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ARTÍCULO ORIGINAL

Determinantes del rendimiento de la innovación de producto: ¿por qué algunas innovaciones son más exitosas que otras?

Determinants of Product Innovation Performance: Why Are Some Innovations More Successful than Others?

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RESUMEN

Este artículo estudia la influencia de los factores determinantes del desempeño tales como factores estratégicos, factores de mercado, factores de desarrollo-proceso y factores organizativos sobre el desempeño de la innovación de productos y cómo esas relaciones pueden variar dependiendo del tipo de innovación -incremental o radical. Analiza las relaciones entre los factores estratégicos, factores de mercado, factores de desarrollo-proceso y factores organizativos que determinan el desempeño de innovación de producto para ambos tipos de innovación (radical e incremental), utilizando un Meta-Análisis previo incluido en la literatura para establecer qué dimensiones y componentes tienen más incidencia e importancia al medir la innovación del producto.

PALABRAS CLAVE: innovación, determinantes del rendimiento, desempeño de la innovación.

ABSTRACT

This paper examines what influence determining factors such as strategic factors, market forces factors, development and process factors, and organizational factors have on product innovation performance, and how the relations between them can change, depending on the type of innovation – whether incremental or radical. These relations are also examined for both types of innovation, by using a previous meta-analysis included in the literature to measure the most important and influential dimensions of product innovation performance –efficacy and efficiency.

KEYWORDS: innovation, performance determinants, business innovation.

Introduction

There has been a considerable debate and concern about product innovation in both the academic as well as the practitioner press in recent times. The primary reason for this focus is the evidence that innovation improves performance of firms (Damanpour, 1991; Hult, Hurley and Knight, 2004). In this sense, there is no more fundamental issue to new products managers than understanding the factors that separate success from failure in product innovation (Cooper and Kleinschmidt, 1987a).

In the product innovation literature there is some extensive review that has examined the determinants of new product success (Cooper, 1979; Montoya-Weiss and Calantone, 1994). Previous empirical research on new product performance has provided considerable evidence that a wide variety of antecedent factors can influence the outcomes of new product development activity. The determinants proposed usually involve some combination of strategic, development process, organizational, and/or market environment factors as drivers of new product performance (Montoya-Weiss and Calantone, 1994).

Product superiority is mentioned as «the number one factor that influences commercial success and that project definition and early predevelopment activities are the most critical steps in the new products development process. Success, they argue, is earned. It is not the ad hoc result of situational or environmental influences. Synergy, both marketing and technical, is crucial» (Cooper and Kleinschmidt, 1987a. p. 169).

Hence, evaluation of Product Innovation Performance (PIP) is a critical issue on innovation management research, and its measurement is gaining importance as its effectiveness and efficiency not only determines an organization's competitive advantage (Barney, 1991; Castro, 2011), but also its very survival (Cedergren, Wall and Norström, 2010).

«Firms that offer products that are adapted to the needs and wants of target customers and that market them faster and more efficiently than their competitors are in a better position to create a sustainable competitive advantage (Prahalad and Hamel, 1990; Amit and Schoemaker, 1993; Nonaka and Takeuchi, 1995; Calantone *et al.*, 1995). Competitive advantage is increasingly derived from knowledge and technological skills and experience in the creation of new products (Teece *et al.*, 1997; Tidd *et al.*, 1997). Within this context, special attention needs to be paid to the measurement of innovation performance. Both researchers and practitioners require a good measurement instrument for this concept (Montoya-Weiss and Calantone, 1994)». (Alegre, Lapiedra and Chiva, 2006. p. 333)

Innovation performance measurement is an elusive subject due to the multiplicity of meanings associated with performance measurement as well as the varied, (Arteche, *et al.* 2017), but simultaneous, roles that performance measurement plays; and the numerous, distinct customers of performance measurement (Hannachi, 2015). Given the importance of product innovation performance, its measurement is a significant challenge. In fact, both researchers and managers require a relevant measurement instrument of PIP (Alegre, Lapiedra and Chiva, 2006).

«In management research, general firm performance has traditionally been the dependent variable of empirical studies». (Alegre, Lapiedra and Chiva, 2006.

p. 334). On the other hand, practitioners also need instruments to assess innovation management and innovation outcomes (Arteche *et al.*, 2017). Through this paper, the reader will achieve to a better understanding about determinant factors of product innovation performance. In this sense, the paper unfolds as follows: first, the state of the art about business innovation is presented. It aims to highlight the importance of innovation and performance in business and economics research, and develop subsequently a measurement scale of the Product Innovation Performance (PIP). Next, our expanded understanding of the PIP is described and a model is proposed to study relationships between performance determinants and outcomes. Finally, conclusions are presented.

