

**BSC - BASIC ASSESSMENT OF THE BUSINESS MODEL EFFECTIVENESS OF THE
SELECTED METALLURGICAL COMPANIES**

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Silesian University of Technology, Department of Organization and Management, Zabrze, Poland, EUJan.Brzoska@polsl.pl**Abstract**

Companies operating under conditions of global economy which can be characterized by increasing international competition, search for sources and methods to reach profitability and competitive edge. At the moment, the most important is to create and implement various kinds of innovations. Attribute of innovations is the changes and innovativeness that is why Increasing competitiveness and globalization as well as crisis phenomena affect the whole economy, including the metallurgical sector. This sector can be characterized by high degree of consolidation and it is susceptible to economic situation variations. In this context, metallurgical companies, if they want to effectively compete, introduce product, process, organizational and marketing innovations, which are frequently related to changes of their business model. Assessment of efficiency and effectiveness of the implemented business models is an important research problem, both from the theoretical and management practice point of view. Basic research questions regarding this issue is: how to measure results and effects gained by changing the business models. These changes were related to high extent to the introduced innovations. The purpose of the paper was the application of BSC to measure results gained upon implementation of changes in the business model. The following research hypothesis was extended: properly composed Balanced Scorecard will allow for assessing effectiveness of its dynamics in metallurgical companies. The subject of the research was structural changes of business models and economic, market, process and development results related to them. Objects of the research (case studies) were two metallurgical companies: the rolling mill of hot-rolled steel products and metallurgical products servicing and trading company

Keywords: Balanced Scorecard, business models, metallurgical companies, effectiveness**1. INTRODUCTION**

Globalization of economy, increasing competitiveness and crisis phenomena cause changes in strategies and business models of companies (including metallurgical). These are oriented at growth of effectiveness and competitiveness, with innovations at the source. Metallurgical sector can be characterized by high degree of consolidation and susceptibility to economic trends variations, what makes the companies, operating in this sector, to implement various innovations and it is related to changes of business models. Proper business architecture, representing a structure of such model should be able to create value for a client and enable development of company, within a long-term. Generated value represents efficiency and effectiveness of the applied business model. Measurement and then evaluation of efficiency and effectiveness of the implemented business models is an important research problem, both from the theoretical and management practice point of view. One may thus ask a research question related to this problem: how to measure results and effects gained based on the change of business models, by implementing various innovations. This means multi-dimensional character of the created value, thus the concept of its utilization to measure and evaluate Balanced Scorecard (BSC). The purpose of the paper is to apply BSC to measure and evaluate results and effects gained by the examined companies, based on creating business models able to create and absorb innovations. The following research hypothesis was adopted that properly composed Balanced Scorecard enables evaluation of efficiency and effectiveness of business model dynamics at companies implementing innovations. Structural changes of business models and economic, market, process

and development results related to them were examined in two metallurgical companies: rolling mill of hot-rolled steel products and metallurgical products servicing and trading company.

2. VALUE AS THE GROUNDS OF ATTAINED EFFECTS AND RESULTS OF THE APPLIED BUSINESS MODELS

When analyzing contemporary trends within the scope of examining competitiveness and innovation management, one can notice increasing interest in business models. This is related mostly to two reasons:

- treating business models as clear concept of creating value, both for a client and company owners,
- searching for instruments and methods of competitiveness increase,
- perceiving business model as an architecture of business operations, which is able to provide organization with effectiveness by generating profit,
- treating business model as a carrier of various innovations.

Business models are also used as management instruments in existing companies or represent the grounds for planning operations of a new company or starting a business on a new market, that necessitate changes of business models. Development of research over business models bore fruits in the form of many definitions and concepts. This classification is presented by J. Brzóska in his paper [1]. In turn S. M. Shafer, H. J. Smith, J. C. Lindner [2], after thorough analysis of works over business models performed by 12 researchers, formed their own concept, treating business model as a core logic representation and strategic selections of creating and retaining value within the area of value network. Four categories are pillars of this model, which cover elements necessary to create business models, i.e.: strategic selection, value network, creating value and capturing value. Focusing on creating value is manifested in a very brief definition of business model presented by B. Demil, X. Lecocq [3], saying that "this is a description of dependencies between company elements, where cooperation allows for creating and delivering value for client" [3]. Polish researchers: T. Gołębiowski, T. M. Dudzik, M. Lewandowska, M. Witek-Hajduk present more developed definition of business model including in it, beside logic of operation and creating value, resources, processes and external relationships [4]. In turn D. J. Teece when approaching to the issue from the IT point of view, presents the following definition: "Business model specifies logics, data and evidence that support proposal of value for a client and possible structure of incomes and costs of company, in order to deliver such value to client" [5]. Proposal of value is the central elements of business model based on nine components developed by A. Ostrowalder and Y. Pingeur [6] (the remaining segments are: clients segment, distribution channels, relationships with client, incomes streams, key resources, key partners, structure of costs). Similar concept of business architecture was presented by F. Newth [7] treating the proposal of value as one of its six elements, next to the following categories: dynamic abilities and processes, strategic resources, incomes flows, formula of profit and cost structure. It should be noticed that the last three elements represent specified proposals of sources and methods of generating incomes on sale, formula of profit and margin and show the structure of costs resulting from the applied resources and processes for implementation of value. Concepts of business model, able to create values based on innovations, have an increasing meaning. To include the proposal presented by the following authors: C. K. Prahalad and M. S. Krishnan [8] treating the business model as one of the most important elements of competitive and innovative potential structure of a company that is used for its transformation. This concept was used to test methodology of changes and effectiveness of business models of the selected metallurgical companies.

