THE ROLE OF INNOVATION SPEED IN SMEs' NEW PRODUCT DEVELOPMENT

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RESUMEN

Product performance and innovation speed are two of the main issues in innovation literature. It is assumed that innovation speed is vital in today's competitive, uncertain and turbulent market environment. Our work offers a review of the different ways in which innovation speed has been conceptualized and measured. Based on the analysis of 159 small and medium-sized enterprises, this study indicates the need to differentiate between development and launching speed. The preliminary results show the key roles of entrepreneurial orientation and innovation speed for SMEs and the differential effect of development and launching speed on new product performance. An interesting conclusion comes from the inverted U-shaped relation that exists between development speed and new product performance.

Palabras clave:

Innovation, new product performance, development speed, launching speed, market performance, entrepreneurial orientation, SMEs

1. Introduction

In a global, competitive environment, firms face exponential developments in technology and shifting customer demands (Srinivasan, 2008). Because these factors lead to a reduction in product life cycles (Langerak et al., 2008), companies not only have to develop new products, but they have to do so as quickly as possible (Kessler and Chakrabarti, 1996). As a result, one of the success factors of innovation that is generally viewed as being among the most critical is innovation speed (Carbonell and Rodríguez, 2009). Despite the perceived relevance of innovation speed, there are numerous discrepancies in existing empirical studies regarding the consequences of this variable for innovative performance (Langerak and Hultink, 2006). A number of studies show positive results (e.g. Lynn et al., 1999, Kessler and Bierly, 2002; Chen et al., 2005), while others show mixed results (e.g. Ittner and Larcker, 1997) or no evidence of any relation between development speed and new product profitability (e.g. Griffin, 1997). One of the major sources of inconsistency is the use of different terms and ways to measure speed in new product development (Kessler and Chakrabarti, 1996). Taking this into account, and moving beyond earlier research, our aim is to look at the differences between development speed and launching speed in terms of performance. Hence, we seek to differentiate the speed with which an idea is converted into a new product and the speed with which that product is then commercialized. To that end, we develop and test a model using entrepreneurial orientation as a key antecedent of innovation speed. We draw on authors like Atuahene-Gima and Ko (2001), who argue that entrepreneurial firms are positioned to be first to market because of their exploratory, risk-seeking approach to product innovation.

Since the aforementioned importance of adapting to shifting landscapes through entrepreneurship and successful product innovation is of major concern, especially for small and medium-sized enterprises (SMEs), for whom it is more difficult to convert research and development into effective innovation (O´Regan et al., 2006), the main focus of this study is on SMEs. In fact, SMEs usually lack the resources, capabilities and market power of traditional multinational enterprises (Knight, 2001) and accordingly have less power to obtain returns with innovation speed. Others reasons come from the economic point of view. SMEs, which represent more than 99% of the enterprises in Europe and provide around 65 million jobs, offer a key contribution to innovation and growth on the global economy, while at the same time facing unique challenges with regard to new product development.

The remainder of this study is organized as follows. First of all, the literature relevant to this subject is reviewed and hypotheses are developed. Next, the methodology used to design the empirical study is described. The study closes with the preliminary results and conclusions.

2. Literature review

2.1. Innovation speed

Different terms, such as time-to-market (e.g., Chen et al., 2005), cycle time (e.g., Ittner and Larcker, 1997), innovation speed (e.g., Kessler and Chakrabarti, 1996) and speed-to-market (e.g., Meyer and Utterback, 1995) have been used to define new product development speed, representing in general the speed with which an idea moves from its conception to its initial commercialization or introduction on the marketplace. They are considered an indication of a firm's ability to move quickly through the new product development process (Chen et al., 2005). Hence, there appears to be a lack of conceptual integration caused by the numerous discrepancies in the use of terms and the subsequent measurement of variables. The aim of this study is to throw some light on this confusing area of study (See table 1).

TABLE 1
Definitions and measures of Innovation Speed

Carbonell and Rodríguez (2009)	**Innovation speed** describes the pace at which product development activities occur between idea conception and market launch (Kessler and Bierly, 2002)
Chen et al., (2005)	**Speed-to-Market** describes how quickly an idea moves from conception to its first commercialization or introduction on the marketplace.
Fang (2008)	**Speed to market** reflects the time elapsed between the initial development, which includes conception and definition, and the ultimate introduction of an innovation on the marketplace (Griffin 1997)
Griffin (2002); Langerak et al., (2008)	**Development cycle time** is defined as the time that elapses between the beginning of idea generation and the moment when the new product is ready for market introduction
Langerak and Hultink (2006); Langerak et al., (2010)	**Development time** is defined as the time that elapses between the beginning of idea generation, when the firm decides to develop a new product, and the moment the product is ready for market introduction.
Menon et al., (2002); Menon and Lukas (2004)	**New product development speed** is defined as the pace of activities between idea conception and product implementation.

