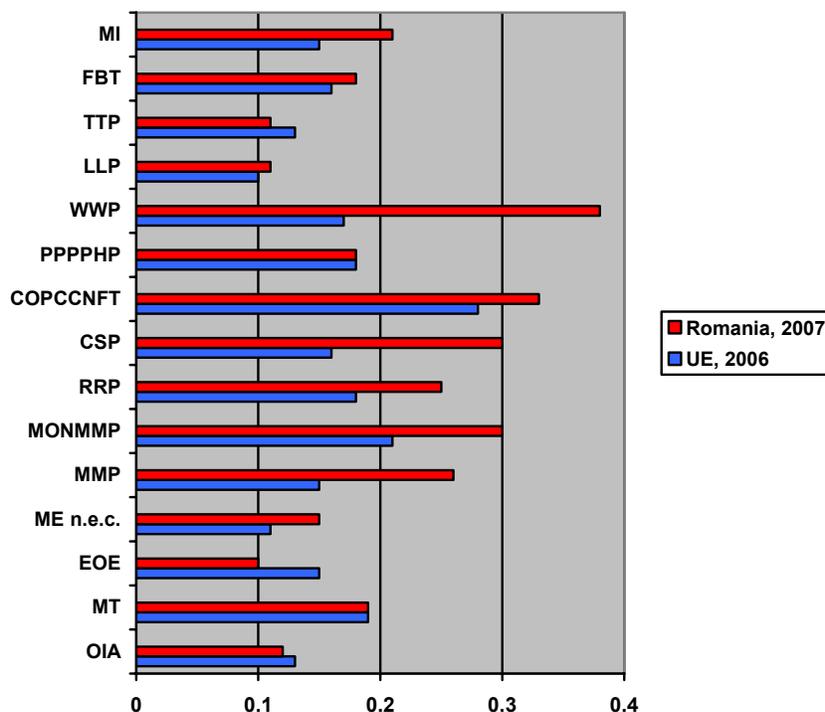
The investment increases the production capacities and ensures their modernization, contributing to labor productivity growth and, implicitly, to products and services, companies

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<sup>1</sup> M. Porter. *Competitive Strategy. Techniques for Analysing Industries and Competitors*, The Free Press, New York, 1980, p. 22

and sectors' competitiveness increase. By improving technologies, innovation potential, and extension of intangible assets (for instance, introduction of software applications), the investment speeds up the structural adjustments imposed by the technological progress.

A first indicator which highlights the investment effort intensity is the report between gross formation of fixed capital (GFFC) and value added (VA). The figures corresponding to the respective report by 2006, for 21 the EU member countries (Estonia, Greece, Latvia, and Malta are missing), by some industrial sectors, are shown in the next figure; for Romania, the figures concern the report between net investment (NI) and gross value added (GVA) by 2007 (sectors CAEN Rev. 1).



**Fig. 1.** Investment effort intensity in the manufacturing industry and its constitutive sectors, in the EU, 2006, and Romania, 2007

Legend: MI – Manufacturing industry; FBT – Food, beverages and tobacco; TTP – Textiles and textiles products; LLP – Leather and leather products; WWP – Wood and wooden products; PPPPHP – Pulp, paper and paper products, Publishing houses and printing; COPCCNFT – Crude oil processing, coal coking and nuclear fuel treatment; CSP – Chemical substances and products; RRP – Rubber and plastic products; MONMMP – Manufacture of other non-metallic mineral products; MMP – Metalurgy and metal products; ME n.e.c. – Machinery and equipment n.e.c.; EOE – Electrical and optical equipment; MT – Means of transport; OIA – Other industrial activities

Source: for the EU – EUROSTAT data processing; for Romania – processing by author of data from the Romanian Statistical Yearbook 2009, INS, Bucharest, 2010, pp. 555-558 and 584

The comparative analysis of the two rates calculated for the EU21 and Romania spotlights the bigger intensity of the investment effort in Romania on the manufacturing industry as a whole and most of its sectors. The most significant over-fulfillment has been registered in the case of sectors Wood and wooden products, Chemical substances and products, Rubber and plastic products, Manufacture of other non-metallic mineral products, Metalurgy and metal products. In the EU21 the figures related to the 1995-2006 period point out the investment effort reduction,

particularly in the sectors of textiles and clothing articles, crude oil processing, chemicals, and means of transport.