3. METHODOLOGY OF EVALUATION OF BUSINESS MODEL EFFECTIVENESS

A method based on the New Era of Innovations was used to evaluate the business model changes and the BSC [9] to evaluate their effectiveness, as shown in **Fig. 1**.

Elements of this model are as follows:

- social architecture (knowledge resources, management systems, competences, development of employees, motivation),
- technical architecture (ICT devices, computers, ICT systems, machines, etc.),
- business processes representing combination of these bases (infrastructural in fact) and deriving resources from them necessary to implement proper product creating value for a client.

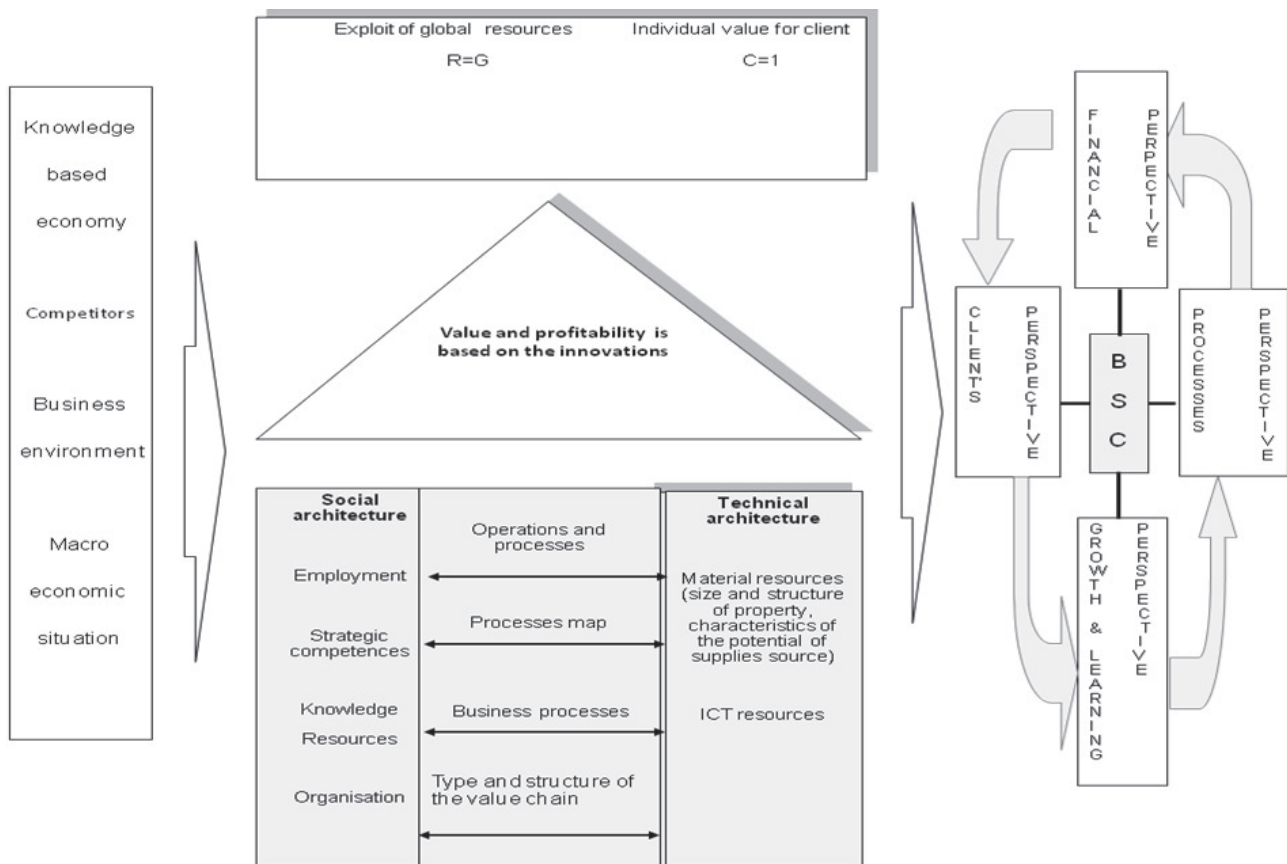


Fig. 1 Scheme of the concept of the method to the assessment business model effectiveness