1. From Business Innovation to Product Innovation

What makes a new product a success? And what separates new product «winners» from «losers»? The answers to these questions are critical to effective product innovation management (Cooper and Kleinschmidt, 1987a). Being able to understand performance determinants and new product success factors is important because it provides guidelines to the screening of new product projects, that is which ones should be left aside and which ones pursued; this leads to insights into the way the new product project should be managed (Cooper and Kleinschmidt, 1987b).

In the past few years there has been a tremendous interest in business innovation and more specifically in product innovation. The *Journal of Product Innovation Management* had a special issue on developing really new (as opposed to incremental) products a few years back. On the other hand, the Marketing Science Institute designated developing really innovative products as one of its top research priorities.

This topic is important for several reasons. On the one hand, product innovation provides great opportunities for firms in terms of growth and expansion into new areas. Significant innovations allow firms to establish competitively dominant positions, and afford newcomer firms an opportunity to gain a foothold in the market (Danneels and Kleinschmidt, 2001). However, product innovation is also associated with high risks and management challenges. Prior research has suggested that more innovative products require more firm resources and a different development approach to be successful and that many products fail in the process (Danneels and Kleinschmidt, 2001)

Based on a concurrence analysis of terms, present in the titles and abstracts of over 7,000 published articles, in the Web of Science in business and economics journals on business innovation, we have obtained the terms that represent the themes of greatest interest for researchers.

As shown in figure 1, a network image, the most relevant terms studied in these topics are those corresponding to innovation and performance.

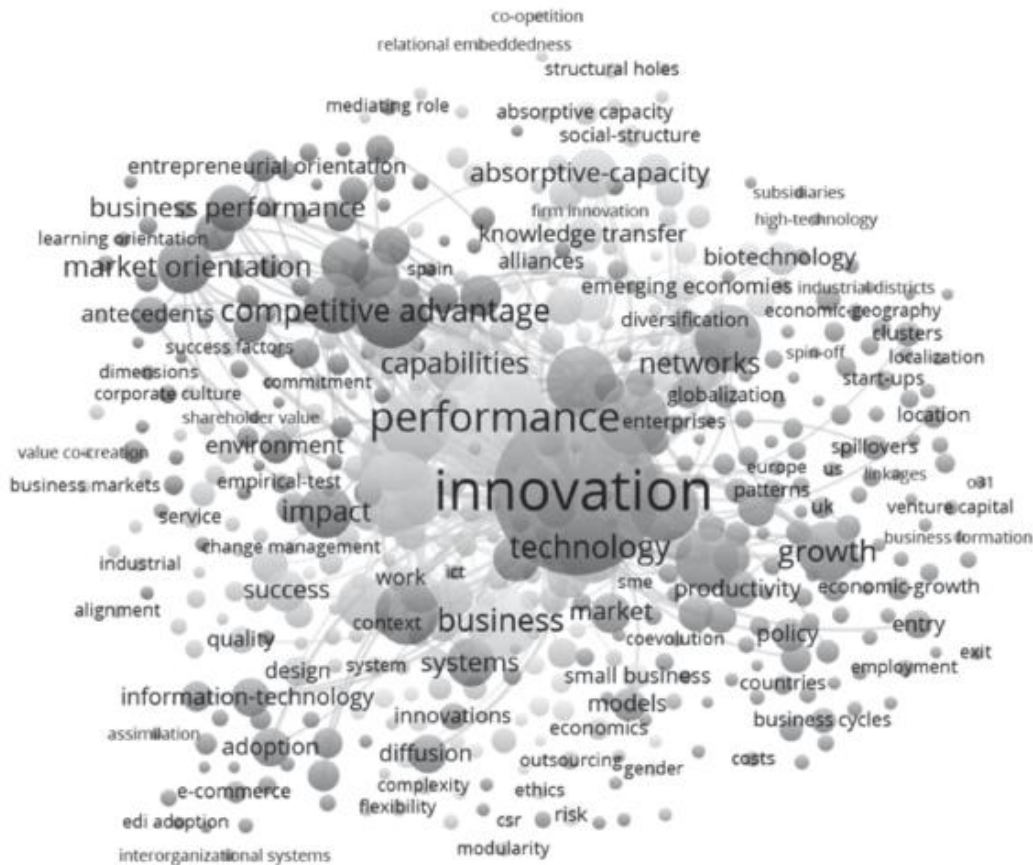


Figure 1: Concurrence of terms in the literature on economics and business.
Source: Over 7 000 articles on Business Innovation present in The Web of Science.

After that, we did a cluster analysis. Figure 2 shows four clusters. The blue cluster (cluster 1) focuses on market aspects, whereas the purple cluster (cluster 2) focuses on the contribution of technology in innovation; the aquamarine cluster (cluster 3) focuses on the capabilities associated with innovation and the final cluster (cluster 4) to the economic aspects of the process.

