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Journal of Strategic Information Systems 15 (2006) 29–50
www.elsevier.com/locate/jsis

Resource-based view and competitive strategy: An integrated model of the contribution of information technology to firm performance☆

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Received 1 April 2004; accepted 15 June 2005
Available online 26 July 2005

Abstract

The contribution of IT to business performance has been studied from two main perspectives: a 'strategy as positioning perspective,' which underlines a market power imperative, and a resource-based view perspective, which conceptualizes the enterprise as a 'bundle of unique resources.' The objective of the present study is to improve our understanding of the contribution of IT to firm performance in building upon the complementarity between the two perspectives. To do so, a model proposed by [Spanos, Y.E., Lioukas, S. 2001. An examination into the causal logic of rent generation: contrasting Porter's competitive strategy framework and the resource-based perspective. Strategic Management Journal 22(10), 907–934], which comprises both a competitive strategy framework and the resource-based perspective was adapted to reflect the role played by IT. More precisely, the model encapsulates the effects of both IT support for business strategy and IT support for firm assets on firm performance. To test the model, a survey of 96 small- and medium-sized enterprises (SME) was conducted.

Keywords: Information technology and business value; Resource-based view of the firm; Competitive strategy

☆ This study was supported by the Fonds québécois de la recherche sur la société et la culture (FQRSC).
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doi:10.1016/j.jsis.2005.06.003

1. Introduction

The contribution of Information Technology (IT) to the achievement of business objectives is an important management issue. Indeed, the 2001 Computer Sciences Corporation's annual survey reported it as the second most important issue for North American IT executives (CSC, 2001). It has also been an enduring issue; every year since the 1991 edition of the survey, it has been ranked among the top five IT management concerns. In terms of research, numerous studies, adopting various perspectives, have focused on the research problem for several years now (Melville et al., 2004).

Two of the research perspectives originate from the strategic management literature. The first perspective reflects a market power imperative, and views the firm as a "bundle of strategic activities aiming at adapting to industry environment by seeking an attractive position in the market arena" (Spanos and Lioukas, 2001, p. 907). In the strategy literature, the dominant paradigm of this perspective is Porter's (1980, 1991) competitive strategy framework. In an IT context, it is best exemplified by Porter and Millar (1985) who see IT as a means by which firms can gain competitive advantage by altering the competitive forces that collectively determine industry profitability. IT can contribute to this alteration of competitive forces by contributing to either lowering costs or enhancing differentiation. The second perspective, the resource-based view of the firm, conceptualizes the enterprise as a bundle of resources—assets, processes, knowledge—that are inherently valuable, and contends that the firm's unique resources should define the essence of strategy (Spanos and Lioukas, 2001). In an IT context, this perspective sees IT capabilities themselves—e.g. IT infrastructure, IT human resources, and IT intangibles—as a source of competitive advantage (Bharadwaj, 2000).

Although the premises on which the two perspectives are based differ, strategic management researchers have recognized the complementarity between the market driven perspective of strategy and the resource-based view (Henderson and Mitchell, 1997; Spanos and Lioukas, 2001).

In IT literature, the two perspectives have been used independently of each other; they have even be described as competing views (Duhan et al., 2001). The objective of the present study is to improve our understanding of the contribution of IT to firm performance in building upon the complementarity between the two perspectives. To do so, a model proposed by Spanos and Lioukas (2001), which comprises both Porter's competitive strategy framework and the resource-based perspective, was adapted to reflect the role played by IT. More precisely, the proposed model encapsulates the effects of both IT support for business strategy and IT support for firm assets on firm performance. To test the model, a survey of 96 small- and medium-sized enterprises (SMEs) was conducted.

2. Theoretical foundations

The market driven perspective and the resource-based view of the firm are established on different premises. The first originates from traditional economic research, and is based on a market power imperative; it considers industry structure as the primary cause of strategy and performance (Henderson and Mitchell, 1997). The second tradition derives

more directly from strategy research, and emphasizes the importance of firm-specific capabilities (Henderson and Mitchell, 1997). This perspective posits that the necessary condition for a firm's success is its ability to create distinctive capabilities (Teece et al., 1997). In the market driven perspective, of which the dominant paradigm is Porter's (1980, 1991) competitive strategy framework, the industry structure determines the competitive rules, and influences the strategies that are potentially available to the firm (Teece et al., 1997). In Porter's view, resources are not valuable in and of themselves; rather, their value depends on how well they fit industry structure and how well they support a particular strategy. In contrast with this perspective, the resource-based view sees resources as inherently valuable, and contends that the firm's unique resources should define the essence of strategy (Spanos and Lioukas, 2001, p. 910).