Meaning of business processes in a business model is specific due to creation of value, as mentioned by K. Dohn [9] and due to implementation of innovations as noticed by J. Brzóška [10] and A. Szmal [11], including implementation of eco-innovations as mentioned by A. Ryszko [12]. Application of each business model is related to creation of multi-dimensional value, which in practice can be translated to attaining results and effects by a company. Their measurement is an important instrument that allows for evaluation of effectiveness, competitiveness and efficiency of implemented new business models or changes in the functioning models. During the research, Balanced Scorecard (BSC) was used to perform such evaluation, which fact is supported by [13]:

- complex or even multiplied effects of implementation of various types of innovations, i.e. product, process, marketing, organization and social,
- approach based on sustainable development, covering all areas of company operations,
- option to measure attained results and effects.

It is worth to mention that the results and effects configured in the form of BSC correspond to individual elements of business model. For example, perspective of learning and development represent social architecture and business processes are represented by internal processes perspective.

4. DYNAMICS OF BUSINESS MODELS AND VALUE CREATED BY THEM - CASE STUDY

Results of research are presented using case studies of two selected companies. The first of them is trade and service company developing steel products service centers. The second one is long hot rolled steel products rolling mill.

The business model developed based on the New Era of Innovation principle is the basis of the method used to analyze the dynamics of change of its structures in relation to a given company. These changes were related to various innovations introduced in the company to high extent. These could be product, process, organization and marketing or social innovations. Business model based on principles (theory) of the New Era of Innovation covering social and technical architecture as well as business models binding them allows for analysing changes and creating concepts of company development. Each well composed business model guarantees multi-dimensional value, which decides about effectiveness and competitiveness of a company. Balance Scorecard was used to measure this value.

Case study 1 - Trade and service company of metallurgical products (company A)

The examined company has been established in 1999 and in 2013 attained sales at level ca. 12 million EUR and its economy value added (EVA) is at the level 0.3 - 0.4 million EUR. At the end of 2013, the examined company employed 107 employees. Within the Company, research of the business model change within 2006 - 2013 was performed. Within this period (starting with 2009), the company changed the business model from trading company to servicing and trading company by starting the servicing centers of steel products. This was related to starting innovative processes related to steel products servicing that allow for producing new products and services (product innovations) in modern service centers. Specialized services within the scope of advisory and designing were started treated as complementary product for metallurgical products. Efficiency of the extended scope of services was related to high extent to introduction of modern systems of customer services based on close relations and prosumer orientation (marketing innovation). Financial resources gained from the program "Innovative Economy" (1.8 million EUR) were an important factors enabling implementation of innovations.

The most important changes in the business model were analyzed in three main business model components, i.e. social architecture, technical architecture as well as business operations and processes.

I. Social architecture

Engineering and trading competences were developed within the scope of metallurgical products service, production and designing metallurgical products. The number of employees with university degree increased significantly. CRM system has been introduced. Prosumer relationships are built. Significantly increased range of formal information and knowledge (trainings, post-graduate studies, developed IT systems). Cooperation with metallurgical products was extended. Creating elements of the business intelligence system

II. Technical architecture

Increase in assets and equity. Investment into metallurgical products service technologies. Modern devices for plastic working, metal working and production of steel structures. Well organized logistics system (deliveries from leading manufacturers of metallurgical products). Good location of depots and service centers. Developing ICT. Using cloud computing services. Initially Software as a Service, then Platform as a Service.

III. Operations and business processes

Business processes: metallurgical products service, procurement, production of metallurgical products, metallurgical products market marketing, designing and advisory. Developed HR process (selection of staff, motivation system). Developed chain of value adapted to client needs - source of value creation based on specialist steel products services; to less extent on trade operations.

Results representing value created by the business model of the investigated company are given in **Table 1**.

Case study 2 - hot rolled products rolling mill (Company B)

The examined company, located in one of the EU countries, has been established in 1994 as a result of restructuring large metallurgical holding operating as a joint stock company, where employees were the major shareholders. At the end of 2013, it attained sales at level ca. 45 million EUR and its economy value added (EVA) is at the level 1.5 - 1.6 million EUR. At the end of 2012, the examined company employed 232 employees. Within 2006 - 2013, evaluation concerning the change of the business model took place in the company. Within that time, slow changes of business model could have been noticed because innovations have been implemented, for years, to a very limited scope or not at all. The applied business model was based on limited assortment of long steel products, hot rolling technology, production assets leased on favorable conditions and relatively low costs of work. Changes of the business model took place after new technologies (process innovation) were introduced together with new products (product innovation). Further changes took place after starting service center (in a limited scope), in this case, they can be perceived as innovations of product and marketing character (CRM).