Likewise, the network visualization on co-citation reveals the most relevant authors for these topics (see figure 2). In this graph again four clusters can be observed again: one of the groups contains articles on marketing, being Day (1994), Hurley (1998), Slater (1995) and Bagozzi (1988) the most representative authors; another cluster focused on strategy with Eisenhardt (1989) and Teece (1997) as the most representative authors. The third cluster focused on management with Cohen (1990), Barney (1991) and Nonaka (1995) as the most relevant authors; and a fourth cluster with more scattered topics and not necessarily connected topics.

In spite of the importance of product innovation, it seems that we need a much better understanding of exactly what it means, what factors determine product innovation performance and how to measure it properly. We argue that scholars have not yet adequately answered these questions and others related to product innovation performance and we want to address these issues in this study.

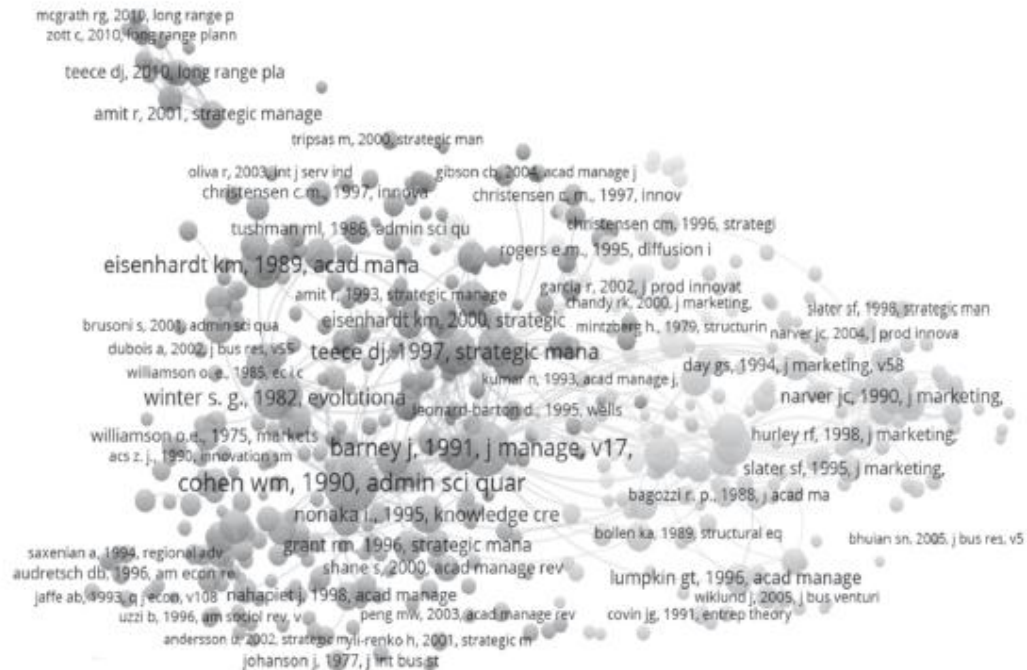


Figure 2: Cluster analysis – Theoretical Research Fields.

Source: Over 7 000 articles on Business Innovation present in The Web of Science.

2. Importance of Product of Innovation

Managers today face a dilemma regarding product innovation. On the one hand, there is increasing pressure to develop and launch more new products in order to maintain competitive advantage. On the other hand, product innovation remains a very high-risk effort, filled with difficulties and littered with failures (Cooper and Kleinschmidt, 1987a). New product failure rates remain high while almost half the resources that U.S. industry devotes to product innovation is spent on innovation «losers», that is, products that fail commercially or even never make it to the marketplace (BoozAllen and Hamilton, 1982; Cooper, 1984).

Therefore, in our time, if businesses are to survive and prosper, managers must become smarter at selecting new product winners, and at effectively managing the new product process from product idea through to launch (Cooper and Kleinschmidt, 1987a). These two challenges; on the one hand better project selection and on the other more effective process management, point to the need for a greater understanding of the components of success in product innovation (Cooper and Kleinschmidt, 1987b).

From a researcher's perspective, several general conclusions may be drawn regarding the content and nature of empirical research on new product performance (Montoya-Weiss and Calantone, 1994). First, although there is some consistency as to which factors are considered by researchers, the range of factors included in the typical set is indeed narrow. This indicates a need for more broad-based studies that include multiple factors from diverse categories (Montoya-Weiss and Calantone, 1994). Second, some factors have not been studied extensively enough to draw strong conclusions regarding their impact on performance (Montoya-Weiss and Calantone, 1994) one of them being market and environment factors –hence the importance to study and analyze them in order to draw better conclusions. Therefore, we set out to gather evidence to help answer the question, «Why are

some product innovations more successful than others?» by looking at the new product experiences (success and failures) of a number of firms.

