

MANAGING OF INNOVATION IN MODERN METALLURGICAL COMPANIES

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Abstract

The role of innovation and innovativeness is crucial for every kind of organization. Changes in the implementation and absorption of innovation could be a way to for organizational and financial success of a company. Nowadays, it is important to realize that both processes have to be implemented for a company to remain competitive. This paper the author describes innovation management in metallurgical companies and its importance. The impact of innovation on the global economy is the main goal of presented investigation. Research is based on the literature review and data analysis for the years 2007-2016. This allows for predictions and to propose the theoretical model that can be verified in real existing organizations.

Keywords: Metallurgical companies, innovation, management.

1. INTRODUCTION

The increasing importance of knowledge as an economic driver has major implications for innovation management, which is, in turn, a key determinant of national and regional competitiveness in the global, knowledge-driven economy.[1] The contribution of knowledge to innovation is achieved in part by reducing transaction costs between firms and other actors, most notably in the areas of research and information, buying and decision-making, policy and enforcement. The systemic approach to innovation recognises that innovation and knowledge generation take place as a result of a variety of activities, many of them outside the formal research process [2]. Knowledge is thus generated not just in universities and research centres, but also in a very wide variety of locations within the economy, and notably as a product (learning-by-doing) or of consumption (learning-by-using).

Innovation management is a discipline; it does not come about through a random or hit-and-miss approach, but it requires design. Innovation management involves focusing on the organisation's mission, searching for unique opportunities, determining whether they fit the organisation's strategic direction, defining the measures for success, and continually reassessing opportunities. Innovation does not require genius, but it does require total dedication in pursuit of a unique opportunity. In the current economic context, growth must mainly originate from increasing the productivity of knowledge work, and increasing this productivity is the most important contribution management can make [3]. The most valuable assets of a 21st century firm are its knowledge workers and their productivity. Knowledge-intensive organisations, ranging from knowledge-intensive service-providers to high-tech manufacturers, need to manage innovation processes so as to increase knowledge productivity.

In comparison to traditional mechanistic command and control management, these characteristics entail a fundamental change in the strategic perception of the organisation, which accordingly has to consider the following management challenges [4]:

- Manage human capabilities in a strategic manner. Modern management has to face the perpetual challenge to place the human being at the forefront of operations, and understand that an organisation is a collection of different human beings.
- Network with internal and external partners. People have different attitudes, different customs, different professional backgrounds - management should focus on integrating the web of formal and informal relationships inside and outside the company.

- Create adaptive and interactive organisational structures. If the organisation is to stay responsive to external change, a flexible and adaptable organisational structure is a necessity.
- Balance order and chaos - process efficiency versus destructive innovation. The balance between process efficiency in existing business models and process adaptation for destructive innovation to drive corporate change is a delicate one.
- Balance individual and corporate motivation.

2. BASIS OF INNOVATION

The characteristics of innovation are classified in main three areas. Product innovation which is in place when a new or improved product is launched in the market, such as: market demand: Demand and acceptance of the product in the market is one of the key criteria for product innovation. It is directly linked to the company's market share and to profit margin. Level of resonance: It is the level of target-customers locally, nationally or internationally; it is the product acceptance and market penetration yardstick. Optimal use of existing condition: It is examined whether the existing technology is used in an optimal way relevant to the product and its production. It relates to updating procedures and technology forecast. Price/Value: The price and value of a product is compared with the prices of corresponding competitive products in the market. Compliance with the regulations: Compliance with the safety, health, environmental regulations, etc. It is a characteristic of innovation because compliance with the regulations could often lead to qualitative innovative changes on the product. Originality: It is examined whether the product is a new solution or encompasses changes compared to competitive products. These changes may concern the product, its package, the way it is distributed or its use. It is also a way to evaluate an enterprise's approach to innovation. Offer of improvements: The product as an evolution of an existing technology, in the sense of using new materials, the existence of new functions, the use of the product in new applications. It defines whether the product brings about changes on the basic design or its architecture. Coverage of operational needs: Coverage rate of specific operational needs, customer needs, including over-coverage offering additional functions not fully determined by customer demands. It relates to customer requirements analysis. Aesthetic: The product's outward appeal is a criterion of innovation often underestimated; it constitutes though a key success factor.