2.1. The market driven perspective

Porter's (1980, 1991) competitive strategy framework identifies five industry forces—the intensity of industry rivalry, the threat of new entrants, the threat of substitutes, the bargaining power of suppliers and the bargaining power of customers. These forces determine the profit potential of an industry or of a segment of this industry (Teece et al., 1997). In such a context, a firm has to assess these forces and determine how to find a position in the industry so as to best defend itself from them (defensive effects) or influence them so as to take advantage of them (offensive effects) (Teece et al., 1997). The way a firm chooses to improve its competitive position should ideally create significant difficulties for others to imitate, which results in a long-term or sustainable competitive advantage. In Porter's (1991) terms, holding the industry structure constant, a successful firm is one that has an attractive relative position. Porter posits that such an attractive relative position is the result of one of two basic types of competitive advantages: lower costs than rivals or the ability to differentiate and command a premium price in excess of the extra cost of differentiating. In this view, "superior profitability can only logically arise from commanding a higher price than rivals or enjoying lower costs" (Porter, 1991, p. 102).

A number of IT researchers have adopted a market driven perspective to examine the potential and actual effects of IT on firm performance. In the context of Porter's work, Ives and Learmonth (1984) focus on the use of IT to strengthen the relationship between a firm and its customers. They propose to use the 'customer resource life cycle' as a tool to determine how a firm can use IT to differentiate itself from its competitors, become a low cost producer, or identify a market niche. The authors provide numerous examples of firms that have used IT to support one or several activities of the customer life cycle, hence increasing the strength of their relationship with their customers. Complementing the competitive forces framework with the concept of the value chain proposed by Porter (1985), Porter and Millar (1985) show how IT can alter the rules of competition by changing the industry structure, create competitive advantage by providing firms with new ways to outperform their rivals and even create opportunities for initiating new business. In a case study of four firms, Levy et al. (1999) show how Porter's value chain and five forces framework are "invaluable in analysing business processes and competitive drivers" (p. 256) for SMEs. They suggest that the value chain analysis leads to identifying

activities that contribute directly to profitability, while the five forces model leads SMEs to look outside their operational boundaries. In a study of the relationship between goals that firms set for IT, management practices and executives' perception of the value of IT, Tallon et al. (2000) rely on Porter (1996) contention that firms differentially focus on two key objectives, that is, operational effectiveness and strategic positioning. Translating this distinction into corresponding goals for IT, they identify four types of corporate goals for IT: (1) operational focus, which strives for efficiency and effectiveness, (2) market focus, which translates into IT being aimed at extending market reach and changing industry and market practices, (3) dual focus, which is a combination of operational focus and market focus, and (4) unfocused, where IT is not critical to any aspect of the firm. From their analysis of a sample of 304 business managers, they found that executives in firms that have more focused IT goals perceive higher levels of IT business value as well as higher levels of strategic alignment for IT. In turn, higher levels of perceived strategic alignment were associated with higher levels of perceived business value.

2.2. The resource-based view

The resource-based view of the firm originates from Penrose (1959) work, where the firm is described as a bundle of resources. Penrose posits that the growth of the firm is both facilitated and limited by management search for the best usage of available resources. Barney (1991) provides a precise and formalized description of this perspective. Resources include assets, capabilities, processes, attributes, knowledge and know-how that are possessed by a firm, and that can be used to formulate and implement competitive strategies. The resource-based view relies on two fundamental assertions, that of resource heterogeneity (resources and capabilities possessed by firms may differ), and of resource immobility (these differences may be long lasting) (Mata, Fuerst and Barney, 1995). If a resource possessed by a firm is also possessed by several of its competitors (no heterogeneity), this resource cannot contribute to competitive advantage. Heterogeneity is the required condition for obtaining at least temporary competitive advantage. Resource immobility is the required condition for sustained competitive advantage, since competitors would face cost disadvantage in obtaining, developing, and using it compared to the firm that already possesses it.

Several researchers have adopted a resource-based perspective to address the issue of the contribution of IT to business value (Wade and Hulland, 2004; Melville et al., 2004). In their studies, IT resources were conceptualized in a variety of fashions. In a literature review of the resource-based view in IS research, Wade and Hulland (2004) identify eight such IS resources, which fall into three main categories. The first category, outside-in resources—external relationship management and market responsiveness—are externally oriented and pertain to the establishment of relationships with business partners, and to the understanding of competitors. The second category, inside-out resources—IS infrastructure, IS technical skills, IS development, and cost effective IS operations—are used from inside the firm to respond to market requirements. Finally, spanning resources—IS business partnerships and IS planning and change management—involve both internal and external analysis capabilities. A small number of empirical studies have examined the relationship between IS resources and firm performance. Among those, Bharadwaj (2000)

compared the performance of firms that had been recognized by the magazine *Information Week* as being IT leaders in their industry to the performance of a control group. She found that firms with high IT capabilities outperformed the firms from the control group. Using the same sample, Santhanam and Hartono (2003) compared their performance with two different control groups, and confirmed the results obtained by Bharadwaj (2000).