3. Literature Review

3.1. What is Innovation?

The term «innovation» has acquired various meanings over the years. In general terms, it is the process of developing a new item, the new item itself, and the process of adopting the new item (Zaltman *et al.*, 1973). Other authors define innovation –as a broad concept– as the ideation, development, and commercialization of substantially new products, services or businesses which facilitates the development of new sources of competitive advantage (Alegre, Lapiedra and Chiva, 2006).

On the other hand, product innovation consists of the successful exploitation of new ideas (Myers and Marquis, 1969) which implies two conditions: novelty and use (Gee, 1981). More specifically, product innovation is a new technology or combination of technologies introduced commercially to meet a user or a market need (Utterback and Abernathy, 1975). Product innovation is considered by Freeman (1982) as a process in the marketing of a new (or improved) product that includes: the technical design, R&D, manufacturing, management and commercial activities.

Several authors make distinctions according to different types of innovation. For example, Christensen (1997) distinguishes between sustaining and disruptive technological change. In his paper, he explains why firms that are successful innovators based on sustaining technologies ignore crucial innovations based on disruptive technologies (Christensen, 1997).

On the one hand, what Christensen (1997) describes as sustaining technologies are the ones that improve the performance of established products that are already known and valued by customers, whereas what he calls disruptive technologies consist of products with a new value proposition that only few customers know and value (Christensen, 1997). Elaborating on Christensen's (1997) argument (Meeus and Oerlemans, 2000), conclude that in turbulent markets a focus on continuous innovation (adaptation) is a better innovation policy than inertia and gradual innovation (selection) and vice versa (Verhees and Meulenbergh, 2004).

According to our review of literature, we classify product innovations in two concepts: radical and incremental innovations (Jansen, Van Den Bosch, and Volberda, 2006). On the one hand, radical innovations are exploratory in nature and are designed to meet the needs of emerging customers or markets (Benner and Tushman, 2003; Danneels, 2002). These types of innovation offer new designs, create new markets and develop new channels of distribution (Abernathy and Clark, 1985). They require new knowledge or departure from existing knowledge (Benner and Tushman, 2002; Child and McGrath, 2001; Levinthal and March, 1993).

Radical innovation is not the only choice for new product introduction. Evidently, there can only be one pioneer in any product market, therefore what some authors describe as «imitation» remains a viable and sometimes more common strategy than innovation (Golder and Tellis, 1993; Kerin, Varadarajan and Peterson, 1992; Schnaars, 1994). This «imitation» strategy can take different degrees, from pure clones, which represent «me-too» products, to creative imitation or incremental innovation, which takes an existing product and improves

on it (Schnaars, 1994; Shankar *et al.*, 1998). Product development accordingly can take a mixed form between two extremes on a continuum, from brand new or radical, disruptive innovation to pure imitation (Zhou, 2006).

This incremental or exploitative innovation is that which is designed to meet the needs of existing customers or markets (Benner and Tushman, 2003; Danneels, 2002). That is, they broaden existing knowledge and skills, improve established designs, expand existing products and services, and increase the efficiency of existing distribution channels (Abernathy and Clark, 1985; Jansen, Van Den Bosch y Volberda, 2006). Hence, incremental innovations build on existing knowledge and therefore reinforce existing skills, processes, and structures (Abernathy and Clark, 1985; Benner and Tushman, 2002; Levinthal and March, 1993; Lewin, Long, and Carroll, 1999).

According to several marketing authors, incremental innovation refers to product line extensions or adding modifications to existing platforms and products (Ali, 1994; Ali, Kalwani, and Kovenock, 1993). Marketing managers design such products to satisfy a perceived market need (Ali, 1994). These types of innovation are expected to be developed in a relatively short period of time (Ali, 1994) and typically they contribute to larger market share for firms (Banbury and Mitchell, 1995). Therefore, the introduction of incremental innovation is critical for the long time survival of firms (Iyer, Laplaca, and Sharma, 2006).

So, which type of innovation determines a higher product innovation performance? Are disruptive products successful whereas imitators fail? Or is it the other way around? According to Ali and colleagues, the issue of incremental *versus* radical innovation has been framed as an issue of low risk –low reward strategy for incremental innovations as opposed to high risk–high reward strategy for radical innovations (Ali, 1994; Ali, Kalwani and Kovenock, 1993 1993), so perhaps the answer to the original question needs to be analyzed depending on the context (Zhou, 2006).

Indeed, the success of a new product introduction is contingent on external factors related to market opportunities and environmental threats (Bowman and Gatignon, 1996; Green, Gavin, and Aiman-Smith, 1995; Kerin, Varadarajan and Peterson, 1992). Contingency theory posits that no strategic choice is universally beneficial in all cases and situations therefore firms must «fit» their strategic decisions to their specific environmental conditions (Ginsberg and Venkatraman, 1985), which in turn are defined by suppliers, customers, and current and potential competitors and substitutes (Porter and Linde, 1995; Zhou, 2006) and are not controllable by the firm (Zhou, 2006).