Process innovation is the introduction of new processes in product development or the improvement thereof. Market research: Market research may disclose alternative solutions regarding design, price, distribution and product promotion and offers an estimate of product acceptance and image in the market. Connection to target-customers: Frequency of contact between the company and target-customers at local, national or international level. The main objective is to establish a long lasting relation mainly with large customers. Access to new technology: Frequency of the company's contact with the current technological evolutions regarding production of product. It relates directly with departments of R&D, design, cooperation with technological bodies, participation in exhibitions, etc. Costing Methodology: Costing methodology in all stages of the product development process. Analysis and accurate costing methodology is required to cut the total product production cost. Compliance with the regulations: Compliance of the product development process with the safety, health and environmental regulations, in parallel with the procedures to verify all the above. Compliance of the development process with the regulations often contributes to qualitative upgrading of the product. Technique of ideas development: The existence of specific techniques and approaches for the elaboration of new ideas is examined; such ideas affect significantly the development of a successful innovative product. Improvement techniques: The effort and the techniques to integrate new technologies and uses in the product are assessed. Emphasis on fulfilling operational needs: Focus of product development process on the specific operational need the product addresses. It involves conversion of requirements to product specifications and relates to the way the trademark participates in product development process. Focus on aesthetics in the design: The success of products using a fixed technology and with fixed target-customers depends directly on their attractiveness and their visual diversification vis-à-vis competitive products. The aesthetic aspect of a product in combination with the analysis of its ergonomics is one of the main targets of industrial design. The

use of systems and design engineers is assessed. Formal procedures to protect copyright: It is examined whether the required actions are taken to protect copyright. It is assessed whether an enterprise is geared towards protecting patents and designs and whether the above methodology constitutes its policy.

Management (organization) area: The introduction of changes in administration and organization constitutes the administrative innovation that completes the first classification. Feasibility study: It is the base (technical, economic, commercial) to decide upon an investment. Formal procedures to ensure communication with target-customers: Such procedures may include participation in exhibitions, sample distribution, meetings with groups of customers, etc. Formal procedures to apply the best technology: One of the key indications of innovation is systematic follow up of current technological evolution, the assessment of the technological level of competitors, the identification of new technologies and the correct selection of the best technology. Cost control: Control is a systematic review process applied during the design phase, in order to cut production cost, preserving at the same time the value and the required operation specifications (value/price) and ensuring the product's sustainability and competitive price. Quality control: Formal control procedures during the design phase that include use of methods to analyse and improve innovation process quality and processes to safeguard rules applying to date. Organizational culture: Emphasis of organizational culture on innovation. It has been evidenced that organizational culture relates directly to a company's innovativeness. Some elements of organizational culture placing emphasis on innovation is the encouragement to create new ideas, the clarification of the enterprise's innovation policy to all employees, the determination of performance measurement systems, personnel training etc. Quantitative controls with criteria to assess improvement of technology, new materials, functions and uses: Introduction of controls with quantitative data and minimum acceptance values to assess improvement of technology, new materials, functions and uses. Processes for the integration and evaluation of new technologies and methods by the company. Quantitative controls with criteria on the satisfaction rate of functional needs: Introduction of controls with quantitative data and minimum acceptance values to fulfil specific functional needs. Marketing and quality control processes for the aesthetic aspect of the product: Introduction of marketing and quality control processes to assess and ensure good product aesthetic appeal. It relates directly to production and testing of originalities.[5]

3. DATA ANALYSES

In 2014, the iron and steel metallurgy 24 manufacturers of metallurgical products (1 more than in 2013) employing more than 9 people. The number of individuals employed in this sector amounted to over 30,000 people, including 20,400 people employed in the manufacture of metallurgical products. The total operating revenues of this sector exceeded PLN 30.7 billion, with the manufacturers of metallurgical products accounting for nearly PLN 24.3 billion (up by 1.4%). The total capital expenditures of the sector amounted to PLN 750 million, PLN 540 million of which accounted for capital expenditures on the manufacture of metallurgical products (down by 1.8%). Net revenues from the sales of export products amounted to nearly PLN 11.9 billion, with the manufacture of metallurgical products accounting for PLN 9.6 billion (up by 6.7%). The sector comprised 76 entities, including 16 profitable manufacturers of metallurgical products (1 more than in 2013). The sector's net financial result was positive and amounted to nearly PLN 717 million. The manufacturers of metallurgical products achieved a positive result of PLN 77 million in 2014 (compared to the loss of PLN 468 million in 2013).

In 2014, this sector (excluding micro-enterprises) accounted for 2.8% of total operating revenues of the entire manufacturing section and 1.6% of all individuals employed in this section. The dominant position in the sector is held by a dozen-or-so largest enterprises specialising in metallurgy.

