

RECENT EVOLUTION OF ROMANIAN INDUSTRIAL COMPETITIVENESS IN THE EUROPEAN CONTEXT

Felea Adrian Ioan

Economics Department, Faculty of Economic Sciences, University of Oradea
adi_f11@yahoo.com

Abstract: *Competitiveness is a key concept and a constant concern of the contemporary society. This article is meant to evaluate Romania's industrial competitiveness level. The first part of the article, refers to the importance of the constant concern regarding the national competitiveness concept, and also regarding its branches and economic sectors. The second part of the article reveals the set of applied indicators used to describe the sectoral competitiveness in the context of sustainable development. This indicators refer to the following: GDP (I1); GDP annual growth rate (I2); Employment rate (I3); Work force productivity (I4); Exports (I5); Total gas emissions (I6); Energetic intensity (I7); Sustainable energy resources percent of total primary energy (I8); Waist disposable performance (I9); Research, development and innovation expenses as a percent of GDP (I10); Engineers and exact science specialists percentage (I11); Professional training degree (life long learning) (I12) TIC training degree (I13) Generated FDI stock / received FDI stock (I14). The application developed in this article is meant to present the results of the conducted evaluations, regarding the economic competitiveness indicators used in the field of anian industry, and in the last part of the paper reveals the conclusions and recommendations of the analysis. The application was developed using the data bases presented by the Romanian National Institute of Statistics and Eurostat.*

Key wods: *competitiveness, industrial competitiveness, applied indicators*

JEL Code: *F23; R11*

1.Introduction:

The economic literature regarding competitiveness reveals a great number of definitions and interpretations, the most important being presented in the first Report of the PhD Thesis, report that is entitled „The actual state of the concerns related to competitiveness and sustainable development” (Felea Adrian Ioan, 2011). The concerns regarding competitiveness are present in all the plans of the economic and social life, at national, regional, industrial, sectoral and firm level. Especially in the last decade there have been intense discussions regarding the EU competitiveness reported to its main international competitors USA, China and Japan.

This article is not meant to detail the definitions, interpretations and concerns regarding the national, regional and firm competitiveness concept, but it focuses on the economic sectoral competitiveness, a subject that is less popular within the recent economic literature, compared to the concept of national and regional competitiveness.

According to the position occupied on the Resources – Consumers trajectory, the economic sectors are divided into the following categories (Olah, 2004): primary

sector (agriculture and extractive / mining industry); secondary sector (manufacturing industry and constructions) and the tertiary sector (services). Some researchers consider constructions branch as a separate sector (IER, Studiul 2/ 2006).

In the structural and competitiveness analysis of our national economy, we can also find the concept of activity branch (as a branch of the national economy), defined as the ensemble of economic entities (companies, firms, institutions, etc) that obtain similar products / services (for exemple: agriculture, forestry, industry, constructions, transport, trade, finances, etc). The national economic branches can be divided into three spheres: the sphere of materials production, the sphere of spiritual production and the sphere of services (Olah, Gheorghe; 2004).

The economic sector competitiveness is fundamental for the national competitiveness. Although the structuring and evaluation of nations does not reflect the competitiveness of economic sectors, it implicitly comprises it, and that is reflected in the phase of defining the national competitiveness concept. For example the most simple and also complex definitions, are the following: "The capacity of an economy to obtain and mantain high GDP per capita growth rates" (World Economic Forum). The existance of a certain capacity involves, obviously competitive economic sectors.

"Competitiveness results from the ability of a certain country to produce goods and services respecting the free trade and market efficiency conditions, that can resist the international market test, in the conditions of maintaining and growing the real income on long term" (IER, Studiul 2 / 2006, OECD definition).

It is obvious that the goods and services production in the specified in the above definition, may be realised only in competitive economic sectors.

The first Study of IER entitled „The Romanian economic competitiveness. Necessary adjustments for achieving the Lisabon Agenda objectives" refres directley to the sectoral competitiveness (mezzeconomic), the conducted analysis being set on two different levels: „price based competitiveness" and „quality competitiveness". At an economic sector level IER recommends combining the quantitative aspects (price, export volume, productivity, investment) with the qualitative aspects (management, brand, innovation).