In reviewing the literature available we noticed that in some situations being the first to bring an innovative product to market can enable a firm to achieve a competitive advantage (Lieberman and Montgomery, 1988, 1998). This is because unlike in incremental innovations, radical innovators have the potential to create markets, shape consumer preferences, and even change consumers' basic behavior (Pilzer, 1990). However, an incremental innovation strategy may also lead to better new product performance because incremental costs often are much lower than radical innovation costs (Zhou, 2006). This is because in the case of incremental innovation there is not a need to spend as many resources on market and product research; the existing products already provide the company with information for its product development and market (Schnaars, 1994; Zhou, 2006).

Various authors argue that firms need to become ambidextrous (Gibson and Birkinshaw, 2004; He and Wong, 2004; Zhou, 2006) in order to build capabilities to be able to develop both incremental and radical innovation simultaneously in different organizational units (Benner and Tushman, 2003; Tushman and O'Reilly III, 1996). This is because the capabilities required to be able to innovate in each case are different. For example, those firm units that engage in radical or exploratory innovation have to be able to pursue new knowledge and develop new products and services for emerging customers or markets, whereas units pursuing incremental or exploitative innovation build on existing knowledge and extend existing products and services for existing customers (Benner and Tushman, 2003; Zhou, 2006).

While the importance of pursuing both types of innovation has often been highlighted, there is an opportunity for researchers to explore the differences between both types of innovation and how the influence of different determinants on product innovation performance varies depending on the type of innovation – whereas it is a radical, disruptive innovation or a more incremental, exploitation type of innovation. From the practitioner standpoint, much more remains to be understood about how ambidextrous organizations coordinate the development of incremental and radical innovation in different organizational units.

3.2. Performance Determinants

We have established that being able to innovate and launch new products is important for a company's success as companies cannot depend on their current product offerings alone to meet their profit, sales and growth objectives. However important, still many new products do not succeed in the marketplace, on the contrary, several studies have shown that a majority of new products fail. For example, Booz Allen and Hamilton, Inc. (1989) reported failure rates between 30 % and 40 % and American Demographics estimated that 17 000 new products were introduced in the U.S. in 1993, and 85 % of them failed. A 1995 study by Information Resources, Inc. found that 70–80 % of new product introductions fail, with each failure resulting in a net loss of up to \$ 25 million (Iyer, Laplaca y Sharma, 2006). For these reasons it is not surprising that researchers, managers and consultants alike have shown an increasing interest in the determinants of product innovation performance.

Previous empirical research on product innovation performance has provided considerable evidence that a wide variety of antecedent factors or determinants can influence the outcomes of new product development activity (Montoya-Weiss and Calantone, 1994). The list of determinants of new product performance considered in this study was developed based on an examination of the literature, with special incidence on the Meta-Analysis provided by (Montoya-Weiss and Calantone, 1994) due to its relevance and recognition as one of the seminal papers on this topic.

The first study to undertake this task was Project SAPPHO, which employed a pairwise comparison methodology (Rothwell, 1972) where forty-three pairs of projects-success versus failure were studied and 41 variables were found to be statistically significant in their relationship to project outcomes. A similar study was undertaken in Hungary and revealed a parallel set of success factors, notably market need satisfaction; effective communication; efficient development; a market orientation; and the role of key individuals (Rothwell, 1972; Rothwell *et al.*, 1974). Kulvik's success/failure study in Finland yielded similar results to the

above, but identified additional facilitators, including a good «company/ product fit», the utilization of technical «knowhow» of the company, and familiarity with both the product's markets and technologies (Kulvik, 1977).

Utterback and his colleagues investigated European and Japanese successes vs. failures and identified marketing proficiency, product advantage, early market need recognition, a high degree of customer contact, and top management initiation as the keys to success (Utterback, Allen, Hollomon and Sirbu Jr., 1976), whereas Rubenstein's study of U.S. new products (Rubenstein *et al.*, 1976) identified fifty-four significant facilitators for success including the existence of a product «champion» as well as marketing factors such as need recognition, superior data collection and analysis, planned approaches to venture management and strong internal communications (Rubenstein *et al.*, 1976). On the other hand, researchers from the Stanford Innovation Project used a variety of methodologies to conclude that product innovation success is likely to be greater if the firm introduces a product with a high performance to cost ratio, if the firm is proficient in marketing and commits a significant amount of resources to selling and promoting the product. Also, if the product yields a high contribution margin to the firm and the R and D process is well planned and executed with the product being introduced into the market early and there is a high level of management support for the project from the development stage through to launch (Maidique and Zirger, 1984).

