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Product portfolio management and performance: Evidence from a survey of innovative Brazilian companies[☆]

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ABSTRACT

Portfolio management is gaining increasing attention from researchers and practitioners involved in innovation and product development. In this context, this study aims to analyze the product portfolio management practices that innovative firms in a developing country adopt. This investigation also aims to establish the relationship between these practices and product portfolio performance. The study carries out a quantitative survey on a sample of 71 Brazilian firms, and the results demonstrate that practices associated with formalization, systematization, and clarification in product portfolio decision making significantly influence the fulfillment of performance objectives. In addition, some companies face difficulty in fulfilling the balance of portfolio products, and this difficulty possibly relates to the concentration of incremental innovation efforts in new product development.

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1. Introduction

By determining the current and future set of products that a company uses to compete in the market, product portfolio management (PPM) is gaining increasing attention from researchers and professionals involved in innovation and product development (Kester, Hultink, & Griffin, 2014; McNally, Durmuşoğlu, & Calantone, 2013). Product portfolio decisions fundamentally fall into the following categories (Cooper, Edgett, & Kleinschmidt, 1999): selection and prioritization of the group of product projects that make the implementation of the business strategy viable, decisions about the allocation of resources, and investments in the different product projects through time.

Decision making regarding product portfolios is complex because, in addition to being part of the planning stages of new product development (NPD) (Heising, 2012), such decision making also relates to political values and a company's power (Kester, Griffin, Hultink, & Lauche, 2011; Martinsuo, 2013). This tendency creates a challenge for the search for balance (i.e., an ideal mix of products in the company's portfolio), which must take into consideration the various interests of the stakeholders. If the company is unable to make effective decisions, the firm may compromise its portfolio and consequently, its NPD performance.

In the last few decades, researchers have been conducting various studies with the objective of improving product portfolio performance. These studies recommend the adoption of specific management practices, such as financial and scoring tools decision making by multifunctional teams, and systematization and formalization of such teams' activities (e.g. Kahn, Barczak, & Moss, 2006; Kopmann, Kock, Killen, & Gemünden, 2015). This present work aims to contribute to the PPM theory by analyzing the portfolio management practices in companies that operate in Brazil. The objective of the study is to establish the relationship between these practices and product portfolio performance. An assessment of the literature shows that a research gap exists in the relationships between the influences of PPM methods, the systematization and formalization of PPM, and the functional integration with product portfolio performance. The study performs a survey on a sample of 71 companies with innovative characteristics in the electronics and computer (hardware and software) sectors.

Many studies investigate the aspects of PPM in North American (Cooper et al., 1999; McNally et al., 2013), Australian (Killen, Hunt, & Kleinschmidt, 2008), Asian (Oh, Yang, & Lee, 2012), and European (Kock, Heising, & Gemünden, 2015; Teller, Unger, Kock, & Gemünden, 2012) firms. Despite the new attention Brazil receives for its economic contributions as a member of the BRIC (Brazil, Russia, India, China and South Africa) group of countries, few studies demonstrate the realities of companies that operate in the country with regard to PPM.

The next section, Section 2, defines the theoretical aspects this research investigates, in addition to the hypotheses the research uses for the fieldwork. Section 3 describes the study's research methods and the results from the survey responses. The last section, Section 4,

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presents the study's conclusions and discusses the findings' managerial implications, the study's limitations, and the directions for further work.

2. Theoretical background and research hypotheses

As a field of knowledge, PPM aims to support companies with regard to making a business strategy viable, optimizing resources, minimizing risks, and reducing the time to market in NPD (Cooper et al., 1999; Jacobs & Swink, 2011). In a practical situation, portfolio management can help in making decisions about prioritizing resources and allocating them to the most promising product projects, while at the same time avoiding the waste of such resources.

PPM aims to attain three principal performance objectives (Cooper et al., 1999; Cooper, Edgett, & Kleinschmidt, 2000):

- (i) Strategic alignment: The translation and coordination of the company strategy for a group of products in a way that considers the current or future product lines that will be responsible for making the business strategy viable;
- (ii) Balance: The establishment of the mix of product projects, considering aspects such as the level of innovation of each of the products in the portfolio (radical and incremental innovation projects), the expected risks and rewards associated with the development of these projects, the target market segments of each product, and the diversification of the portfolio with regard to product development times;
- (iii) Maximized portfolio value: The optimization of the relationship between the resources used in and the expected returns from the product projects.

Various researchers who work on PPM emphasize the importance of fulfilling these three performance objectives (e.g. Jugend & da Silva, 2014; Killen et al., 2008; McNally et al., 2013; Meskendahl, 2010; Mikkola, 2001; Oh et al., 2012; Perks, 2007). Given these strategic and simultaneously complex characteristics, various studies recommend the adoption of specific formalized and objective practices to support PPM activities. This study categorizes these PPM activities into (i) methods (e.g., Dutra, Ribeiro, & de Carvalho, 2014), (ii) formalization (e.g., Teller et al., 2012), and (iii) integration (e.g. Kester et al., 2011; Perks, 2007).