Regional competitiveness subject, and Romanian services and agricultural competitiveness concepts are reflected more complex in the Romanian economic literature, compared to the industrial sector competitiveness. A sistematic approach exemple of regional competitiveness in Romania is a PhD thesis entitled „Human resources and regional competitiveness" (Banica, 2009), that argues that a competitive region is the one that presents high quality factors (capital and qualified human resources), and it combines the above mentioned factors to support innovation and technological progress.

This defining method reflects the importance of the industrial sector (technological progress) on regional competitiveness.

With reference to services competitiveness another important study reveals the following definition: „a nation's or a region's capacity to generate a relative growth of incomes from services and a relative growth of employment in sevice activities, in the conditions of exposing to regional and international competitiveness". The definition formulated by WEF for economic competitiveness mentioned above may be applied to any economic sector. Obviously, sector competitiveness is explained

as being its capacity to contribute at achieving and maintaining high GDP per capita growth rates, in the present existing constraints. The main constraints in which the economy operates and implicitly its sectors are the ones regarding the natural environment and the socio – political and economical environment in which it operates. Under the natural environment aspect, the constraints involving the sustainable development must be considered. From a social economical and political point of view must be considered the following aspects:

1. Social cohesion – one of the three important pillars of sustainable development;
2. Economic activities globalization;
3. State interference in the sectoral activities (through regulations and its institutions);
4. The companies' contributions (private, multinational, foreign) to building the sector competitiveness.

Therefore, the realistic evaluation of sectoral competitiveness may be conducted only in the conditions imposed by the sustainable development strategies, at two different levels:

- At national economic level, through evaluating the sector's economic performance, based on indicators as: the sector's contribution to GDP per capita, sectoral distribution of the added value, work force productivity, costs per unit, work force;
- At the international transactions level, through the identification of the method the analysed sector competes on the international market or it confronts the external competition on the local market, based on indicators as: export market share, export structure, comparative advantage index.

2. Applied indicators for describing the sectoral competitiveness:

If annual models were imposed for evaluation of national competitiveness, that were operated by prestigious international institutions, there is no unitary methodology with reference to the economic sectors competitiveness to be applied by the European or international institutions. The monitoring and evaluating methods applied by national institutions may be grouped in the following categories: inventory analysis, analysis based on statistical indicators in absolute and / or relative values, using statistical and econometric methods. Multi-criteria analysis based on composed indicators.

For describing the sectoral competitiveness concept, as in the case of national and regional competitiveness, several types of indicators may be used: independently used, divided in several categories and aggregated in synthetic indicators. For classifying the sectoral competitiveness indicators may be used similar criteria as in the case of regional competitiveness: comprised qualitative and quantitative aspects, according to their implication on competitiveness, or according to the time variable (t), according to the analysis complexity (Banica, 2009).

The indicators selection is made based on requirements as: simplicity, relevance, accuracy, information availability. Setting the set of indicators that will be used is a fundamental phase of the complex evaluating process of sectoral competitiveness, that involves: screening the present situation, identifying the causes responsible for the existing gaps and projecting the solutions for improving the indicators and also the competitiveness.

The suitable indicators for evaluating the national economic sectors competitiveness, in the conditions of sustainable development are the following:

- GDP (I1);
- GDP annual growth rate (I2);
- Employment rate (I3);
- Work force productivity (I4);
- Exports (I5);
- Total gas emissions (I6);
- Energetic intensity (I7);
- Sustainable energy resources percent of total primary energy (I8);
- Waste disposable performance (I9);
- Research, development and innovation expenses as a percent of GDP (I10);
- Engineers and exact science specialists percentage (I11);
- Professional training degree (life long learning) (I12)
- TIC training degree (I13)
- Generated FDI stock / received FDI stock (I14)

The majority of the above mentioned indicators [I1-I9] are independent indicators, indicators [I10-I13] are input indicators, and the indicator I14 is composed by an input indicator and an output indicator. All the above indicators are suitable for the statistical description and for the dynamic description of national economic sectors' competitiveness.

3. Modeling the independent output economic indicators, applied in the industrial competitiveness evaluation process:

Independent output indicators that have a strict economic value, that will be referred to in this section are the ones marked with I1, I2, I3, I4 and I5.