In Project NewProd, Cooper (1979) identified characteristics that separated 102 new product successes from 93 failures in 102 firms (Cooper, 1979). The use of factor analysis and multiple regression analysis revealed a set of success factors, the most important being: having a unique, superior product with a real differential advantage in the market, having strong market knowledge and market inputs, and undertaking the market research and marketing tasks well and having technological and production synergy and proficiency (Cooper, 1979). In a posterior study, Cooper and Kleinschmidt (1987b) proposed that new product outcomes are determined by the interaction of the market environment with new product strategy and development process execution (Cooper and Kleinschmidt, 1987b). They identified ten constructs or composite variables (derived from a larger set of variables) as determinants of new product performance including: product advantage, market potential, market competitiveness, marketing synergy, technological synergy, protocol, proficiency of predevelopment activities, proficiency of market-related activities, proficiency of technological activities and top management support (Cooper and Kleinschmidt, 1987b).

In their Meta-Analysis, authors Montoya-Weiss and Calantone (1994) review all these studies together with the three additional seminal studies by Maidique and Zirger (1984), Rothwell *et al.* (1974) and Utterback *et al.* (1976) mentioned above and used them to develop an initial inventory of determinants. In total, eighteen factors related to four dimensions were identified including Strategic Factors such as product advantage, marketing synergy, technological synergy, strategy and company resources, Market Environment Factors including market potential, market competitiveness and the environment (the general operating environment faced by the firm), Development Process Factors including protocol (firm's knowledge and understanding of specific marketing and technical aspects prior to product development), proficiency of predevelopment activities, proficiency of market-related activities, proficiency of technological activities, top management support, control and skills, speed to market, project development

costs and financial/business analysis and finally Organizational Factors such as internal/external communication and organizational factors (organizational structure of the firm, teams, new venture, matrix, organizational climate, size, centralization, reward structure, and job design) (Montoya-Weiss and Calantone, 1994).

We selected Montoya-Weiss and Calantone's Meta-Analysis as a reference for Performance Determinants to measure PIP because it continues to be one of the most relevant and most cited studies on Product Innovation Performance Determinants that includes the criteria proposed by several seminal and relevant investigations on the topic.

For this study we have decided to focus our efforts in analyzing market factors and development process factors only and how they influence product innovation performance (PIP). This is because there is consensus in the marketing literature that market knowledge, the firm's knowledge about its customers and competitors, is one of the fundamental drivers for successful product innovation (De Luca and Atuahene-Gima, 2007). However, few studies examine the dimensions or characteristics of market knowledge and how and why these resources influence product innovation performance (De Luca and Atuahene-Gima, 2007).

3.3. Product Innovation Performance (PIP) Measurement

In management research, general firm performance has traditionally been the dependent variable of empirical studies (Alegre, Lapiedra y Chiva, 2006). On the other hand, practitioners also need instruments to assess innovation management and innovation outcomes given the amount of money, time and resources allocated to innovation activities (Alegre, Lapiedra y Chiva, 2006; Hannachi, 2015).

In order to achieve product innovation performance, firms need a deep understanding of innovation dynamics, a well thought innovation strategy, well-defined processes of innovation strategy implementation and, above all, profound tools to measure innovation performance (Hannachi, 2015).

Given the importance of product innovation performance (PIP), its measurement might be an overwhelming challenge for some. In fact, both researchers and managers require a relevant measurement instrument of PIP (Alegre, Lapiedra y Chiva, 2006; Hannachi, 2015) to facilitate its operationalization and measurement. With this study, we hope to contribute to a better understanding of the concept of product innovation performance (PIP) and how to measure it accordingly.

Product Innovation Performance (PIP) is a broad, multidimensional concept with various definitions and heterogeneous measurement procedures (Hannachi, 2015). Many authors have attempted to provide several different tools to measure product innovation performance and they vary because «performance» can be measured from many different points of view: from commercial performance to technical performance, financial performance, etc. Definitely, the most used criteria to assess and measure performance, both by practitioners and researchers, are based on financial and market aspects (Suomala, 2004) given that the primary objective of product innovation is to generate profits for firms (Hannachi, 2015).

However, some authors posit that using only these more quantitative criteria is too restrictive and narrow since innovation benefits range is wider and richer (Hannachi, 2015). Other product innovation benefits include more qualitative aspects such as improvement loyalty of existing customers, improvement of the

company image, grow into new markets, etc (Hannachi, 2015; Storey and Easingwood, 1999). These authors argue that these effects are of considerable importance to any firm and must be included in the measurement process. However, these «company benefits» as named by (Storey and Easingwood, 1999) are much less frequently used by firms and researchers to measure the PIP concept (Hannachi, 2015). Driva, Pawar and Menon (2000) posit that criteria such as customer satisfaction, reputation and competitive advantage produced, despite being considered by managers to be the most useful aspects, are rarely used to measure performance (Driva, Pawar and Menon, 2000). A new product might achieve a limited financial return, yet be considered a great success for managers because it had a major impact on the market, or introduced a new technology to the industry, or opened up a new window of opportunity to the firm (Cooper and Kleinschmidt, 1987a).

