BALANCED SCORECARD AS A TOOL FOR RESEARCH AND DEVELOPMENT PERFORMANCE MANAGEMENT– A CASE STUDY IN AN AGRICULTURE COMPANY

Marie Kubáňková – Jaroslava Hyršlová – Jan Nedělník

Abstract

Purpose: The growing number of research oriented to research and development (R&D) performance reflects broad debates dedicated to R&D evaluation, measurement of its effectiveness related to competitiveness and also R&D added value and cost management. Therefore many authors call for research focused on the implementation of strategic management accounting tools, primarily the Balanced Scorecard (BSC) used as a R&D management tool in small and medium-sized enterprises (SMEs). The aim of this paper is to contribute to the empirical knowledge of implementation of strategic management accounting tools in R&D performance management, with a primary focus on the BSC implementation in SMEs.

Design/methodology/approach: The purpose of this paper is to propose a procedure for R&D performance management tailored for SMEs based on BSC. This paper also intends to be an inspiration for further research in this area. As a case study method is recommend by the literature when a particular management tool is a desired output, the case study was provided in a case company. The investigation lasted nine weeks, three key steps can be recognized: (1) reference framework development; (2) strategic goals of the case company and the status quo of R&D management identification (3) development a BSC for the case company.

Findings: The case study concludes the BSC proposal as a system of interrelated indicators and a procedure for R&D performance management. The indicators transform the strategic goals of the company into a set of corresponding R&D goals. Hereby this paper responds to the challenges endorsed by the literature, specifically the call to investigate the implementation of BSC in R&D performance management.

Research/practical implications: Empirical research of the practical implementation of strategic management accounting tools is of a crucial importance of the further development of this scientific discipline. Innovation management measurement as well as R&D

performance management are subjects of interest for a number of expert studies. The ambition of this paper is to provide a procedure for SMEs how to manage R&D by BSC, and also to bring an inspiration for further research in this field.

Originality/value: The added value of this paper is extension of the existing knowledge concerning the BSC used in the management of R&D performance.

Keywords: research and development, Balanced Scorecard, strategic management accounting

JEL Codes: O32, M10, M20

Introduction

The expanding amount of literature dedicated to R&D performance management reflects an extensive discussions how to evaluate R&D projects, measure their added value, manage related costs or analyse competitiveness caused by R&D investment (Pearson, Nixon and Kerssens-van Drongelen, 2000). Technical development, steady technological improvements and innovations together with global competition increase the uncertainty over the product lifecycle; these factors rather complicate long-term planning primarily in the area of R&D (Chiesa et al., 2009).

Strategic management accounting can make a significant contribution to achieving and maintaining a competitive advantage for a company in the global environment (Bremser and Barsky, 2004). Strategic management accounting helps to identifying a strategic orientation of a given company and it provides information for the decision-making processes. Company competiveness or even survival depends on a successful assessment of the current situation and the choice of an appropriate strategy. Innovation management measurement as well as R&D performance management are subjects of interest for a number of expert studies (Adams, Bessant and Phepls, 2006; Savino, Messeni Petruzzelli and Albino, 2017). There are notable calls for a research into the use of BSC in R&D management primarily in SMEs (Bremser and Barsky, 2004; Tuomela, 2005). SMEs are often more productive in the innovation process, they usually achieve higher R&D productivity; however SMEs do not usually use strategic management accounting tools in general and neither in R&D performance management (Tuomela, 2005). The aim of this paper is to contribute to the empirical knowledge of implementation of strategic management accounting tools in R&D performance management, with a primary focus on the BSC implementation in SMEs. This

paper reflects the challenge outlined by Bremser and Barsky (2004) and Tuomela (2005). The ambition of this paper is to provide a procedure for SMEs how to manage R&D by BSC, and also to bring an inspiration for further research in this field.

