

INNOVATION MANAGEMENT IN METALLURGICAL ENTERPRISES

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In current economic conditions effective management plays an increasingly important role in metallurgical enterprises. As changing environment stimulates evolution in companies and industries modern managed enterprises turn to innovation management in search for vital components of effective strategies. With rising threats and uncertainties metallurgical companies require effective strategies to remain an important section of industry in Poland. Authors describe methods of innovation management on the example of chosen metallurgical enterprises in Poland in the years 2008-2011.

Key words: metallurgical enterprises, innovation, management, Poland

INTRODUCTION

Observing the changes in the world economy and the size of the competition for each type of business, it becomes advisable to add some heuristic methods of thinking into the strategy. If the company does not have any new, original solutions and duplicates the old ones, it will eventually weaken its position. That is why the innovation is so important nowadays.

Lets first try to define innovation. We can find many definitions in literature. Samples of those are like: “Being innovative means new, so far not known method for fulfilling new kind of needs.”[1]; “Each idea, proceeding, matter which is new, is called innovative, because it is qualitatively different from hitherto ones.”[2]; “Innovation is the new competitive arena where present-day gladiators, equipped with similar information and access to similar resources, try to outsmart one another to victory.”[3]

Defined simply, innovation is, of course, introduction of something new. We presume that the purpose of introducing something new into a process is to bring about major, radical change. Process innovation combines a structure for doing work with an orientation to visible and substantial results. It involves stepping back from a process to inquire into its overall business objective, and then effecting creative and radical change to realize order-of-magnitude improvements in the way that objective is accomplished.[4]

According to E.M. Rogers innovation process can be divided into three stages: Invention of novel idea, beginning with recognition of market/user needs, Idea

development, Idea implementation, or the adoption and diffusion of the innovation by users.[5]

The innovation process ends, when the innovation is adopted and implemented by an organization, or when resources run out, or when political opposition prevails to terminate the developmental efforts. It should be pointed out that organization can't gain competitiveness in the maturity stage of innovation process. In order to do it, it has to encourage employees to seek for continuous improvements and new brilliant ideas.

One of the leaders in defining what really can be called innovation was Joseph Schumpeter. In his book “Capitalism, Socialism and Democracy” he described a process where “the opening up of new markets, foreign or domestic, and the organizational development illustrate the same process of industrial mutation, that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one” which he called “creative destruction”. He saw great source of innovation in perfect competition, saying that: “[What counts is] competition from the new commodity, the new technology, the new source of supply, the new type of organization competition which strikes not at the margins of profits and the outputs of the existing firms but at their foundations and their very lives.”

ESSENCE OF INNOVATION

The OECD methodology expands the concept of innovation into the area of organization and marketing and determines relationships with other companies in the course of the Innovation process. The fundamental change was the inclusion of companies found in lower research-development activity areas into studies, which allowed the appreciation of the role of Innovation in

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services and industry branches based on more traditional technologies.[6] Therefore, the present edition is suited to the requirements a larger recipient group/group of customers. This methodology constitutes the basis for current studies on innovations, not only in the OECD countries or the EU.

A model of networks that takes into account subjects, activities and resources – a model that takes into consideration multidimensional relationships: industry-science, enterprise-enterprise.

MANAGING INNOVATION

For the Polish companies and economy, innovativeness is a sine qua non condition for achieving a favourable position in the world economy in the future. Even now, when Poland is a member of the European Union, the economy of which surpasses the Polish economy with respect to innovativeness, this issue is particularly important. It can generally be stated that management of innovations in prosperous countries has the following characteristics [7]:

- Economy – national/European GNP per inhabitant is above the average, high exports – an open region and high innovativeness, a diversified structure of the economy and industry, the significant presence of high-tech industries, well-qualified workforce.
- Expenses on R&D – the predominance of expenses on R&D by private companies, the region, producer and user of technologies.
- R&D infrastructure – strong and diversified research resources, the structure of intermediary institutions adapted to the needs of the economy.
- Policy – a clear pro innovative strategy and policy based on social consultations, orienting the system.