For these indicators the present value calculation and also the evolution rate in time are suitable. The present value is usually calculated for one year, and by evaluating several values for several successive years we could notice the indicator's time evolution. The evolution rate of a certain indicator (I_j) will be calculated using the following relation:

$$i_j(t) = \frac{I_j(t) - I_{j0}}{I_{j0}} \times 100\%, \quad j = \overline{1, 14} \quad (1)$$

where

I_j(t)- represents the value of indicator I_j at the moment t

I_{j0}- represents the value of indicator I_j in the reference year (t₀)

A. Indicators I1, I2, I3 and I4

GDP is the main indicator used to describe competitiveness. By observing the GDP evolution and its evolution rate, we can generate the image of the direction in which the economy, the economic sector, the region or any other entity is oriented or directed, from the competitiveness point of view, and also from the speed used in that certain direction. The comparative analysis of GDP per capita and GDP at a sectoral level permits the hierarchy under the aspect of national competitiveness, of economic sectors between themselves and the nations from the competitive advantage of the same economic sector point of view. GDP per capita may be

decomposed into two important elements: productivity (GDP per employed population) and employment (employed population / inhabitants).

Nowadays there is a diversity of utility methods of the indicator GDP per capita (Cambridge Econometrics, 2003).

$GDP / \text{total population} = (GDP / \text{total number of working hours}) \times (\text{total number of working hours} / \text{employed population}) \times (\text{employed population} / \text{aged employed population}) \times (\text{aged employed population} / \text{total population})$

Also, there are several methods of decomposing the indicator GDP per capita that show the influence factors (Banica, 2009):

$GDP / \text{total population} = (GDP / \text{employed population}) \times (\text{employed population} / \text{human work resources}) \times (\text{human work resources} / \text{total population})$.

Starting from the definition and the expression of GDP, we will express the GDP at a certain sector level (k), using the following relation:

$$PIB_k = \sum_{i=1}^n q_{ki} \cdot P_{ki} \quad (2)$$

where

q_{ki} - the quantity obtained through the fiscal good (i) in the sector (k)

P_{ki} - the price of the good

n- number of distinct goods.

If we admit that the national economy is structured on three sectors (par 2.1), then PIB_k will be calculated for the three sectors and at national level, and it could be expressed as:

$$PIB = \sum_{k=1}^3 PIB_k \quad (3)$$

For any sector we can calculate the following indicators PIB_k / POP and, $PIB_k / POPO_k$

where,

POP- total population (total number of inhabitants)

$POPO_k$ - employed population in the sector „k” (number of workers in that certain sector)

Obviously,

$$\frac{PIB}{POP} = \sum_{k=1}^3 \frac{PIB_k}{POPO_k} \times \frac{POPO_k}{POP} \quad (4)$$

In the equation (4) two fundamental indicators for describing the „k” sector competitiveness are expressed:

$\frac{PIB_k}{POPO_k}$ „k” sector productivity

$\frac{POPO_k}{POP}$ employment rate in sector „k”

The analysis regarding competitiveness could be extended to the interior of a certain national economic sector, by evaluating similar indicators at branch or subsector level of those certain sectors:

$$PIB_{kr} = \sum_{j=1}^m q_{krj} P_{krj} \quad (5)$$

where,

q_{krj} - the quantity obtained from fiscal good (j), inside branch (r) of sector (k)

P_{krj} -price of fiscal good (j)

m- number of different goods generated in branch (r) of sector (k)

If inside the sector „k” there have been R branches that generate fiscal goods identified, it could be expressed as:

$$PIB_k = \sum_{r=1}^R PIB_{kr} \quad (6)$$

For the sake of comparison, inside sector (k), between its branches there could be determined the following indicators:

$\frac{PIB_{kr}}{POPO_{kr}}$ - branch (r) productivity in sector (k) ;

$\frac{POPO_{kr}}{POPO_k}$ - employment rate in branch (r) of sector (k)

With reference to the two indicators the following relation is valid:

$$\frac{PIB}{POP} = \sum_{r=1}^R \frac{PIB_{kr}}{POPO_{kr}} \times \frac{POPO_{kr}}{POPO_k} \quad (7).$$

The set of indicators determined by the relations (1 – 7), for national economic sectors and branches for EU 27 and for member states of EU27 is used to describe the Romanian level of sectoral competitiveness in the European context, to analyse and compare the national economic sectors and their branches. By calculating the evolution rate of PIB_k , PIB_k/POP , $PIB_k/POPO_k$, $POPO_k/POP$ and of the similar indicators at subsector level, using type (2) relations we can notice the sectoral competitiveness level and the branches dynamics evolution.