1   Reference framework

Chiesa et al. (2009) classify the existing knowledge of R&D performance management to four levels. At the first there are findings from a research focused on the choice of individual indicators or metrics suited for R&D, at the second level research has looked into the choice of the performance perspectives of R&D. At a third level, research has adopted a systemic perspective to R&D performance measurement and finally at the last level more strategy-oriented stream of research has adopted a contextual perspective where performance management system for R&D should be studied within the context in which it is applied.

A great impulse for the business performance management systems literature was the BSC created by Kaplan and Norton (1996); several authors have applied this tool for R&D management (Bremser and Barsky, 2004; Tuomela, 2005) as the BSC allows to implement a strategy in accordance with the strategic goals in financial, customer and innovative perspectives with the alignment to internal processes and all managerial levels of a given company (Bisbe and Otley, 2004; Morandi, 2011). Bremser and Barsky (2004) claim: BSC offers a great approach to performance measurement and management. One of the identified problems of strategic management accounting is the lack of attention to practice (Tuomela, 2005). Pearson, Nixon and Kerssens-van Drongelen (2000) argue that the key challenge of R&D performance management is the decision about the long-term strategic and financial goals. As BSC can be decomposed to individual indicators, the implementation of BSC in R&D management ensures integration and compliance of R&D planning with the whole company strategy (Bremser and Barsky, 2004). BSC offers a balanced combination of non-financial and financial indicators to manage of R&D performance in accordance with the innovation process to maximization of the value of R&D opportunities; BSC can also make a significant contribution to the learning process.

Based on the reference framework and in line with the main aim of the paper, the following question was asked: Can BSC to improve R&D performance management in SMEs? Can a simple procedure for R&D performance management in SMEs be designed?

2 Methodology

The original BSC proposal by Bremser and Barsky (2004) was extended to the area of strategic partnership in line with Mayer-Haug et al. (2013). Tab. 1 summarizes the initial BSC indicators for R&D departments.

Tab. 1: Initial BSC designed for R&D department

Strategic areas	Strategic indicators at company level	Indicators at R&D department level
Finance	A. Return on investment capital B. Customer profitability C. Company turnover growth	1. R&D annual budget (A) 2. Total R&D expenses (A) 3. R&D expenses as % of turnover (B) 4. Licences revenue (A, B, C)
Customers	D. Retaining number of customers E. Retaining market share F. Acquiring new customers (number and quality)	5. Product lifecycle on the market (D, E, F) 6. Customer satisfaction with a new products (D, E) 7. Added value perceived by customers as a result of highly professional services (D, F) 8. New products and technologies with a positive impact on the environment (F, D)
Internal processes	G. Profitability of new products H. R&D effectiveness (time between development and market launch) I. Percentage of funds to be spent to keep existing products on the market J. Other non-R&D indicators	9. Number of successful projects 10. Average cost of one product development (G) 11. Total number of projects
Learning and development	K. Staff fluctuation L. Staff development M. Percentage required qualifications and competencies being fulfilled N. Measuring staff satisfaction O. Analysis of innovation culture	12. Number of recognized patents (M) 13. Percentage required qualifications and competencies being fulfilled (K, M) 14. New acquired skills 15. Newly used technology 16. Competitiveness of R&D vs. competitors (M) 17. Customers satisfaction (N, O) 18. Staff training (K, L)
Strategic partnership	P. Networking and engaging in prestigious consortia Q. Acquisition of external sources for R&D financing	19. Number of projects co-financed from public sources 20. Number of projects implemented in cooperation with other private entities 21. Number of new strategic partnerships

Source: adjusted according to Bremser and Barsky (2004), Mayer-Haug et al. (2013)

Case study allows describing interactions; Jorgensen and Messner (2010) recommend using a case study method if searching a complex problem. This method enables assessment from a wide perspective (Morandi, 2011) and it is often used for creating a specific management tool (Coyte, Ricceri and Guthrie, 2012). Therefore the case study was selected as

an appropriate method to answer the research questions. The investigation lasted nine weeks; three key steps can be recognized:

1) Introducing the reference framework according to McCarthy and Gordon (2011) to the management.