As we can see in the table, the first three concepts include launch activities in the description of innovation speed, while the last three refer only to development activities. In order to contribute to the clarification of the current conceptual inconsistency, we consider it necessary to distinguish between development speed and launching speed. In this way we can justify the contradictory results that have been found so far.

Despite the terminological confusion, innovation speed has become increasingly important for the survival and growth of organizations competing in industries that are characterized by shortened product life cycles. Clearly, some of the major factors that influence a company's decision to adopt fast new product development as a critical element of its strategic business plan come from outside the company: intensely competitive markets, rapidly changing consumer tastes, accelerating technological advancements, lack of patent protection and maturity of product life cycles, to name a few (Menon et al., 2002). Organizations that do not respond adequately and in a timely way to such factors run the risk of being outperformed by their competitors. Finally, new product development speed is critical because product life cycles are shortening and because products become obsolete more quickly than they did in the past, while competition has also intensified (Langerak et al., 2008). It is assumed that reducing development cycle times leads to faster market feedback, reduced costs and increased business success. Product development speed distinguishes a firm from its competition through faster learning and greater proliferation of its products in the marketplace.

As noted by Chen et al. (2010), whereas most studies on innovation speed focus on its antecedents, they do not provide evidence to make it possible to generalize with regard to the way firms could accelerate the new product development process. In addition, there has been a paucity of research on the context and outcome of speed. Moreover, existing literature has produced inconsistent and conflicting predictions with respect to the benefits of innovation speed. Some studies show that innovation speed is positively associated with new product performance (Kessler and Bierly, 2002; Lynn et al., 1999), while others find no evidence that such a correlation even exists (Meyer and Utterback, 1995). It is safe to say that the valence of the relation between innovation speed and new product success is, at present, far from clear (Griffin, 2002).

To summarize, although there appears to be a growing number of academic studies that examine innovation speed, there is a lack of research into innovation speed as a function of enterprise size. At the same time, this aspect is of some importance, because SMEs display certain characteristics that could have special significance for innovation speed, such as strategic planning, a less formal or more flexible approach and a less bureaucratic structure (Knight, 2001).

2.2. Entrepreneurial orientation

Entrepreneurial orientation has received substantial conceptual and empirical attention, making it one of the few areas in entrepreneurship research with a cumulative body of knowledge (Covin et al., 2006). In fact, there are many different perspectives on entrepreneurship. From a resource-based perspective, entrepreneurial orientation is a key approach to accumulating, converting and leveraging resources for competitive purposes, for instance the development and use of product, process and administrative innovations to rejuvenate and redefine the firm and its markets or industries. Lumpkin and Dess (1996) suggest that entrepreneurial orientation reflects a firm's ability to be proactive, take risks and be innovative in its operations. Taking into account a firm's characteristics, Naman and Slevin, (1993) argue that an entrepreneurial firm is generally distinguished by its ability to innovate, initiate change and rapidly react to change flexibly and adroitly (Naman and Slevin, 1993).

In general, entrepreneurial orientation reflects the value firms attach to the process of identifying and exploiting market opportunities (Shane and Venkataraman 2000). Lumpkin and Dess (1996) define entrepreneurial orientation as the methods, practices and decision-making styles managers use to act in an entrepreneurial fashion, including such processes as experimenting with promising new technologies, being willing to seize new product-market opportunities, and having a predisposition to undertake risky ventures. The literature suggests that firms require a new set of imperatives, such as entrepreneurship orientations, if they are to be successful in product innovation in these turbulent times (Atuahene-Gima and Ko, 2001).

Despite the widely acknowledged importance of entrepreneurial orientation the empirical literature lacks evidence regarding its role in SMEs (Avlonitis and Slavou, 2007).

3. Hypotheses

3.1. Entrepreneurial orientation and new product performance

Although entrepreneurial orientation has been found to lead to improved performance (Wiklund and Shepherd, 2005), the empirical evidence is contradictory. Lee et al., (2001) found only weak evidence to suggest the existence of a positive relation between entrepreneurial orientation and the start-up's performance, while Slater and Narver (2000) found no relation at all with business profitability. Wiklund and Shepherd (2005) suggest that an entrepreneurial orientation enhances the relation between a firm's knowledge-based resources and its performance, while Naman and Slevin (1993) emphasize its fit with organizational structure and strategy, and Lumpkin and Dess (1996) suggest that the relation with performance is context-specific. In spite of these controversial findings, we relied on the conceptual arguments of earlier studies that converge on the idea that firms benefit from being innovative, responsive and bold. Therefore, firms may benefit from adopting an entrepreneurial orientation, as efforts to anticipate demand and aggressively position new product/service offerings often result in strong performance.