GDP at all levels (national economy, sector and subsector) is measured in monetary units (euro or lei). For the analysis conducted at EU level we will use the GDP in euros.

B. Exports could be determined as GDP share at national, sector, branch and company level.

Therefore,

PIB_k^E - exports of sector k[UM];

PIB_{kr}^E -exports of branch r of sector k[UM];

UM- monetary units.

The relative values of the two indicators could be calculated reported to the total value, as:

$$pib_K^E = PIB_K^E / PIB_K^R$$

$$pib_{Kr}^E = PIB_{Kr}^E / PIB_{Kr}^R \quad (8)$$

If there is the possibility of delimiting the human resource that serves the sectoral exports $POPO_K^E$ and branch exports $POPO_{Kr}^E$, then we can calculate the specific value and the indicators „work productivity” and „employment rate” with reference to exports, using similar relations with (7). The indicators (PIB_K^E, PIB_{Kr}^E) and their relative values we can calculate using type (1) relations, the evolution rate. The above mentioned indicators allow identifying the actual state and the time evolution of the exports realised at sectoral level and at national economic branches, compared to other states in the European context.

4.Results:

Using the information presented in the EU report regarding the industrial structure (**EU Industrial Structure 2011. Trends and Performance, 2011**), we analyse a series of evolutions in the industrial sector at EU level and also in comparison with its main competitors.

The growth rate evolution of the manufacturing industry in the EU, between 1991 – 2011, in the international context is presented in Figure 1

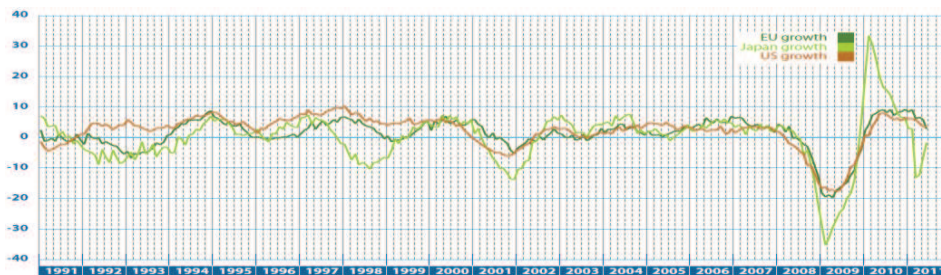


Figure 1: Growth rate in manufacturing industry in the EU reported to USA and Japan

Source: EU Industrial Structure 2011. Trends and Performance

We can easily conclude that the EU and the other two analysed competitors have a fluctuating evolution, that varies every year, but it finally maintains a positive growth. In the above Figure we can notice the „moment 2008” when we can see a powerful reduction for all the three competitors. Japan’s evolution is notable and it is characterised by a powerful decrease, but also by a spectacular reinforcement above the level of EU and USA, followed by a reduction to the negative area.

Using the information presented in the EU Industrial Structure 2011. Trends and Performance, the second Figure presents the contributions of the economic sectors to the formation of EU GDP

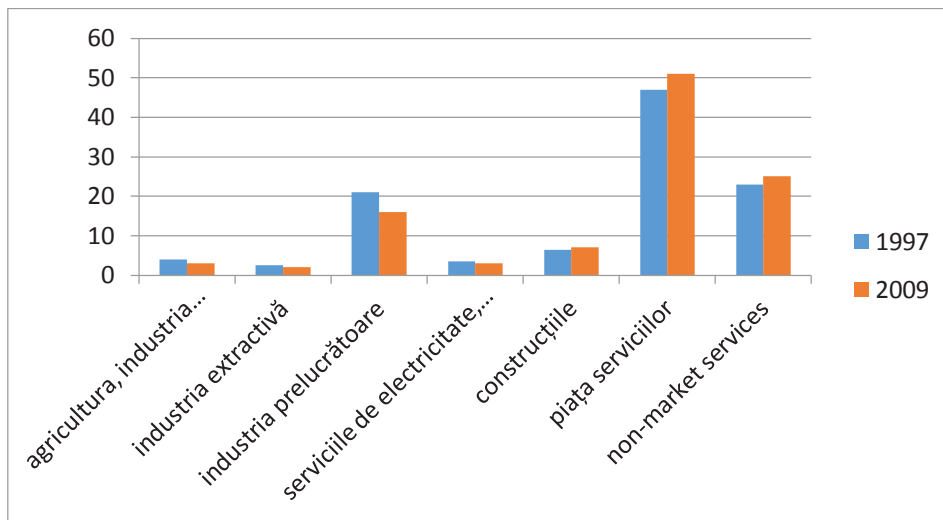


Figure 2: Economic sectors contribution to the EU GDP formation:
Source: EU Industrial Structure 2011. Trends and Performance