Researchers recommend different management practices and specific methods to obtain adequate product portfolio performance. The application of these methods to PPM is useful for evaluating strategic, market, technological, and risk factors, as well as the return on investment from the product portfolio (Coulon, Ernst, Lichtenthaler, & Vollmoeller, 2009). The PPM literature cites the following methods (Jugend & da Silva, 2014): financial methods (Archer & Ghasemzadeh, 1999; Chao & Kavadias, 2008; Killen et al., 2008), marketing and market research information (Abrantes & Figueiredo, 2014; Kester et al., 2011), scoring and ranking (Bitman & Sharif, 2008; Henriksen & Traynor, 1999), checklists (Christiansen & Varnes, 2008), maps (Closs, Jacobs, Swink, & Webb, 2008; Oliveira & Rozenfeld, 2010), and graphs and diagrams (Mikkola, 2001; Oh et al., 2012).

Therefore, the study expects to find a positive relationship between portfolio management methods and the fulfillment of performance objectives, and accordingly, establishes the following hypothesis:

H1. A positive correlation exists between PPM methods and the fulfillment of product portfolio performance objectives.

Cooper et al. (1999); Kahn et al. (2006), and Teller et al. (2012) argue that the formalization of PPM, in combination with support from senior management, increases the companies' maturity in terms of their portfolio management activities (Kopmann et al., 2015). This formalization aims to clarify the rules, procedures, and criteria for the analysis and

decision making for all products in the portfolio (Archer & Ghasemzadeh, 1999; Meskendahl, 2010). Therefore, the study expects to find a positive relationship between the formalization of PPM and fulfillment of the portfolio objectives, and accordingly, establishes the following second hypothesis:

H2. A positive correlation between the level of formalization of the product portfolio and the fulfillment of the portfolio performance objectives.

PPM methods (e.g., financial methods, scoring, ranking, checklists, maps, and graphs and diagrams) tend to contribute to the systematization of portfolio decision making and, consequently, helps improve this process (Cooper et al., 1999; Coulon et al., 2009; McNally et al., 2013). As a result, a positive relationship between management methods and the formalization of PPM may exist, as the next hypothesis proposes:

H3. A positive correlation exists between PPM methods and the formalization of a product portfolio.

Some studies (e.g. Kester et al., 2011; Perks, 2007; Weissenberger-Eibl & Teufel, 2011) consider functional integration as a best practice for PPM. Integration promotes effective decision making for the product portfolio because it strengthens the sharing of knowledge and information among the company's different functional perspectives, including in the evaluations of the technical, managerial, and market aspects involved with PPM (McNally, Durmuşoğlu, Calantone, & Harmancioglu, 2009; Perks, 2007). Jacobs and Swink (2011) highlight that integrating the functions of marketing, engineering, R&D, production, and sales is important to PPM. Heising (2012) also discusses integration, especially in the NPD planning phases, when the change and interruption costs are still very low in relation to the final stages of product development. Thus, the study expects to find a positive correlation between integration and the fulfillment of product portfolio performance objectives, as the fourth hypothesis states:

H4. A positive correlation exists between the integration of the functions involved in PPM and the fulfillment of the product portfolio performance objectives.

Section 3 establishes the research design based on this study's theoretical framework and research hypotheses derived from PPM theory. Fig. 1 illustrates the model that guides this study.

3. Research design

To achieve its objectives, the study conducts an exploratory quantitative investigation using a questionnaire based on the study's research framework (see Fig. 1). Appendix 1 lists the factors and variables in the survey, as well as the underpinning works. The appendix also includes the mean and standard deviation results for each examined variable.

The study gathers the data using the structured questionnaire. The questionnaire includes several statements based on the four research hypotheses and asks respondents to indicate their agreement or disagreement with a statement on a five-point Likert scale (from 1 = 'totally disagree' to 5 = 'totally agree'). Before the study finalizes the structure of the survey instrument, it conducts a pilot test of the questionnaire with a PPM expert in academia and an executive at a company in the electronics sector.

The study conducts the survey on a sample of companies in the electronics and computer sectors. A recent report on innovation by the Brazilian Institute for Geography and Statistics (mostly known in Portuguese by the acronym IBGE) (IBGE, 2013) provides support for the study's choice of sectors. These sectors have some of the highest rates of innovation in Brazil. The electronics and computer sectors invest 13.5% and 6.5%, respectively, of their revenue in innovation (IBGE, 2013). Companies in these sectors continuously develop new products

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