I. Social architecture

Slow growth of engineering competences within the scope of production and then service of metallurgical products. The number of employees with university degree increased slowly. Competences concerning cooperation with suppliers of charge from outside EU as well as wholesalers and industrial partners (including metallurgical service centers). Increased scope of formal information and knowledge (training). Still, significant meaning of utilization of hidden knowledge.

II. Technical architecture

Using equity to invest in new technologies and products (perforated shapes). Modern technical devices for servicing metallurgical products (cutting, machining, bending). Well organized system of deliveries from outside EU. Better utilization of the leased property. Structure oriented at production of typical and innovative metallurgical products and services. Modern production control systems. Controlling IT system. Better utilization of the leased property. Structure oriented at production of typical and innovative metallurgical products and services related to steel products.

III. Operations and business processes

Business processes: production and sales of classic and innovative long products, service of metallurgical product, purchase of charge, project management. HR process - motivation system related to effects (BSC), more trainings. Quality management system ISO, controlling, risk management. More developed value chain - creating value based on effective production of both typical and innovative long products as well as metallurgical service. Competitive edge based on price / standard quality of long products (sections) ratio and differentiation (new products) and services flexibility.

Results representing value created by the business model of the investigated company are given in **Table 1**.

Table 1 Balanced Scorecard - Company A and Company B

Client's perspective					Financial perspective				
Purpose	Measure	Scope (years)			Purpose	Measure	Scope (years)		
		2008	2011	2013			2008	2011	2013
Level of client's satisfaction	Percentage of satisfied clients	75.5 (80.1)	85.9 (82.2)	85.2 (83.0)	Value of sale	million EURO	4.2 (30.3)	9.4 (43.5)	12.1 (45.1)
Level of client's loyalty	Number of regular clients	98 18	136 24	142 28	Profitability of sales	Profit to sales ratio	1.3 (3.1)	8.8 (4.8)	7.4 4.3
Sales value per 1 strategic client	thousand EURO / client	36 (280)	93 (305)	99 (350)	Profitability of assets	Gross profit / assets	5.4 (7.8)	8.6 (11.8)	7.4 (10.2)
Clients retention	Number of returning clients	2 (0)	6 (2)	5 (2)	Economical profit - EVA	million EURO	-0.19 (1.2)	0.41 (1.6)	0.35 (1.4)
Business processes perspective					Growth and learning perspective				
Purpose	Measure	Scope (years)			Purpose	Measure	Scope (years)		
		2008	2011	2013			2008	2011	2013
New offers	Quantity	3 (2)	14 (7)	17 (11)	Number of satisfied employees	Percentage of satisfied employees acc. to questionnaire research	Drop 0.3 (Increase) (1.7)	Increase 1.2 (3.8)	Increase 0.56 (1.8)
Services quality increase	Complex services value versus the whole services	0.124 (no data)	0.156 (no data)	0.194 (no data)	Qualifications of personnel	Number of engineers and economists with marketing degree	39 (7)	68 (10)	73 (16)
Decrease of complaints number	Percentage (%)	1.4	1.2	1.0	Increase of employees productivity	Value of sales per 1 employee (thousand EURO)	39 (148)	88 (166)	111 (178)
Decrease of unitary costs of clients service	Percentage (%)	8.1	2.2	-1.8	Innovativeness of employees	Number of reported innovative solutions	5 (3)	4 (5)	4 no data

5. CONCLUSION

Application of BSC in the examined metallurgical companies allowed for quantitative evaluation of results concerning the implemented innovations through changes of business model. In both companies, favorable changes in the employment structure took place, the productivity increase among the employees was also noticed. Changes in the social architecture of business models did not cause the growth of employee-based innovativeness, which means that the examined companies applied open innovations. Because of innovative changes in the business processes, there was significant improvement of quality and increase in the offered products, what enables large dynamics of sale - especially noticeable in the metallurgical products servicing and trading company. Increased number of regular clients can be attributed to changes in the business processes and in the social architecture. The number of satisfied clients increased moderately, what emphasizes the need for further implementation of marketing innovations. Changes in the technical

architecture related to process innovations allowed for significant improvement of profitability of assets as well as customer service quality. Implementation of modern devices contributed to growth of sale and operating profit. In case of rolling mill of hot-rolled steel products significant engagement of own capital into investment being the carrier of process and product innovations affected the relatively small growth of economic value added (EVA). To sum up, one can say that application of BSC allows for evaluating effectiveness of business models what can be used to change their structures oriented at larger abilities to absorption and creation of innovation.

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