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THE MANAGEMENT OF STEEL INDUSTRY IN THE CONTEXT OF DURABLE DEVELOPMENT

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ABSTRACT: The durable development imposes the respect of economic, social and environment-protection requests. The objective of this paper is the emphasis of applying a rational management at the level of all the siderurgical operators in order for a healthy economic growth to be assured, correlated with the environment protection. In this sense, the study is based on the analysis of a data set which relates to the growth rhythm of the GDP, raw steel production and the consume of finished steel products/capita for the significant countries from the perspective of these indicators. Also, there are emphasized the objectives of sustainable development and the requests of the systematic management imposed by them at the level of the operators from the siderurgical industry.

Keywords: steel industry, management, durable development, economic growth

1. INTRODUCTION

The steel is one of the omnipresent elements in our day-to-day life, because it presents a series of characteristics which recommend it compared to other materials (mechanical resistance, possibility of recycling in a high percent, machinability and easy maintenance etc.). Thus, the steel industry became an extremely important branch within the world economy by the products supplied to a large number of sectors as well as the contribution to the economic development and the assurance of a high number of work places [1]. This last aspect is sustained by the data supplied by the current statistics that sustain the fact that over 2 million people are implicated in the direct industry and the number of generated work places is appreciated to over 50 million people if the links with other sectors are taken into consideration [2]. The usage of steel recorded an important growth worldwide, respectively by over 7 times compared to 1950, a similar trend, by 1.5 times, being estimated for 2050, compared to the actual situation. In terms of consumption/capita, there was reached a 220 kg level.

The demand for this product is sustained by the construction activity of homes, electrical plants, and wind farms or for the realization of infrastructure elements in transport domains. But a great importance will have the innovations in the domain which will permit the reduction of production costs, the increase of added value and the infiltration on new markets.

2. MATERIAL AND METHOD

The industrialization process, emphasized by the level of emerging countries determined an obvious growing trend of the world steel market after 2000. In terms of producing raw steel, an increase of 54, 37% is remarked in 2014 compared to 2000, obviously with fluctuations from one year to another. Geographically, Asia is the continent where is concentrated the largest production as well as the demand of raw steel. In this matter, in the production domain a dominant trend is remarked, with a percent of 67, 94% in 2014 from the global volume,

especially as a consequence of the domination of China, with a percent of 49, 51% from the world production, respectively 73.87% from Asia production. The given situation was recorded alongside an internal over-capacity of China, a fact which determined the modification of importer position into the exporter one. In this matter, the consumption/capita is also significant, China being situated currently on the 5th place worldwide, with 515, 7 kg/capita compared with South Korea, which recorded a steel consumption of 1057.4 kg/capita. The raw steel production at a global level is reflected in Figure 1.

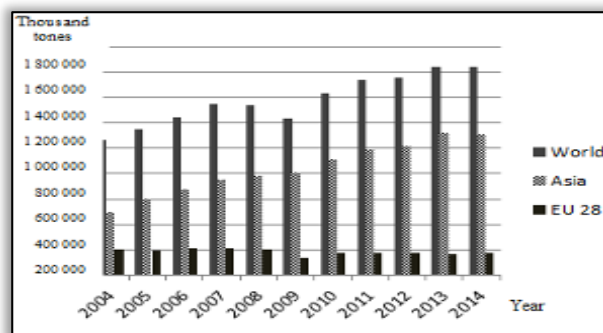


Figure 1. The evolution of crude steel production (2004 – 2014)

From the Figure 1 the growing trend of the world production of raw steel can be found, with an inflection point in 2009, as a result of the economic-financial crisis effects, when the total production level decreased with 7.8% compared with the previous year. But this trajectory was not similar at the level of different regions. Thus, if Asia can be remarked by a continuous growth, even in the recession phase, at the EU level the trend was of production diminishing on the whole interval and much lower in 2009, respectively with 29.81% from 2008. This situation is the result of an action of an ensemble of factors, respectively: the demand reduction, in the context of the situation deterioration within steel-consumer industries; the existence of a production over-capacity (the usage of production capacity in a proportion of 71.6% is recorded worldwide); the usage of support measures of siderurgical sectors at the level of production countries, with a direct impact over the concurrence conditions; the access to raw materials and their price; the higher energy cost in Europe in comparison with other areas in the world, with direct implications over competitiveness.

Besides, the discrepancy between Asia and Europe became more and more obvious during the analyzed interval. Thus, if in 2004 the ratio between the production shares in the global volume was of 47.35% / 21.32%, in 2014 a significant accentuation can be found in favor of Asia: 67.94% / 12.54%.

If the hierarchy is clear regarding the production (the first three positions are occupied by Asia, Europe and CIS), at a consumer level another situation can be remarked (in the consumer top there can be found South Korea, Taiwan, Czech Republic, Japan, China). Thus, this is differentiating on countries, depending on GDP, urbanization degree, natural factors action (for example, in the countries situated geographic areas with a high risk degree from a seismically point of view, the steel is a preferred material for building constructions, because of its resistance characteristics), the structure of the industry or the realization of export of products which incorporates a large volume of steel (ships, cars etc.).