The results presented in the Figure 2 reveal the important contribution of services to the EU GDP, that was growing in the period 1997 and 2009, when the services percent in the GDP was about 75%. It could also be noticed that the industrial and agricultural in the formation of GDP decreased in the period analysed. Using the information published on Eurostat, Figure 3 presents the GDP time evolution in the manufacturing industry in Romania, compared to the EU.

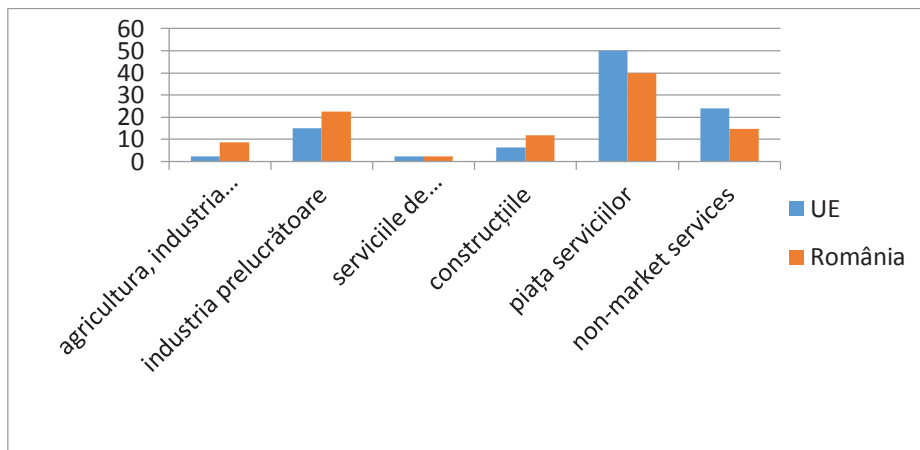


Figure 3: Comparative representations of the economic sectors' contribution to GDP in 2009
Source: Author's calculations based on the information provided by the EU Industrial Structure 2011. Trends and Performance

The graphics in Figure 3 reflect the fact that in Romania the services represented the majority of GDP (about 55%), percent that is under the EU average. In Romania, the secondary sector and the primary sector have a relative contribution to GDP, that is higher than in the EU.

Based on the information published by the National Statistical Institute (<http://www.insse.ro/cms/rw/pages/buletinelunare.ro.do>), we can notice the recent evolution of the following indicators, in the Figures (4 – 9).

- GDP growth rate by industry (total and industrial sectors / branches)
- Work force productivity growth rate (total and industrial sectors)
- Industrial products exports and imports evolution
- Employed population in industry and employment degree at national level;
- Growth rate of medium earnings in Romanian industry.