2) Strategic goals of the case company and the status quo of R&D management were identified in line with Tuomela (2005) and Chiesa et al. (2009). Interviews were provided with the executive manager, R&D manager and R&D project managers to assess the current performance management status at the R&D department level. The structure of the questions was based on a questionnaire created by Aiman-Smith et al. (2005). The questionnaire was broaden to bring data about product portfolio, added value, nature of R&D activities, goals set for the R&D department (return on investment, amount of turnover dedicated to R&D; performance measurement and main characteristics of the performance measurement system used, reasons for performance measurement and the main required performance parameters of R&D; tools currently used for R&D management, how it is monitored to meet defined criterion, how the tools are adapted to the goals pursued).

3) BSC with tailored indicators was developed for the case company.

The proposed procedure allows the adaptation of the BSC to the specific condition of the case company.

The case study was carried out in one private SME actively involved in agriculture, crops breeding and providing expert consultancy services to agricultural entrepreneurs. The company's customers include both private entities (especially agricultural entrepreneurs) and also public sector organizations, in particular the organizations of protected landscape areas. The case company has been established on the market for more than 24 years, has its own R&D department and devotes considerable funds to research on new agro technologies, breeding, landscape reclamation methods and nature conservation practices.

The implementation of BSC in selected company was in line with the basic principles as outlined by Bremser and Barsky (2004): (1) to create an overview of strategic goals at the enterprise level; and (2) those goals on the agreement between both management levels set for a lower management level. Each specific indicator for R&D has its link to the company strategic goals to ensure that R&D will support the strategic development; hereby the final BSC was developed.

3   Results

The following strategic goals of the case company have emerged from interviews with the executive manager:

- to maintain an existing position on the market and customers,
- to expand the portfolio of activities on new bioenergy technologies and products,
- to expand the portfolio of active international partners and projects and to engage in EU Framework Programs.

The following conclusions were drawn from the interviews with the R&D manager:

- R&D department is determined mainly on the basis of specific projects planned on an annual basis; the R&D department is responsible for the implementation of these projects,
- the link between the contribution of the R&D department and the company's goals is not explicitly illustrated,
- the company continuously monitors implemented R&D projects, in particular compliance with the budget and deadlines,
- the mutual communication is at a very good level.

The case study resulted in the creation of BSC, precisely a system of interrelated indicators that transform the strategic goals into a set of R&D goals and ensure the fulfilment of strategic goals of the company. The final BSC is provided in Tab. 2.

In the BSC proposal we can find limiting indicators (*Total R&D expenses, R&D annual budget*) as well as monitoring indicators (*Licences revenue, Customer satisfaction with a new products, Added value perceived by customers as a result of highly professional services, Number of new strategic partnerships*). Indicators *Number of successful projects* and *Percentage required qualifications and competencies being fulfilled* put timely attention to any potential threat or they signal opportunities (success in new projects). Further it is possible to state that managers put the same attention to both the financial and the non-financial indicators when they selected the indicators for BSC. In the original proposal by Bremser and Barsky (2004) indicators for partial areas always related to the given area. In the final design of BSC created for case company some indicators related to more than one area. This concerns for instance indicator *Number of successful projects* that relates to customers' area as well as to internal processes area. Further it is the indicator Percentage required qualifications and competencies being fulfilled that integrates in itself both the learning and growing area and the customers' area. Further it is the indicator *Percentage required*

qualifications and competencies being fulfilled that integrates in itself both the learning and development area and the customers' area.