The majority of organizational units currently functioning in developed countries demonstrate four main challenges, such as:

- Globalization and the freedom of capital flow, which orients an enterprise to the generation of value for the shareholders.
- Market maturity, which results from competitiveness based on effectiveness and innovation.
- The consumer's force, which increases and by means of which the consumer expresses its expectations and participation in a better world and is supported by corporate culture.
- Constant improvement of the firm's ability to identify transient opportunities in the environment, which should be quickly exploited through the development of R&D activity as a resource, which may lead to the achievement of innovation leadership in the sector.[8]
- Innovativeness expressed by the ability of an enterprise to introduce changes in marketing and organization.

In the managing of business, definite solutions of legal, organizational, economic and informative character

occur, which are in invariable reciprocal relationships that affect the course of the management process. Nowadays, no one should question Drucker's statement, formulated twenty years ago, that "there are no undeveloped countries, there are only countries of undeveloped management" and "the only constant thing is change".

The contemporary management of an enterprise is characterized by:

- The orientation towards company's value;
- The market orientation taking into account the client's expectations and the competition;
- The developed relations with the environment, which constitute a dynamic-interactive system;
- The creation of a model of a network, which takes into consideration three interrelated elements: subjects – actions – resources. Their reciprocal relations, supported by information technology should stimulate the development of a company;
- The creations, in enterprises, of factors stimulate the development of Innovation such as information and knowledge. The manifestation of their development is the generation of new ideas and the effectiveness of processing them into marketing, organizational and financial innovations.

All the changes occurring in the environment have an effect on the company's activity. The proper recognition of these changes and their tendencies enables a company to adapt to the conditions prevailing on the market. There is one important fact lying at the foundations of business management that should be well understood by managing boards; the fact that only those organizations which will appropriately adapt themselves the contemporary business environment can survive and not lose a chance of development.

RESEARCH AND DISCUSSION

Metallurgical industry is one of the most significant branches of processing industry that deals with preparation of extracted ores to receive pure metal thereof, refining of metals, their heat treating, chemical and heat treating (quenching, etc.), modelling to give them specific shapes, and alloy production. Metallurgical indus-

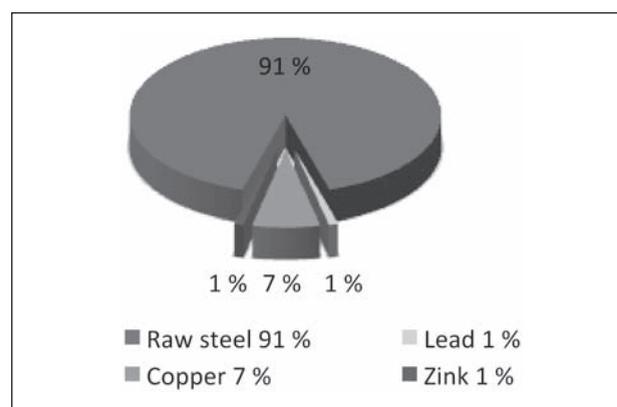


Figure 1 Metallurgical sector structure in Poland

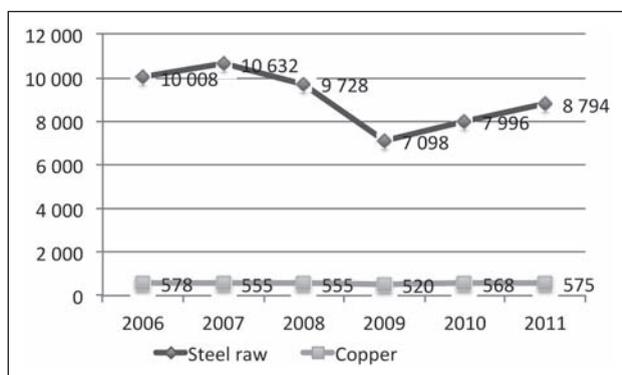


Figure 2 Production of steel and copper in Poland (thousand tonnes)

try may be broken down in ferrous and non-ferrous metallurgy.[9, 10]

In Polish conditions a large majority of metallurgical production is constituted by steel (Figure 1 – 91 %). Copper production is also noticeable (7 %). The share of other metals in the sector amounts to 1 %. Since 2009, upon shutting down of the aluminium works in Konin, Poland has no aluminium works in its territory.