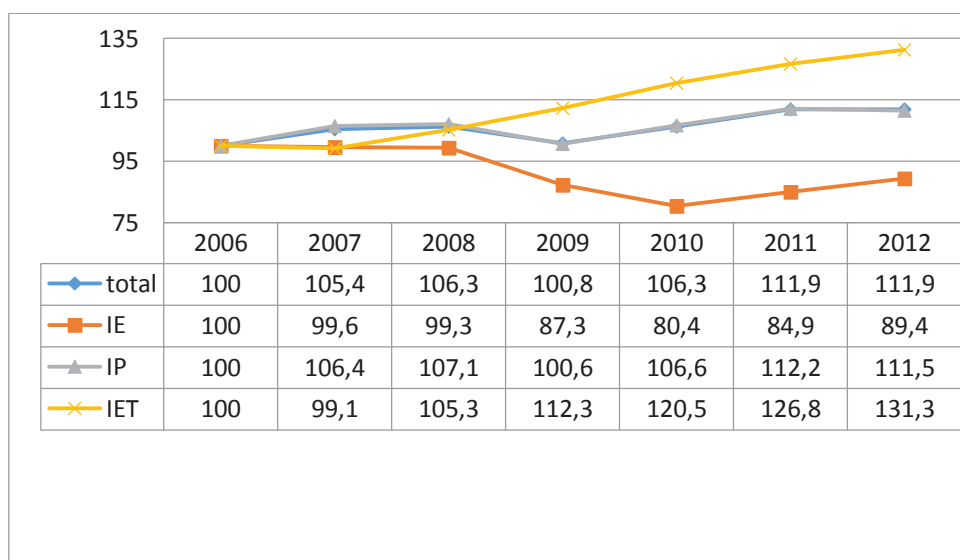


Figure 4: GDP evolution rate in the Romanian industrial sector

Source: Author's calculations based on the information provided by the National Statistical

Institute (<http://www.insse.ro/cms/rw/pages/buletinelunare.ro.do>)

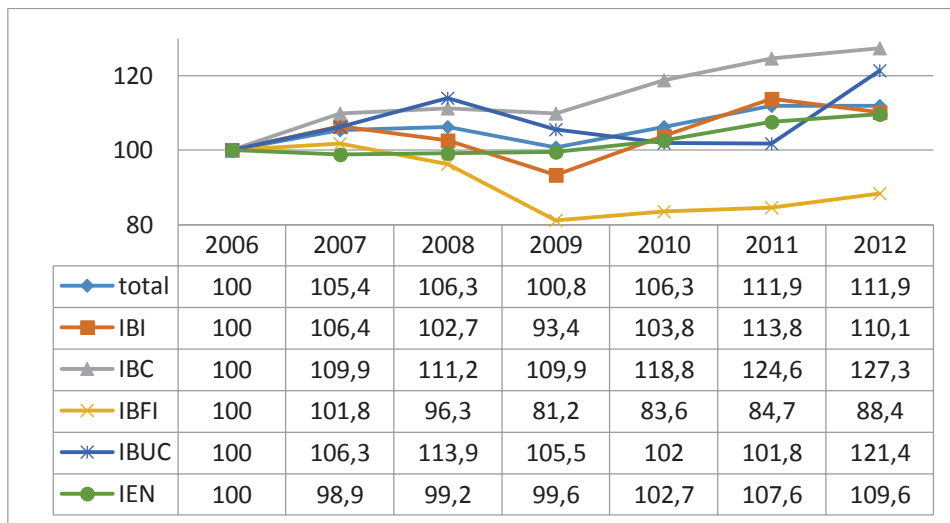


Figure 5 GDP evolution rate in the Romanian industrial sector, divided in the main industrial groups:

Source: Author's calculations based on the information provided by the National Statistical Institute (<http://www.insse.ro/cms/rw/pages/buletinelunare.ro.do>)

The results presented in Figures 4 and 5 reflects the fact that the industrial sector in Romania was influenced by the economic crises through the production reduction in 2009, compared to 2008, and a zero growth in 2012, compared to 2011. The affected branches were the Manufacturing industry, that imposes the whole evolution of the industrial ensemble and the IEN, that decreased in the period 2008 – 2010. The IEN and IET industry presented a continuous growth in the period analysed.

The conducted analysis, divided in the main industrial groups in Romania reflects the fact that the most affected industries were IBUC and IBFI, the single one industry remaining unaffected being the IEN.