Tab. 2: Breakdown of company strategic goals into R&D indicators – final BSC

Company strategic goals	BSC part	Company strategic indicators	Company indicators of R&D department
Maintain existing position on the market	Finance	A. ROA	1. Total R&D expenses (A)
			2. R&D annual budget (A)
			3. Licences revenue (A)
Extend the portfolio of activities about new profitable projects	Customers	B. Keeping existing customers	4. Added value perceived by customers as a result of highly professional services (B)
		C. Acquiring of new customers	5. Customer satisfaction with a new products (C)
		D. Increase turnover from new products	6. Number of successful projects (E, C)
	Internal processes	E. Achieving profitability from new products	
	Learning and development	F. Staff development	7. Percentage required qualifications and competencies being fulfilled (F, C, B)
Extend partner portfolio	Strategic partnership	G. Networking and engaging in prestigious consortia	8. Number of new strategic partnerships (G)

Source: authors

The top management of the company has decided to use this system since they believe it shall increase profitability of business and it will generate new perspective projects. Company manager expressed the main contribution of the case study: *"The investigation encourage me to think over the links between the company's goal and the task for the R&D department. The joint meeting (the presentation and the discussion) was the impetus for us to debate again about the strategy. We concluded of few new proposals for further development of the company."* The R&D manager said: *"The need to look at our department and our department's projects resulted in understanding of how a very important role our department has and how important our department is for the overall success of our company in the market. Thanks to the fact that our employees shall be much more confronted with our customers' requirements and our department shall monitor how commercialization is successful I hope this will have impact on project proposals submitted by our R&D professionals. I believe this change shall be towards projects resulting in market success."*

In order to succeed with the implementation of BSC it seems to be very important to focus also on indicators for concrete R&D projects. This step is in agreement with Papalexandris et al. (2005) and Bremser and Barsky (2004) recommendation who stress the need to create BSC even for individual project teams.

Conclusion

The completed case study has verified the implementation of BSC provided by Bremser and Barsky (2004); the procedure consists of the following steps: 1) formulation of strategic goals at the company level, 2) analysis of the current level of R&D management performance, 3) transforming the performance indicators to lower levels in line with the company's goals to secure a smooth transition to a new management approach. The proposed procedure allows BSC to adapt to specific company requirements as recommended by Coyte, Ricceri and Guthrie (2012) and to achieve effective communication of the need for changes in the performance management system (Papalexandris et al., 2005). The selection of concrete indicators was based on the procedure recommended by Bremser and Barsky (2004). It is clear that the multi-criteria evaluation of R&D activity will provide better information to the management of the company as it will allow the display of customer needs, so the impulses will not only be generated from the "inside" of the company but will take into account market needs. The implementation of the BSC in the case company led, according to the company's management, (1) to improving of communication and enhancing of cooperation – see Pearson, Nixon and Kerssens-van Drongelen (2000), Tuomela (2005); (2) to increase of management awareness of the added value of R&D to creation of added value for the company – see Tuomela (2005), Papalexandris et al. (2005); (3) to support of innovative climate in the company and to creation of new projects – see Taylor et al. (2000).

The main limitation of realised research is the chosen method. A case study was conducted in a selected SME, the conclusions cannot be generalized. Cabelo-Medina et al. (2011) claim that companies are too complex units, so research results in one does not need to lead to the same results in conducting the same research in another company, but summarizing "best practices" is an important task. Examples of good practice can be a guide for a number of businesses, and can be applied to a variety of different companies operating under different conditions. Consequently, on the one hand, the conclusions cannot be generalised, on the other hand, they may be important for other companies to manage R&D

performance. In the area of further research, a more in-depth analysis of the implementation of the BSC in a research organization may bring interesting findings.

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Contacts

Marie Kubáňková

Research Institute for Fodder Crops, Ltd. Troubsko

Zahradní 400/1, 664 41 Troubsko, Czech Republic

Email: mariekubankova@gmail.com

Jaroslava Hyršlová

University of Pardubice, Faculty of Transport Engineering

Studentská 95, 532 10 Pardubice, Czech Republic

Email: jaroslava.hyrslova@upce.cz

Jan Nedělník

Research Institute for Fodder Crops, Ltd. Troubsko

Zahradní 400/1, 664 41 Troubsko, Czech Republic

Email: nedelnik@vupt.cz