A second relevant indicator regarding the investment effort is the gross fix capital formation (GFCF) growth. The growth rate of this indicator throughout the 1995-2006 period in the EU, without Spain and the United Kingdom, and the net investment index (NII) throughout the 2000-2007 period in Romania, are shown in the table below.

**Table 1.** GFCF and NII growth rates in the EU, 1995-2006, and, respectively, Romania, 2000-2007

	EU GFCF increasing 1995-2006	România NII 2000-2007
Manufacturing industry	0,9	165,8
Food, beverages and tobacco	-0,5	185,9
Textiles and textiles products	-2,8	70,4
Leather and leather products	-1,0	86,8
Pulp, paper and paper products, Publishing houses and printing	-0,1	186,1
Crude oil processing, coal coking and nuclear fuel treatment	3,0	240,8
Chemical substances and products	0,3	132,4
Rubber and plastic products	1,0	153,6
Manufacture of non-metallic mineral products	-0,1	176,0
Metals and metallic products	1,85	298,4
Machinery and equipment n.e.c.	0,7	138,5
Electrical and optical equipment	2,6	167,4
Means of transport	0,8	459,3
Other industrial activities	0,1	131,7

Source: for the EU – EUROSTAT data processing; for Romania – Romanian Statistical Yearbook 2008, INS, Bucharest, 2009, Chapter 12

In spite of the fact that the indicators used for comparison of the two entities and their expression forms are different, one can however take out the investment efforts trends by industrial sectors, as well as conclusions regarding congruity or divergence of these trends in the EU and Romania.

The trends convergence became manifest in most analysed sectors, excepting Food, beverages and tobacco, Pulp, paper and paper products, Publishing houses and printing, Manufacture of non-metallic mineral products, which registered in the EU negative growth rates and in Romania significant growth index, above the manufacturing industry average. The most emphasized convergences were registered in the sectors Crude oil processing, coal coking and nuclear fuel treatment and Metals and metallic products, the first sector presenting an investment effort intensity superior in the EU as compared to that registered in Romania, and the second - a reverse situation.

As far as the Food, beverage and tobacco sector is concerned, if the investment meant to it in the EU diminished as a result of domestic and international markets saturation and export reduction, in Romania the investment index was sensible above the manufacturing industry average, the prospects of further on sector development being appreciable.

The largest net investment growth index in Romania was registered in the Means of transport sector (which includes the CAEN Rev. 2 Manufacture of motor vehicles, trailers and semi-trailers, and Manufacture of other transport equipment sectors), as a result of massive investment made by Renault and Ford in the productive units from Mioveni and Craiova; in the EU, the GFCF growth rate was close to medium level registered on the manufacturing industry.

The second sector in the hierarchy established depending on the net investment index throughout the analysed period was Metallurgy and metal products, which also registered a notable GFCF growth index in the EU, as a result of more intensive growth of the CAEN Rev. 1

Metallic constructions and metal products sector (491,3), as compared to that of Metallurgy sector (121,1).

The other sectors with indexes above the manufacturing industry average were Food, beverages and tobacco, already mentioned, Pulp, paper and paper products, Publishing houses and printing (as a result of more intense growth of the CAEN Rev. 1. Publishing houses, polygraphy and reproduction of recorded media sector), Manufacture of other non-metallic mineral products (given the large possibilities to turn to account the existent raw material basis) and Electrical and optical equipment (which benefits from the existence of appreciable production traditions and knew in the analysed period a particular interest of investors in the IT and office means field).

The investment efforts, which vary within large limits among the Romanian industrial sectors and mark sometimes notable differences as compared to the EU orientation, point out, on the basis of data related to an long enough representative period, the attractiveness of different sectors for the domestic and foreign capital, brought about by a set of factors – raw material availability, existent production capacities, modernization requirements of production processes, prospects of demand on the domestic market and export, prospects of obtaining a substantial income from investment (*ROI – return of investment*). For the most analysed sectors, these factors justify the shown levels of the net investment and prefigure their prospects.