3. MANAGERIAL OBJECTIVES IN SIDERURGICAL INDUSTRY IN THE CONTEXT OF DURABLE DEVELOPMENT

Years when obtaining profit by all means was the prime objective passed. The world is aware of the fact that protecting the environment is extremely important, alongside saving energetic resources and water reserves. In this context, the siderurgical industry must fit into the general environment-protection trend, having in view the fact that this branch is energy-intensive and polluting. A part of the operators from this sector started to promote a systematic management in the way of obtaining new products with the help of modern technologies and per formant equipment. However, there are still investors that vise only the profit, especially in the periods when a reduction in the economic activity is recorded, under the impact of several recession phenomena or under the action of some external factors.

In this sense, studies made in the most recent years at a level of metallurgic industry companies emphasized a negative situation of economical-financial performance indicators [3]. The main causes are represented by:

- ≡ the increase of raw material prices and energy fare;
- ≡ the usage of old equipment, characterized by a high consumption of energy;
- ≡ the deterioration of economic situation at the level of downstream industrial sectors (constructions, auto-industry, electronic industry, mechanical industry etc.) and, implicitly,

the reduction of demand for siderurgical products in the context of an over-capacity on the global market;

- ≡ the occurrence of the global economic and financial crisis;
- ≡ unfair concurrence;
- ≡ difficulties in external markets access etc.

If the characteristics of siderurgical industry and steel are taken in view, there is obvious that economic operators from siderurgical industry must choose to promote a management system based on sustainable performance and durable development. Generally, it is considered that the sustainable development in industry represents “a process of a process of continuous improvement of environmental, economic and social performance of enterprises and sustainability performance is interpreted as a result of management of sustainability aspects in enterprises” [4]. Concretely, it can be considered that the durable development must assure the accomplishment of several objectives (Figure 2).

It can be observed that the progress can be assured by the activity developed in industry by the application of a macro-economic policy mix. If the previous specifications are taken into account, the importance of applying measures of systematic management at the level of operators in the steel industry can be identified, whereas the steel is a 100% recyclable material (because of this aspect, steel is the most recycled material, with a quantity which exceeds 650 Mt annually, so over 65% of the newly-produced steel is old steel), and this process determines important energy and material savings (Recycling accounts for significant energy and raw materials savings: more than 1,400 kg of iron ore, 740 kg of coal, and 120 kg of limestone are saved for every ton of steel scrap made into new steel.) [2];different procedures can be applied to steel in order to assure an extension of its lifetime (every 90 seconds, 1 ton of steel is transformed into rust) and, implicitly, resources and energy savings and a diminution of a negative impact to the environment (thermal galvanizing, cadmium etc.); a great number of activities is dependent of the products furnished by siderurgical industry, a fact that influences significantly the number of work places from the entire industry; the steel is used on a large scale for obtaining products necessary to satisfy the personal needs, but also to assure a modern infrastructure, with direct implications over the social progress. The result of applying a macro-economic policy mix is emphasized by the real economic growth rate (Figure 3).

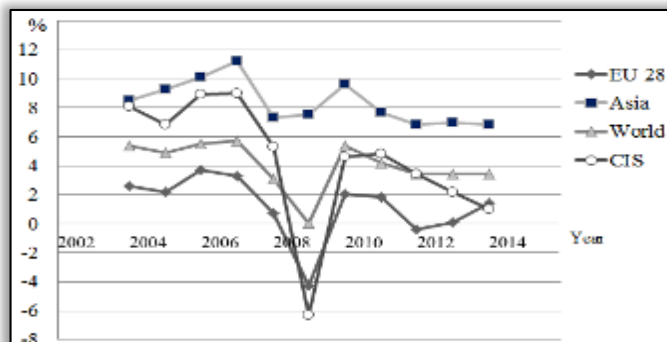
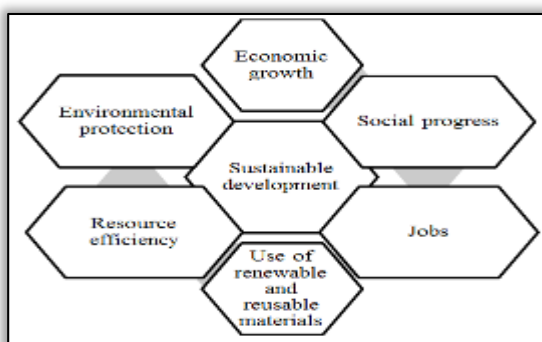