According to the Metallurgical Chamber of Industry and Commerce data, in 2014 the production of crude steel in Poland amounted to 8.6 million tonnes (using 68% of the available production capacity) and was 8% higher than in 2013. 5.1 million tonnes of converter steel was produced in the integrated process (up by 15%) and 3.5 million tonnes of steel was produced in the electrical process (down by 2%). In 2014, the share of alloy

steel manufacture (5.8%) and stainless steel manufacture (0.03%) continued to remain low. The manufacture of hot-rolled finished products amounted to 7.5 million tonnes (up by 1.8% compared to 2013), of which flat products accounted for 2.8 million tonnes (37.4%), including 2.1 million tonnes of cold-rolled sheets (up by 0.8%) and long products represented 4.7 million tonnes (62.6%), dominated by bars - 2.1 million tonnes (i.e. up by 5%). Among the cold-finished products, the manufacture of cold-rolled sheets and strips amounted to 883 thousand tonnes (up by 8%), the manufacture of galvanised sheets and strips amounted to 527 thousand tonnes (up by 12%), while the manufacture of organic-coated sheets and strips amounted to 273 thousand tonnes (up by 19%). The manufacture of steel pipes and hollow sections totalled 848 thousand tonnes (down by 1.3%), of which cold-formed hollow sections accounted for 518 thousand tonnes (down by 4%).

In 2014, the import of metallurgical products to Poland amounted to 9 million tonnes (up by 13% compared to the previous year), with imports from the EU rising by 12% (accounting for 74% of all imports) and the size of imports from outside the EU rising by 17%. In terms of volume, Ukraine represented the largest share of import (despite the 5% drop), but the highest growth in import from third countries was observed in Brazil, Moldova and Belarus. Export from Poland amounted to 4.8 million tonnes (down by 3%), nearly 90% of which was exported to EU countries. As regards the EU, Poland exported mainly to Germany and the Czech Republic, while taking into consideration export outside the EU, metallurgical products were most often sold to Russia, Ukraine and Norway. [6]

The deficit in foreign trade in metallurgical steel products amounted to 4.2 million tonnes in 2014, i.e. EUR 3.4 billion (compared to 3.1 million tonnes and EUR 2.8 billion in the previous year). The structure of trade did not change and, in the case of imports, was as follows: flat products - 65%, long products - 23%, pipes - 7%, ingots and semi-finished products - 4%; the structure of exports, in turn, was as follows: long products - 48%, flat products - 27%, ingots and semi-finished products - 15%, and pipes - 8%. The apparent finished steel product consumption in Poland (production plus import less export) in 2014 amounted to 12.2 million tonnes (up by 17% compared to 2013), with flat products accounting for 54% of the above sum (6.6 million tonnes), long products - 37% (4.5 million tonnes), and pipes and cold-formed hollow sections - 9% (1.1 million tonnes). The economic and financial data of enterprises and growing consumption of metallurgical steel products (despite slightly worse trade balance) indicate that the situation in the sector is slightly improving in 2014. This resulted from substantially lower illegal intra-Community trade in certain steel products in 2013, and domestic demand, which provided an opportunity for a higher utilisation of domestic production capacities. This allows to look to the sector's immediate future with moderate optimism. However, it is necessary to remember the still difficult global position of the Polish steel sector in terms of competitiveness in the context of the EU open market, especially the EU energy, climate and environmental policy.[7, 8, 9]

CONCLUSIONS

The beginning of 21st century was the time of changes in economic and development characters, whose continuation was supposed to take until now according to the program of Restructuring and Development of Steel and Iron Industry in Poland until 2006.

The metallurgical sector is one of the most crucial branches of industry in Poland. Production on the Polish metallurgical sector increased in the last 2 years and its further increase is forecast at least until 2015. A majority, that is 23% of enterprises, has its registered office in the area of Śląskie Province. In comparison to the national average, in the metallurgical sector very large enterprises prevail. Metallurgical products represent an important position in Polish trading. However, an outflow of foreign investments was observed in this sector.

Downward tendency in steel sector was considerably higher than in the case of other branches of the industry, where crisis was characterized only by a slowdown. However, in consideration of the decision about sector reorganizing in 2012, one can assume that the future of steel sector shows great promise for the domestic economy. Current and future projects and investments in infrastructure and construction impose high

requirements on the levels of steel supply and provide an opportunity for revival of Polish metallurgy industry.[10, 11]

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 equal to EUR 108.8 was observed. This tendency puts this branch in an unfavourable position, particularly in comparison with other branches of processing industry that in the majority of cases recorded flow of foreign investments. Accumulated foreign investments in the Polish metallurgical sector amounted to EUR 5.8 billion which constituted 12% of investments in the processing branch, and 4% in the total of foreign investment. Polish international trade in the metallurgical sector amounted to EUR 24.7 billion. In addition, Poland faced a slight deficit equal to EUR 445 million. It constitutes 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 import by more than twice.

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