In 2011 production of steel increased by 7,2 % which indicated continuation of a trend from 2010 (increase by 12,3 %). Despite a production growth in the last two years, it did not return to the level from before the crisis in 2009. The future development depends to a large extent on the condition in the automotive industry, which is the key recipient of the Polish steel sector (Figure 2). Forecasted production growth in this sector, in years 2011-2015, amounts to 5 % a year. Increasing prices of electrical power, which constitute for a large part of steel works costs, create a significant threat. A higher excise duty on electricity entails lower competitiveness of Polish companies, in particular those applying EAF technologies. The output of the copper sector in turn was more stable in the last two years, despite the condition of the world economy. Yearly production of this metal in Poland amounted to 550 thousand tonnes.

Three quarters of enterprises operating in this sector are represented by micro-enterprises (employing less than 9 people – Figure 3). However, this percentage is significantly lower than the national average for all the enterprises (about 95 %). This tendency is present also in other categories, that is the number of large-sized companies in the metallurgical sector is higher than average in the Polish economy. In the 10-49 range it constitutes 16 % of companies (4 % for the entire economy), in the 50-249 range it amounts to 7 % (0,8 %, respectively) and large-sized companies, having over 250 employers, represent 3 %, compared to 0,13 % for the entire economy (Figure 3).

The flow of foreign direct investments in 2009 amounted to EUR 9,9 billion, of which EUR 3,4 billion was constituted by the processing industry. In the metallurgical sector an outflow of capital amounted to EUR 108,8. This tendency puts this branch in an unfavoura-

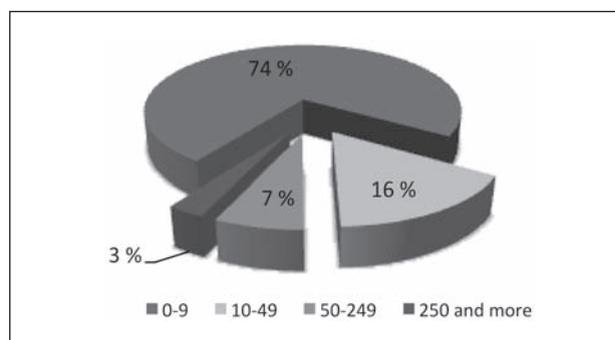


Figure 3 Companies operating in the metallurgical sector in Poland by employment size

ble position, particularly in comparison with other branches of processing industry that in the majority of cases recorded an inflow of foreign investments. Accumulated foreign investments in the Polish metallurgical sector amounted to EUR 5,8 billion, which comprised 12 % of investments in the processing branch, and 4 % in the total of foreign investments.

Polish international trade in the metallurgical sector (Table 1) amounted to EUR 24,7 billion. In addition, Poland faced a slight deficit equal to EUR 445 million. It constitutes for less than 10 % of the trade of Poland. Cast iron, steel, cast iron and steel products represented the largest share in the international trade. Copper and copper products followed these. A positive balance of trade in this field is worth noticing – exports exceeded imports by more than twice.[11]

Table 1 Polish trading in the metallurgical sector

	Export	Import	Balance
Aluminium and copper materials	2 952	2 196	-756
Non-precious metals total	3 320	1 284	2 036
Cast iron and steel	9 624	8 196	-1 428
Non-precious	13 492	13 937	-445