Most of the authors who adopted a resource-based view of IT contribution to firm performance focused on the relationships between IT resources themselves and business performance. Some researchers have argued that a limitation of this view is that "it assumes that resources are always applied to their best uses, saying little about how this is done" (Melville et al., 2004). For instance, Clemons and Row (1991) argue that "benefits resulting from an innovative application of information technology can be more readily defended if the system exploits unique resources of the firm" (p. 289). This argument, referred to as the strategic necessity hypothesis, was supported by Powell and Dent-Micallef (1997) who found that IT resources alone do not provide competitive advantages; rather, firms can gain competitive advantage by leveraging complementary between business and human resources. The same argument was espoused by Ravichandran and Lertwongsatien (2002) who found support for the relationship between IS support for core competencies and firm performance.

2.3. A perspective of complementarity

While both the 'strategy as positioning perspective' and the resource-based view of the firm have served as theoretical foundations for research on the relationship between IT and business value, the two research streams have evolved independently one from the other. Authors have even described them as competing views (Duhan et al., 2001). In strategy research, however, some authors have proposed that the two perspectives are complementary rather than being opposed. To illustrate this complementarity, some authors suggest that each perspective covers one component of the SWOT framework, with the market driven perspective providing the analysis related to opportunities and threats, and the resource-based view corresponding to the strengths and weaknesses component of SWOT (Spanos and Lioukas, 2001).

Spanos and Lioukas (2001) propose a composite model so as "to identify the relative impact of industry vs. firm specific factors on firm performance" (p. 912). As depicted in Fig. 1, the model describes the relationships between resources, strategy, industry forces, and firm performance, both in terms of market performance and of profitability. Spanos and Lioukas describe their model along three types of relationships.

The first type, strategy effects, is acknowledged by both perspectives; it consists in the direct effects of strategy on performance (path γ_3 on Fig. 1). Here, the model posits that when a firm creates value for buyers, either via differentiation or cost leadership, this will impact its performance. The second type of effects, industry effects (paths γ_1 and γ_2) constitutes the competitive strategy perspective component of the model. As a reflection of the central role played by industry in this perspective, the model posits the presence of a direct effect of industry on firm performance (γ_2), which would result from a defensive type of strategic positioning, that is, from strategic choices that would aim toward protecting the firm against the competitive forces. Industry forces are in turn impacted by

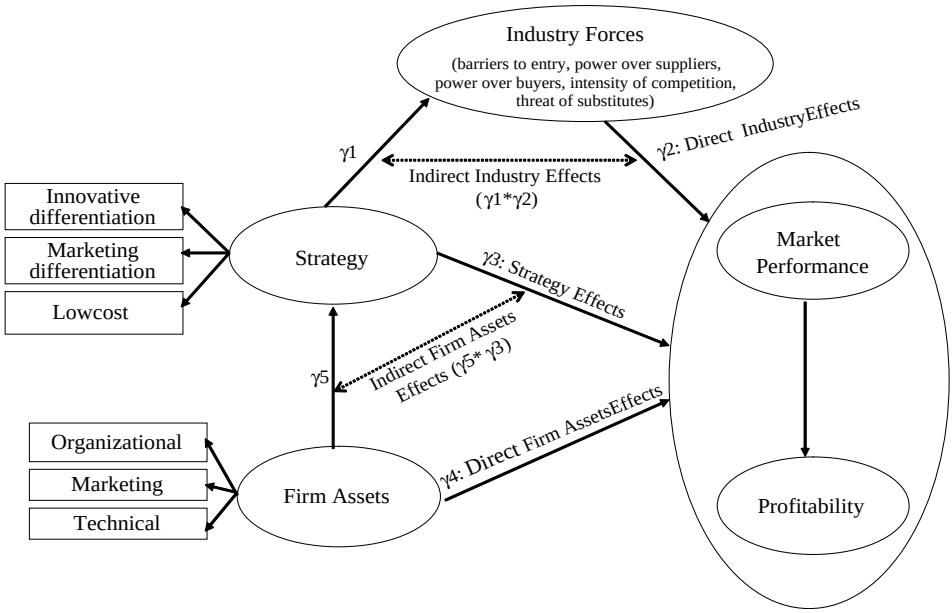


Fig. 1. Resource-based view and competitive strategy—an integrated model (Spanos and Lioukas, 2001).

the firm's offensive strategy (γ_1); in Spanos and Lioukas' terms, "under the offensive type of positioning, strategy influences the relative balance of the competitive forces the firm confronts" (Spanos and Lioukas, 2001, p. 913). Indirect industry effects (γ_1*γ_2) also exist, which result from the combined effects of an offensive type of positioning and of the relative balance of competitive forces.