Reviewing the literature on Product Innovation Performance (PIP) Measurement we found that it is a multidimensional measurement and that practitioners use customer acceptance measures and financial performance dimensions most frequently whereas researchers use slightly fewer measures depending on their focus (Griffin and Page, 1993). Driva, Pawar and Menon (2000) in a survey of PIP measurements in the U.S. and Europe compared measures used by academics to those used by practitioners. They identified total cost of the project, on-time delivery of development project, actual project cost compared to budget, actual *versus* target time for project completion and lead time to market as the criteria most commonly implemented (Driva, Pawar and Menon, 2000).

On the other hand Blindenbach-Driessen, Van Dalen and Van Den Ende (2010) defined PIP as the combination of two dimensions: operational performance and product performance; the first including items on how the innovation project was executed, whereas the second evaluated the commercial outcome of the project (Blindenbach-Driessen, Van Dalen and Van Den Ende, 2010).

In their study from 1993, Griffin and Page (1993), identify several «core» measures categorized in four different dimensions: Customer Acceptance Measures, Financial Performance, Product-Level Measures and Firm-Level Measures. A few years later and based on a survey among product development managers, the same authors categorized PIP measurements in three dimensions: customer-based success, financial success and technical performance success (Griffin and Page, 1996).

On a different note, Alegre, Lapiedra and Chiva (2006) considered PIP as a combination of two dimensions: efficacy and efficiency where efficacy evaluates the success of an innovation, while efficiency assesses the effort carried out to achieve that success (Hannachi, 2015). Alegre and colleagues were inspired by the instrument proposed by the OECD's Oslo Manual (2005) to build the product innovation efficacy construct while product innovation efficiency was based on a comparison with firms' competitors on criteria such as average innovation project development time, average cost per innovation project and global satisfaction degree with innovation project efficiency (Alegre, Lapiedra and Chiva, 2006; Hannachi, 2015).

Cooper (1984) included eight performance measures that capture different facets of a firm's performance. Factor analysis of these eight measures resulted in three independent dimensions of new product success, that is the impact or

importance of the program on company sales and profits, the success rate of the program and the relative performance, which captures the overall performance of the program relative to objectives, to competitors, and in terms of profits *versus* costs (Hultink and Robben, 1995). Cooper and Kleinschmidt (1987) elaborated on the previous study with an updated research that included 10 success measures.

They identified three independent dimensions that characterize new product success, namely financial performance, opportunity window (the degree to which the new product opened up new opportunities to the firm in terms of a new category of products or/and a new market area for the firm) and market impact (Hultink and Robben, 1995).

Conversely, Cordero (1990) distinguishes measures to evaluate overall performance, measures to evaluate technical performance and measures to evaluate commercial performance to assess new product success. Cordero recognizes that there is no single measure that is entirely satisfactory (Hultink and Robben, 1995; Cordero, 1990).

Other relevant authors include Hsu and Fang (2009) who identified four PIP dimensions including market performance, financial performance, customer performance and product performance (Hsu and Fang, 2009); and Cooper and Kleinschmidt (1995) who produced three dimensions: financial performance, market impact and a final dimension they termed «opportunity window».

Finally, as per our literature review we found a study conducted by Storey and Easingwood (1999) on consumer financial services sector in the UK who identified three distinct dimensions of performance: sales performance, profitability and enhanced opportunities (Hannachi, 2015; Storey and Easingwood, 1999).

There is no single measurement that can evaluate PIP comprehensively, which is the reason why all authors mentioned in this study have a multidimensional approach (Hannachi, 2015). We use Hannachi's meta-analysis as a reference to determine which criteria to include when measuring PIP because it is one of the most recent studies on Product Innovation Performance (PIP) Measurement that includes the criteria proposed by several seminal and relevant investigations on the topic, including the work by Cooper and Kleinschmidt (1987, 1995), Griffin and Page (1993, 1996), Driva, Pawar and Menon (2000), Blindenbach-Driessen, Van Dalen and Van Den Ende (2010), Alegre, Lapiedra and Chiva (2006), Hsu and Fang (2009) and Storey and Easingwood (1999).

Hence, the constructs we included to measure PIP are financial product performance, market product performance, customer product performance, technical product performance and strategic product performance (Hannachi, 2015).

From the review of the literature on business innovation performance, we propose a model to analyze and understand the most relevant factors that determine performance in innovation (figure 3).

As per figure 3, there are four main determinants of product innovation performance: strategic factors, market factors, development process factors and organizational factors (Montoya-Weiss and Calantone, 1994; Hannachi, 2015). Each of these factors has specific variables that need to be studied further in order to contribute to the understanding of the relationship between the determinant factors and innovation performance. These are included in table 1.