*The investment intensity*, conditioning the technological level of industrial sectors and economy's branches, can be determined as the report between the stock capital of each sector and its personnel or, more easily, as the report between the investment in tangible assets and the number of employees. The investment intensity can represent, above a certain level, a redoubtable barrier to entry a sector and conditions, in a large measure, the products/services costs and, implicitly, their competitiveness. The data regarding this indicator at the level of some NACE Rev. 1 sectors in the EU throughout the 2004-2006 period (in million euro/1000 employees) and CAEN Rev. 1 in Romania, by 2008 (in million RON/1000 employees), are shown in the next table.

**Table 2.** Investment intensity of industrial sectors in the EU and Romania

	EU mil. euro/1000 emp. 2004-2006	Romania mil. RON/1000 emp. 2008
Crude oil processing	39,5	105,98
Chemical substances and products	13,0	34,59
Transport equipment	10,4	15,15
Non-metallic mineral products	8,5	45,75
Food, beverages and tobacco	7,1	24,01
Pulp, paper and paper products. Publishing houses and printing	6,7	23,48
Rubber and plastic products	6,6	23,29
Basic metals and metallic products	5,8	15,92
Electrical and optical products	5,5	16,81
Wood and wooden products	4,7	21,39
Machinery and equipment n.e.c.	4,3	11,63
Other industrial activities	3,7	6,86
Textiles and clothes	2,3	3,09
Leather and footwear	2,0	2,21

Source: for the EU – EUROSTAT data processing; for Romania – processing by authors of data from Romanian Statistical Yearbook 2009, INS, Bucharest, 2010, pp. 146-147 and 584

The industrial sectors hierarchy by their investment intensity made throughout the mentioned periods for the EU corresponds, to a large extent, to that resulted for Romania. Among the EU sectors order are not ranged the following Romanian manufacturing sectors: Transport equipment, which had an investment intensity much inferior to that registered in the community space in spite of the massif investment mentioned above; Non-metallic mineral products, with

an intensity which would place it on the second position (explained by the quantitative and diversified availability of raw materials); Electrical and optical equipment (two places difference given the European hierarchy); Wood and wooden products (whose special intensity is explained by the appreciable raw material basis available, worked however irrationally by excessive exploitation of the forest stock and turning insufficiently to account the wooden mass, as well as the sector consecrated traditions).

## Energy Intensity

It is an indicator with the same significance as the precedent one, but with other reference object, namely the energy quantity consumed for producing a product/service unit, therefore incorporated in the latter. At the industrial sector level, the energy intensity represents the energy quantity incorporated in the products/services specific to the respective sector; the sector is considered energy-intensive if that quantity exceeds the whole industry average.

The indicator is determined as value of energy consumed in the production process divided by the value added afferent to that production, excluding the energy incorporated in the raw material processed in the respective production process.

The energy intensity is a determinant of products/services competitiveness since the energy they incorporate influence, sometimes in an appreciable measure, their production cost, depending on their energy-intensity.

The energy intensity of the EU industrial sectors, registered as average throughout the 2004-2006 period and shown in the next table, provides a conclusive picture of sectors grouping depending on the level of respective indicator.

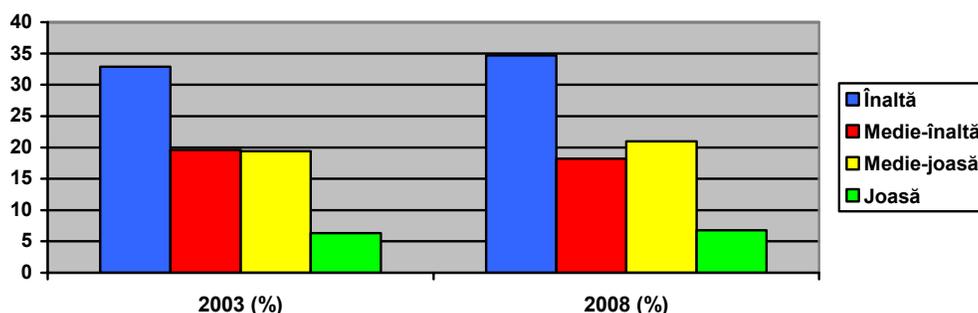
**Table 3.** The EU industrial sectors grouping (NACE Rev. 1) depending on their energy intensity, 2004-2006 average