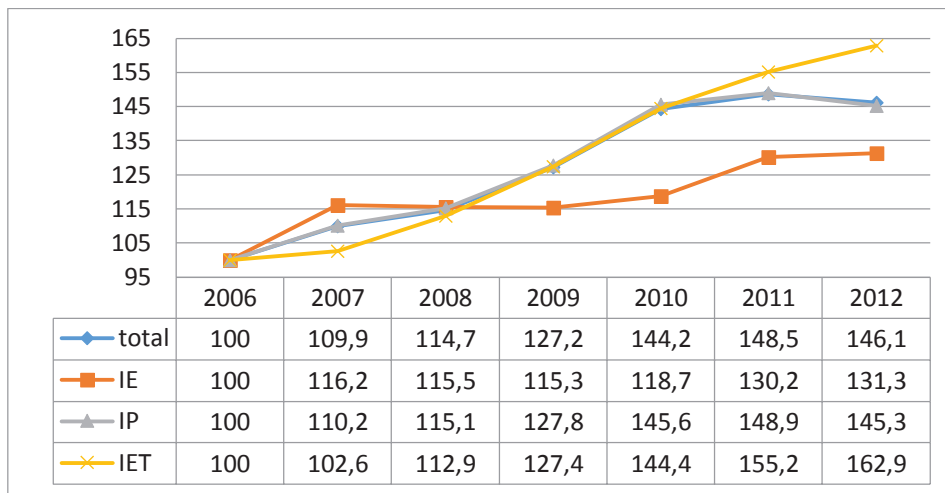


Figure 6: Work force productivity evolution rate in Romania

Source: Author's calculations based on the information provided by the National Statistical

Institute (<http://www.insse.ro/cms/rw/pages/buletinelunare.ro.do>)

The above Figure presents the fact that the work force total productivity in the industry is increasing in the period analysed, except in 2012. If we analyse the evolution of the three components of the industry, we can see a regression of the manufacturing industry, a progress of the other two branches.

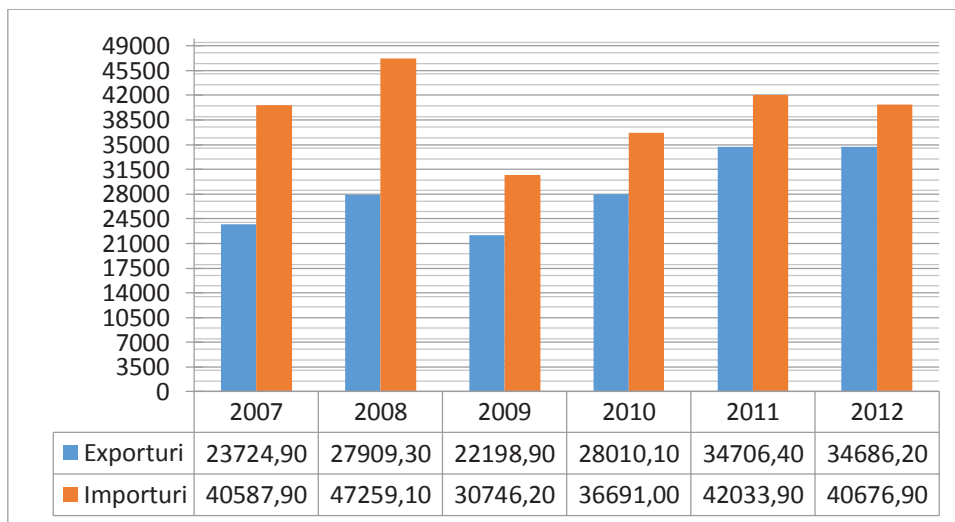


Figure 7: Industrial products imports and exports evolution in Romania / mil euro

Source: Author's calculations based on the information provided by the National Statistical Institute (<http://www.insse.ro/cms/rw/pages/buletinelunare.ro.do>)

Analysing the Figure 7, we may draw the following conclusions. We can notice that on the period analysed, the level of exports is under the level of imports. We can also notice that the economic crisis effect also on this part of the industry, initially appeared in 2008. The important thing is that although the imports of industrial products in 2008 was not achieved, in the exports case we can talk about a fast recovery, and the result is that today the exports level is higher than in 2008.

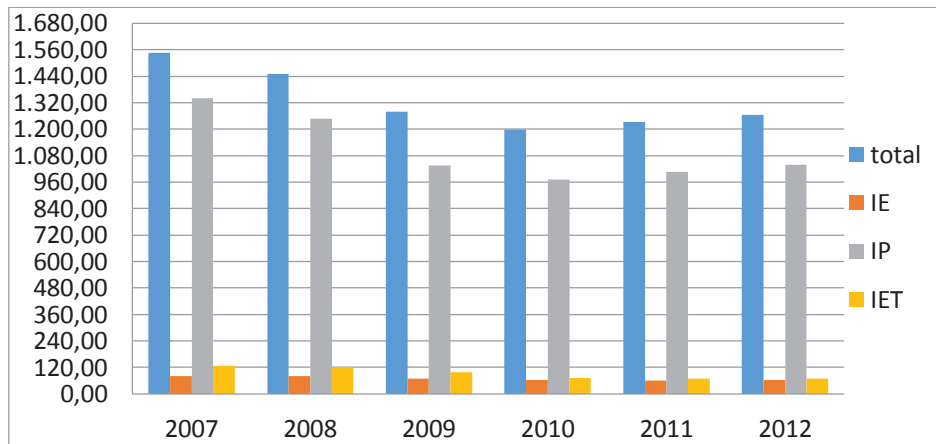


Figure 8: Evolution of Employed work force in the industrial sector

Source: Author's calculations based on the information provided by the National Statistical Institute (<http://www.insse.ro/cms/rw/pages/buletinelunare.ro.do>)