CONCLUSIONS

The metallurgical sector is one of the most crucial branches of industry in Poland.[12] Production on the Polish metallurgical sector and its further increase is forecast at least until 2015. A majority, that is 23 % of enterprises, has registered offices in the area of Silesia region. In comparison to the national average, in the metallurgical sector large enterprises prevail. Metallurgical products represent an important position in Polish trading. However, an outflow of foreign investments was observed in this sector.[13, 14]

In years 2007-2013 Poland is granted a significant flow of the EU funds which amount to over EUR 67 billion.[13] Entrepreneurs may apply for the funds from the following Operative Programs (OP): 5 national Operative Programs: (Infrastructure and Environment; Innovative Economy, Human Capital, Development of

Eastern Poland, Technical Assistance), 16 Regional Operative Programs and Programs of European Regional Cooperation. Exemptions from tax on legal persons CIT (rate: 19 %). They are available in Special Economic Zones, that is in selected regions of Poland, where economic activity is run on special terms - exemptions from income tax amount to 30 % - 50 % of investment expenses or costs of personnel employment in the period of 2 years, whichever are higher.

REFERENCES

- [1] S. Kasprzyk, *Innowacje. Od koncepcji do produkcji*; IWZZ, Warszawa 1980, pp. 26-27.
- [2] T. Sztucki, *Encyklopedia marketingu*; Agencja Wydawnicza Placet, Warszawa 1998, p. 127.
- [3] R.E. Johnston, J. Douglas Bate; *The power of strategy innovation*; Amacon, New York 2003, p. 6.
- [4] T.A. Davenport, *Process Innovation: Reengineering Work through Information Technology*; Harvard Business School Press 1993, p. 23.
- [5] E.M. Rogers, *Diffusion of Innovations*, 5th edn. New York: Simon and Schuster 2003 in C. L. Cooper, D. F. Channon; *The concise Blackwell encyclopedia of management*; Wiley Blackwell 1998, p. 299.
- [6] *Oslo Manual, Guidelines for collecting and interpreting innovation data*, 3rd edition, OECD Publishing, 2005, pp. 10-25.
- [7] European Commission, Directorate General for Research, *Key Figures 2003-2004. Towards a European Research Area. Science Technology and Innovation*, Office for Official Publications of the European Communities, 2003.
- [8] A. Zakrzewska-Bielawska, *The strategic dilemmas of innovative enterprises: proposals for high-technology sectors*, *R&D Management*, 42 (2012) 5, 514-514.
- [9] R. Lenort, J. Feliks, D. Stas, *Forecasting the consumption of plates in plants producing heavy plate cut shapes*. [in:] *METAL 2010: 19th International Metallurgical and Materials Conference*. Ostrava, TANGER, 2010, pp. 214-218.
- [10] R. Lenort, R. Klepek, A. Samolejova, *Heuristic Algorithm for Planning and Scheduling of Forged Pieces Heat Treatment*. *Metalurgija*, 51 (2012) 2, 225-228.
- [11] P. Pomykalski, S. Bakalarczyk, E. Weiss, *Financing structure analysis of business entities in manufacturing of basic metals and fabricated metal products in Poland*, [in:] *20th Anniversary International Conference On Metallurgy and Materials*, Brno, TANGER 2011, pp. 1293-1297.
- [12] R. Gradzki, K. Kowalska-Michalska, *Stability in the elastoplastic range of rectangular-plates subjected to uniaxial compression, with unloaded edges clamped*, *HIN-WALLED STRUCTURES*, 5 (1987) 2, 93-109.
- [13] K. Janovska, S. Vilamova, A. Samolejova, I. Voznakova, *Determination of complex energy consumption of metallurgical production on the base of mathematical modelling of interdisciplinary linkages*, *Metalurgija*, 51 (2012) 4, 571-573.
- [14] K. Janovska, I. Voznakova, L. Svajdova, *The Verification of Applicability of Economical-mathematics Methods of Structural Analyses as a Tool for Optimising Economic Proceedings of Metallurgical Enterprise*. In *Conference proceedings of 19th International Metallurgical and Materials Conference METAL 2010*, Ostrava: TANGER, 2010.

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