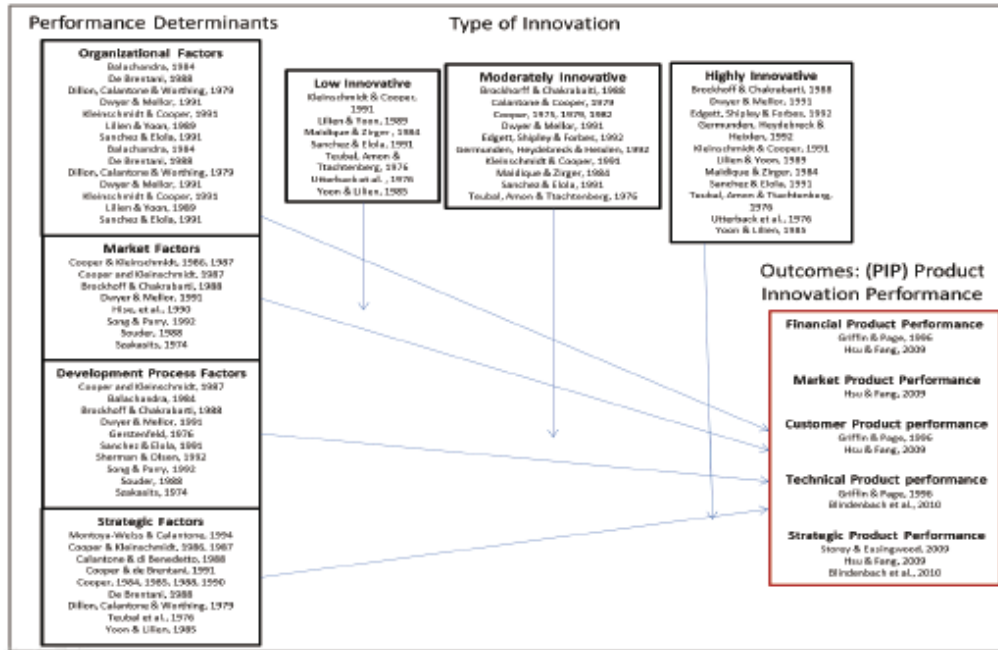


Figure 3: Proposed model.

Source: Based on Montoya-Weiss and Calantone's (1994) Meta-Analysis and Hannachi's (2015) Meta-Analysis.

Table 1: Variables that determine product innovation performance

VARIABLES / NUMBERS OF ARTICLES RELATED TO THE VARIABLES STUDIED IN THE LITERATURE REVIEW								
STRATEGIC FACTORS	Product advantage	Technological synergy	Company resources	Strategy	Marketing synergy			
	8	4	4	3	2			
DEVELOP. PROCESS FACTORS	Prof. technical activities	Prof. marketing activities	Protocol	Top management support/skill	Prof. pre-develop. act.	Speed to market	Finalcial /business analysis	Cost
	9	8	6	5	4	4	2	1
MARKET ENVIROMENT FACTORS	Market potential	Market competitiveness	Enviroment					
	5	3	1					
ORGANIZA-TIONAL FACTORS	Internal/ external relations	Organizational factors						
	4	2						

Source: Based on Montoya-Weiss and Calantone's (1994) Meta-Analysis.

Also, the authors in our literature review recognize there are three types of product innovation: highly innovative, moderately innovative and low innovative product innovation (Hannachi, 2015), which in this case we posit moderate the relationship between the determinant factors and the dependent variable in this case, innovation performance.

Finally, we have innovation outcomes, in this specific case product innovation performance which is measured from five different perspectives: financial product performance, market product performance, customer product performance, technical product performance and strategic product performance, all of which should be analyzed further in posterior studies in order to clarify their relationships and characteristics.

Conclusions

Nowadays high competence underline the importance of a better understanding of the concept of product innovation, its performance and determinants. Both, the academic sector and practitioners show this interest.

In the academic sector this situation is reflected in the literature published on innovation in economy and business journals, being one of the main fields of research the relationship between innovation and performance.

This paper has reviewed and analyzed the relevance of factors that determine business performance in process and product innovation, and contributes to innovation literature by proposing an ordering of the determinants of product innovation performance (PIP) and by placing a moderate relationship between the determinant factors and the dependent variable, innovation performance, considering the three types of product innovation proposed in the literature: highly innovative, moderately innovative and low innovative product innovation. The multi-dimensional nature of PIP shows the need for multidisciplinary investigations. Future research should focus on the analysis of each of the factors; seeking consensus on concepts as well as greater empirical evidence of the proposed relationships.

The world of practitioners demands better tools for the management of innovation processes and the academy should respond not only with explanatory studies, but also through the proposal of methodologies that help to overcome the current ratios of success / failure in product innovation.

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