The third type of effects, labelled firm assets effects, belongs to a resource-based view of the firm. Spanos and Lioukas hypothesize a direct effect between firm assets and performance. This effect, independent of strategy, is described as an efficiency effect (γ_4); it is the impact on performance that results from "the possession of a superior stock of available resources" (Spanos and Lioukas, 2001, p. 913). The more advantaged the firm is with respect to its competitors, the better its performance (Barney, 1991). Another path (γ_5) pertains to the impact of firm assets on strategy. That is, the presence of resources will enhance the firm's ability to design competitive strategies, be they of a cost leadership or of a differentiation type (Mata et al., 1995). Finally, the model posits that there exists a combined effect on performance of 'the firm's ability to develop and/or modify its strategy posture, which ability is a consequence of available stock of resources' (γ_3*γ_5) (Spanos and Lioukas, 2001, p. 914).

Although, until now, IT researchers have used the two perspectives independently, the strategic alignment model proposed by Henderson and Venkatraman (1999) can be used, from a theoretical standpoint, to integrate these perspectives. Indeed, Henderson and Venkatraman argue that a 'strategic fit', that is, the alignment of external (strategic) and internal (functional) business and IT domains, is required in order to increase business performance. Researchers have successfully used this model to study the manner in which

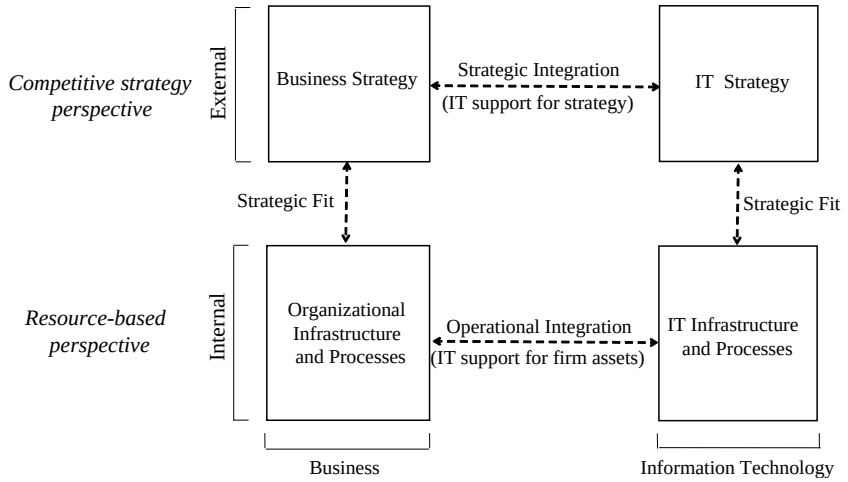


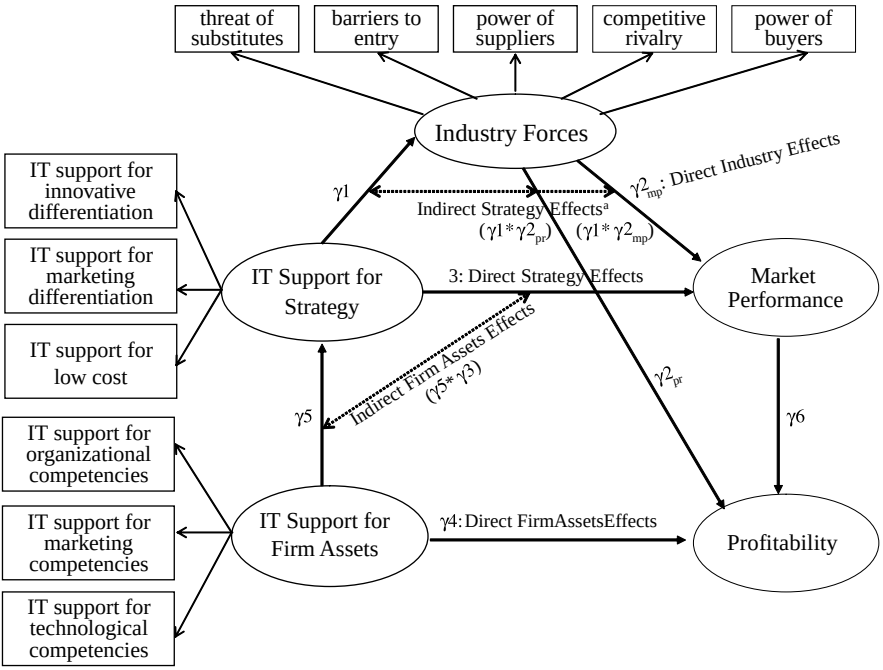
Fig. 2. Strategic alignment from a dual perspective (adapted from Henderson and Venkatraman, 1999).