	Energy/ Production (%)	Energy/V A (%)	Group	Average Energy/V A (%)
Basic metals	5,6	24,8	High	21,1
Pulp and paper	5,8	20,8		
Crude oil processed	1,5	17,4		
Non-metallic mineral products	6,0	16,8		
Chemicals	3,1	10,5		
Textiles	3,1	10,3		
Food and beverages	2,1	8,7	Mediem/ high	7,6
Wood and wooden products	2,4	8,0		
Rubber and plastic products	2,4	7,5		
Leather and footwear	1,4	5,4		
Clothing articles	1,3	4,5	Mediem- low	3,7
Metallic products	1,6	4,4		
Furniture and other industrial activities	1,2	3,7		
Motor vehicles	0,7	3,5		
Machinery and equipment n.e.c.	1,0	2,8		
Electric machinery and apparatus	0,9	2,8		
Other transport equipment	0,7	2,5	Low	2,1
Radio, TV and communications equipment	0,7	2,3		
Publishing houses and printing	0,8	2,2		
Tobacco	0,3	1,7		
Scientific instruments and others	0,7	1,7		
Office machinery	0,3	1,6		

Source: EU industrial structure 2009. Performance and competitiveness. European Commission, Enterprise and Industry, Publications Office of the European Union, Luxembourg, 2009, p. 106. EUROSTAT data processing

The Romanian industrial sectors grouping depending on their energy intensity as compared to that registered in the EU throughout the 2004-2006 period points out that in the Romanian manufacturing industry most sectors in which it is specialized are framed in the first two groups – of high and medium-high energy-intensity -, in spite of the fact that the Romanian energy independence degree was, by 2008, of 72,5% (coal – 72,7%, crude oil – 35,5%, natural gas – 72,0%), and the oil price continuously increased. The final energy consumption (in equivalent oil tons – eot) of industry (including constructions) however decreased from 11285 thousand eot by 2004 to 10505 thousand eot by 2005 and 9415 thousand eot in 2008, as a result, mainly, of significant industrial activity restriction.

An alarming reality is that in the Romanian manufacturing industry's structure the weight of energy-intensive sectors increased, during the 2003-2008 period, as shown in the next figure, in which the sectors grouping followed the previous table model.



**Fig. 2.** The Romanian manufacturing industry structure depending on sectors grouping by their energy intensity, by 2003 and 2008

Source: processing by authors of data from the Romanian Statistical Yearbook 2009, INS, Bucharest, 2010, p. 853

The growth throughout the mentioned lapse of time with 1.8 percentage points of the high energy-intensity sectors weight was brought about by weight increase of Crude oil processing by 4,5 p.p. and Non/metallic mineral products by 0,8 p.p., the other constitutive sectors of this group (see the Table nr. 3) diminishing their weight. It is necessary, at the same time, to underline the beneficial reduction in the industrial production of the medium-high energy intensity sectors weight (see the same table), as well as the gladdening growth of the sectors weight showing a medium-low and low energy intensity.

## Conclusions

From the standpoints of these two industrial competitiveness determinative factors, in the Romanian manufacturing industry, the actions of restructuring production and modernizing the production processes should go resolutely and consistently on, by a judicious industrial policy, in order to significantly reduce the energy-intensity on the whole, particularly by reduction of high and medium-high energy-intensity sectors weight.

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## Investițiile și intensitatea energetică în calitate de factori determinanți ai competitivității industriale a UE și a României

### **Rezumat**

*Articolul tratează influența investițiilor și a intensității energetice asupra competitivității industriale la nivelul Uniunii Europene în ansamblu și al României. Comparația între cele două entități privind aceste influențe evidențiază existența a numeroase convergențe și, de asemenea, discrepanțe, defavorabile industriei prelucrătoare românești.*