Figure 2. Objectives of sustainable development

Figure 3. The evolution of economic growth rate

Table 1. The evolution of the economic growth rate and the growth rhythm of crude steel production %

| Year | EU 28 | | Asia | | World | | CIS | |
|------|-------|-------|------|------|-------|------|------|-------|
| | Re | Rg | Re | Rg | Re | Rg | Re | Rg |
| 2005 | 2,2 | -3,4 | 9,3 | 18,9 | 4,9 | 8 | 6,8 | -0,1 |
| 2006 | 3,7 | 5,9 | 10,1 | 12,6 | 5,5 | 8,9 | 8,9 | 5,8 |
| 2007 | 3,3 | 1,3 | 11,2 | 12,3 | 5,7 | 7,8 | 9 | 3,5 |
| 2008 | 0,7 | -5,5 | 7,3 | 3,3 | 3,1 | -0,3 | 5,3 | -7,9 |
| 2009 | -4,3 | -29,8 | 7,5 | 3,4 | 0 | -7,8 | -6,3 | -14,5 |
| 2010 | 2 | 23,9 | 9,6 | 13,1 | 5,4 | 15,7 | 4,6 | 10,7 |
| 2011 | 1,8 | 2,8 | 7,7 | 8,3 | 4,2 | 7,2 | 4,8 | 4,1 |
| 2012 | -0,4 | -5,1 | 6,8 | 3,1 | 3,4 | 1,4 | 3,4 | -1,5 |
| 2013 | 0,1 | -1,4 | 7 | 9,4 | 3,4 | 5,7 | 2,2 | -2,4 |
| 2014 | 1,4 | -1,8 | 6,8 | -0,7 | 3,4 | -0,5 | 1 | -2,1 |

Legend: Re – economic growth rate; Rg - growth rhythm or crude steel production Source: [5], own calculation based on [6]

4. RESULTS

For the identification of the influence exercised by the economic situation over the siderurgical industry activity, data from Table 1 can be followed, data structured at the level of the most

important groups in terms of raw steel production. Thus, a significant impact of the economic crisis over the steel production from EU and CIS can be found. Instead, in Asia, the product diminution was not quite big immediately after the crisis, but, surprisingly, in 2014, even if the economic growth rhythm was positive. The conclusion resulting from this situation is that the steel production is influenced by a group of factors, the economic situation being important, but not determinant. Instead, a sustained economic growth represents a real resource support for satisfying social and ecological needs. In this matter, the economic operators must be aware of the fact that a durable organization is the one that promotes a performant management, while using technologies which permit obtaining products without environment degradation and with efficient resource consumption. Obviously, the possibility of promoting the requirements of a durable management is strictly connected by the volume of the available financial resources. This aspect cannot be neglected, especially in the context of imposing the limited resources allocation for reaching the proposed objectives, a fact that can generate significant risks [7]. In addition, they must also relate to the production volume and cost, to assure the profitability of the activity [8].

5. CONCLUSIONS

Durable development is an extremely important concept in the context of the necessity of adopting global measures, which reduce the poverty and assure the environment protection. The assurance of a correlation between the economic growth, social protection and environment protection must represent a fundamental objective of macro-economic policies from every state, as well as of the international agreements and conventions in the domain. From this point of view, the fundamental challenge is rising in front of the industrial policy, which must respond to the requirements of the assurance of the quantity necessary to consumption but also those of rational usage of resources and environment protection. The siderurgical industry is an extremely important component of the industry with a major role within the managerial strategies, which vise the assurance of the durable development coordinates. In this matter, the made research permitted synthesizing the next conclusions:

- » For quantifying the sustainable performance from the siderurgical industry there can be used both qualitative and quantity indicators; in this matter, the production of raw steel can be emphasized; the consumption of steel/capita; the CO₂ emission for producing a ton of steel; the number of work places generated by this branch, correlated with other downstream branches; the quantity of recycled steel; the energy consumption for producing a ton of steel etc.
- » The siderurgical industry furnishes one of the most used materials in the life of the people, being the single 100% recyclable material;
- » The recyclability of steel has a benefic impact to the environment, because an important reduction of CO₂ emissions is made (it is considered that a ton of recycled steel determines a diminution of approximately 1.5 tons of CO₂ emissions);
- » The industry operators vise the obtaining of profit and the appliance of durable development measures is conditioned by the existence of enough financial resources;
- » The managerial activity within the industrial organizations is influenced by the action of the natural and biological factors;

The managers of the operators from the siderurgical industry must vise the appliance of durable technologies which permit both the development of an effective activity and the efficient usage of resources.

References

- [1.] A.A. Mohamed, Environmental performance of companies in the iron and steel industry. Accounting issues, Annals of Tibiscus University, vol. XIX (2013), 13-18;
- [2.] www.worldsteel.org, World steel in figures 2014
- [3.] M.D. Ungureanu, G. Dobrotă, G. Bălan, Competitiveness and economic-financial performance in the metallurgical industry companies in Romania, Metalurgija 54(4), (2015), p. 733 - 736
- [4.] Staniskis J. Abaciauskas V. (2004) The sustainable Industrial Development: Reality and Vision. Technological Choices for Sustainability (Subhas K. Sikdar, P. Glavic, R. Jain Editors) Springer. 91-101
- [5.] www.imf.org, World Economic outlook, 2015
- [6.] www.eurostat.eu
- [7.] F.M. Muharam. 2011. Assessing risk for strategy formulation in steel industry through real opting analysis, Journal of Global Strategic Management, 10 (2011), 5-15
- [8.] R. Istrate, M. Schmitt, J. Apfel, I. Ilca, Efficiency of maintenance in steel making industry, Annals of Faculty Engineering Hunedoara /- International Journal of Engineering, Tome IX (2011), 91 - 94