In this study, we use market performance as the performance indicator, as there is a need in this sense. In fact, the previous conceptual argument in favour of a relation between entrepreneurial orientation and performance focuses mainly on the financial aspects of performance. Assuming that market performance must not be overlooked, since it is the market from which firms obtain their revenues (Rauch et al., 2009), we propose a hypothetical relation between entrepreneurial orientation and market performance.

H1: Entrepreneurial orientation has a positive impact on new product market performance

3.2. Entrepreneurial orientation and innovation speed

According to Alvarez and Barney (2007), the key to entrepreneurial success is the ability to spot new opportunities and take advantage of them as they occur. Moreover, Atuahene-Gima and Ko (2001) state that entrepreneurial firms are in a position to be first to market because of their exploratory, risk-seeking approach to product innovation. These aspects could prove especially beneficial in an environment that is characterized by rapid change and shortened product model

life cycles, where future profit streams from existing operations are uncertain and businesses need to look for new opportunities all the time (Rauch et al.,2009). In addition, entrepreneurial firms have a faster market entry than other firms. Accordingly, we would argue that entrepreneurial orientation is an environmental management capability that may help firms to bring products to market more quickly. Hence, we expect entrepreneurial firms to develop and market new products more quickly than non-entrepreneurial firms, given their overriding focus on risk-seeking and experimentation in product innovation.

H2a. Entrepreneurial orientation has a positive impact on development speed.

H2b. Entrepreneurial orientation has a positive impact on launching speed.

3.3. The dimensions of innovation speed and new product performance

Research suggests innovation speed exerts a substantial positive impact on performance outcomes of market share and profitability (Carbonell and Rodríguez, 2009). However, existing literature with respect to the benefits of speed-to-market has produced inconsistent and conflicting predictions. A number of studies suggest that innovation speed is associated with competitive advantage and superior success rates (Chen et al., 2005; Kessler and Bierly, 2002). Yet, there are other studies that present no evidence of a relation between development speed and new product profitability (Griffin, 2002; Meyer and Utterback, 1995) or between speed-to-market and organizational performance (Kessler and Chakrabarti, 1996). At the same time, other works describe that accelerated product development can have hidden disadvantages, such as higher costs and more mistakes (Griffin, 2002), while in some cases no relation between success and development time could be identified (Ittner and Larcker, 1997). These inconsistencies may result from a lack of theoretical integration in the literature with regard to innovation speed. In this study, we argue that a possible way to resolve these contradictions involves drawing a clear distinction between product development speed and the commercialization speed, since they could have a differential effect on new product performance.

3.3.1. Development speed and new product performance

A review of the literature describes the advantages and disadvantages of increasing development speed. Credible arguments can be made for and against each perspective. To reconcile both perspectives, this study proposes an inverted U-shaped relation between development speed and new product performance. This means that, for each new product developed by a particular firm under specific competitive conditions, there is an optimal development speed that maximizes new product profitability (see Figure 1). To the left of the optimal point, increasing development speed improves new product performance, while to the right speed becomes counterproductive. Arguments related to the hidden costs of accelerated NPD, growing market uncertainties, and higher technological risks support decreasing new product profits in the right region (Crawford, 1992).

H3: The relation between development speed and new product performance is an inverted curvilinear U-shaped function

3.3.2. Development speed and new product performance

Time-based strategies, such as first-mover or fast-follower strategies, have become the latest key to competitive advantage in the current market environment (Chen et al., 2005). In fact, one of the strategic launch decisions that has been examined most frequently is the order of market entry. Numerous studies have studied the concept of first-mover advantage and how pioneering new markets can result in a superior competitive position to that of late-entrant firms (Rodríguez et al., 2011). Effective new product commercialization is therefore a challenging task, and several studies have verified that the launch strategy is a key determinant of the success or failure of product innovations (Hultink et al., 1997).

H4: Launching speed has a linear positive impact on new product performance

FIGURE 1.

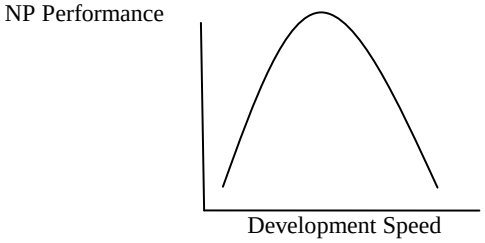
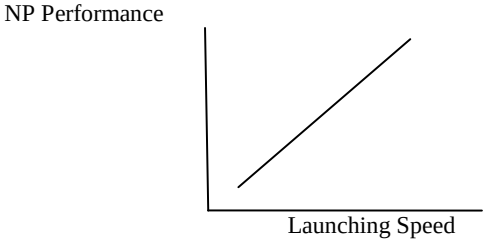


FIGURE 2.