Regarding the employed work force evolution in the industrial sector, the things are unchanged. For total industry, IE and IP present an affected evolution by the economic crisis, since 2007, and in the present moment we can notice a slight increase. An exception is IET that has a negative evolution in the period analysed.

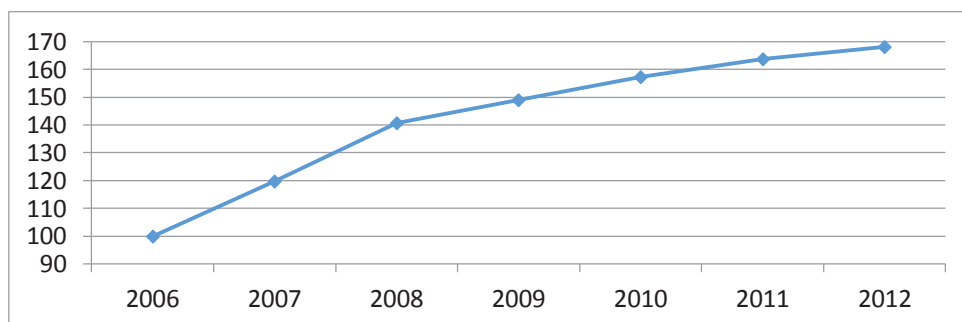


Figure 9: Medium earnings evolution rate on total industry in Romania:

Source: Author's calculations based on the information provided by the National Statistical Institute (<http://www.insse.ro/cms/rw/pages/buletinelunare.ro.do>)

Although the year 2008 affected the Romanian industry with all its components, Figure 9 presents a continuous increase of the medium earnings in industry in the period analysed. Affecting the growth rhythm of industrial production, after 2008, determines the decrease in earnings. To establish if there really was a real earnings increase, we must compare the effective annual growth with the inflation rate.

5. Conclusions:

International and European institutions and also the economic literature reflects that the concerns regarding the national and regional competitiveness are more complex than those regarding the sectoral and national economic sectors competitiveness. Nowadays there is no unitary methodology accepted at international and European level for evaluating the sectoral competitiveness.

Sectoral competitiveness evaluation may be conducted only in the conditions imposed by the objectives and targets of the sustainable development strategies, in two directions: at national economic level and at international transactions level.

For evaluating the sectoral competitiveness there can be used three types of indicators: independent, grouped in categories and aggregated in synthetic indicators.

The proposed indicators are suitable for the statistical description and for the dynamic description of sectoral competitiveness and of national economic subsectors. For all the indicators mentioned we calculated the present value and the evolution rate.

In the period 1997 – 2009, the industrial sector contribution to the EU GDP decreased, the highest reduction being registered in the manufacturing industry, the most important branch of EU industry. The GDP compensation realised through the increase of services in its structure.

The relative industry contribution to Romanian GDP was in 2009, approximately 30%, the most important branch being the IP, with 20%. Comparing it with EU27, we can notice that in Romania, the industry percentage is higher and the services percentage is lower, compared to the EU.

The evolution of the analysed competitiveness indicators reflects the following:

- An increase of industrial competitiveness in Romania
- The economic crisis marked the year 2008 and only a part of the branches and groups of the industrial sector in Romania
- The energetic industry registered a continuous increase in the period analysed
- The employment rate in the industrial sector continuously decreased in the period analysed
- Evolution rate of the medium earnings registered an increase in the analysed period.

To complete the Romanian industrial competitiveness picture in Romania, in the context of sustainable development, it is necessary to evaluate other indicators, like input indicators, output indicators regarding the environment and aggregated indicators.

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This article is part of the third Report of the PhD Thesis entitled ***Romanian economic competitiveness growth in the context of sustainable development.***