4. Methodology

4.1. Data collection and sample

To collect data and identify respondents, we used publicly available directories of firms with 10 to 250 employees and with less than € 40 million annual turnover, which is in accordance with the widely accepted guidelines stipulated by the EU. The questionnaire was pre-tested among several managers from these industries and a group of academics. A personal questionnaire was developed and in-depth field interviews were conducted with the top manager of the various firms. In the end, we managed to obtain information about 159 small and medium-sized firms. On average, the firms had 57 employees and annual revenues of €10 million. We analyzed sample representativeness and checked for non-response bias (Armstrong and Overton, 1977) and single informant bias (Podsakoff et al., 2003).

To test for non-response bias, we compared early with late respondents (Armstrong and Overton, 1977). The last 33 percent were considered representative of firms that ultimately did not respond to the survey. The means of the constructs were compared and no significant differences were found. Subsequent t-tests revealed no significant differences between the groups regarding various aspects of the company and the NPD process, for example company size, number of ongoing projects, development time (in months) and number of members in the project team. Accordingly, it is assumed that non-response bias is not a significant problem.

4.2. Measuring issues and pretesting

Our multi-item scales were predominantly drawn from earlier studies. The constructs were measured using five-point multi-item scales. Entrepreneurial orientation was measured with four items, based on the study by Naman and Slevin (1993). Development speed and launching speed were operationalized through three items 1) time effectiveness (e.g. launching the product on or ahead of schedule), 2) time efficiency (carrying out the project faster than it could have been carried out) and 3) time relative to that considered customary for the industry. These items were borrowed from previous studies (Carbonell and Rodríguez, 2009; Chen et al., 2005; Lynn et al., 1999), but we distinguished between development time and launching time. To obtain an accurate measure of market performance, we relied on the work by Tatikonda and Montoya-Weiss (2001), using three items.

To obtain unidimensionality for multi-item variables, the item-to-total correlations were calculated for each item, taking one scale at a time. Items for which those correlations were lower than .035 were eliminated. Computing reliability coefficients explored the reliability of each purified, unidimensional scale. As shown in Table 2, coefficients values were equal or greater than 0.70, which indicates good reliability. Table 2 also shows the zero-order correlations along with means and standard deviations.

TABLE 2
Means, standard deviations, zero-order correlations, and Cronbach's α

	Mean	S.D.	1.	2.	3.	4.	Cronbach's α
1. Entrepreneurial Orientation	3.51	0.68	1				0.70
2. Development speed	3.06	0.69	0.117	1			0.83
3. Launching speed	3.16	0.72	0.285**	0.427**	1		0.78
4. Performance	3.08	0.88	0.410**	0.287**	0.340**	1	0.72

Significance levels: **p<0.01

5. Preliminary Results

Hierarchical regression analysis has being used to test the hypotheses. The preliminary findings show the key role of entrepreneurial orientation and innovation speed for SMEs and the differential effect of development and launching speed on new product performance. Hence, while the relation between development speed and performance is curvilinear, that with launching speed is linear. We find an inverted U-shaped relation between development speed and new product performance. At a low level of development speed, an increase of development speed has a positive impact on performance (see Table 3). However when development speed becomes too high, there is a negative impact on new product performance. Since this is a work in progress, the results are being extended by including other variables to better explain the relations obtained, which will undoubtedly enable us to expand the managerial implications of the study further.

TABLE 3
Hierarchical regression analysis (standardized coefficients)

	Model 1	Model 2
Entrepreneurial Orientation	0.31**	0,33**
Development Speed	0.19**	0,20**
Launching Speed	0.16*	0,17*
(Development Speed)^2		-0,15*
R2	0.23	0,26

Significance levels: **p<0.01, *p<0.05

6. Preliminary Conclusions

Overall, this paper offers a valuable contribution to the existing literature, especially with regard to smaller firms, which are generally considered to have a high entrepreneurial and innovative potential based on their areas of strength (e.g., flexibility, nimbleness, adaptability). Thus, defining activities that are critical to improving a firm's ability to introduce new product and reduce time to market will enable the managers of SMEs to make the best possible use of their scarce resources and to focus their efforts on factors that create the maximum return on invested capital. Managers should be aware that the adoption of an entrepreneurial orientation and a fast innovative profile could not only present a challenge but also an appropriate opportunity-focused response by firms facing fierce competition from bigger competitors.

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