IT supports a business, both from an external and an internal perspective, and empirically link this support to business performance (Chan et al., 1997; Luftman et al., 1999; Papp, 1999; Croteau and Bergeron, 2001; Sabherwal and Chan, 2001; Croteau and Raymond, 2004).

As shown in Fig. 2, this model, adapted for illustrative purposes, comprises four components deemed to be interrelated: business strategy, IT strategy, organizational infrastructure and processes, IT strategy, and IT infrastructure and processes. More specifically, the model includes two types of strategic fit and two types of integration. Strategic fit reflects the need to harmonize internal and external business domains, i.e. organizational resources and competencies should be aligned with the firm's competitive strategy. The same logic is also applied to the IT domain for the strategic fit between IT strategy and IT infrastructure and processes. Strategic integration occurs when both business and IT strategies are consistent with key environmental contingencies, including components such as strategic competencies and IT competencies. From a competitive strategy perspective, strategic integration thus reflects the capability of IT to shape and support low-cost, differentiation, or niche strategies. Operational integration occurs when the IT function has the capacity to support the firm's business infrastructure and processes with adequate IT resources and competencies. From a resource-based perspective, this reflects the extent to which IT capabilities support the development and deployment of the firm's assets.

3. An integrated model of the contribution of IT to firm performance

For the purposes of the present study, the model proposed by Spanos and Lioukas was adapted so as to portray the role played by IT in explaining business performance, in view of the complementarity between the resource-based view of the firm and the competitive



[a]WhileSpanosandLioukas(2001) label thisas indirect "industry"effects(Figure 1), weconsidertheindirect "strategy" effectslabel to bemore coherentwiththepathlogicofthemodel, as wellas withSpanosandLioukas' description ofthis effect.

Fig. 3. Research model.

strategy perspective. The integrated model is depicted in Fig. 3. While it bears resemblance with the model proposed by Spanos and Lioukas, the present model departs from it in two significant ways. First, rather than pertaining to the effects of strategy and assets on firm performance, the model hypothesizes relationships between the support brought by IT to strategy and to firm assets, and business performance. Second, while Spanos and Lioukas' model did not specify a priori the relationship between strategy, assets, industry forces and each of the two components of performance-market performance and profitability-our model includes such an a priori specification.

The reason for which we opted for the notion of IT support is twofold. First, in terms of strategy, several studies have shown that strategic alignment between IT and the business played a significant role in explaining business performance (Bergeron and Raymond, 1995; Chan, et al., 1997; Bergeron, Raymond and Rivard, 2001). Generally speaking, these studies define alignment as the extent to which IS priorities, capabilities, decisions, and actions support business strategy. Second, in terms of firm assets, we adopt the strategic necessity perspective (Clemons and Row, 1991), by which the benefits due to IT resources are obtained via their support for organizational resources rather than

from IT capabilities themselves. A system that supports marketing planning competencies (Wilson and McDonald, 2001) or a system supporting organizational competence management (Hustad and Munkvold, 2005) are instances of this type of support for organizational competencies.

Spanos and Lioukas' model does not provide any a priori specifications about the relationship between the independent variables and each component of business performance, namely market performance and profitability. An analysis of prior IS research leads us to include such an a priori specification of the relationship between IT support for strategy and IT support for resources and these two independent variables. Indeed, IS researchers who adopt a resource-based view tend to conceptualize performance in terms of profitability. For instance, Melville et al. (2004) define performance in terms of efficiency, such as enhanced cycle time and cost reduction, while Bharadwaj (2000) and Santhanam and Hartono (2003) focus on metrics such as profit ratios. On the other hand, the discussions on the contribution of IT to competitive strategy suggest that this contribution is closely related to market performance, since IT can help alter the rules of competition by changing the industry structure, create competitive advantage by providing firms with new ways to outperform their rivals and even create opportunities for initiating new business. Hence, our model hypothesizes that IT support for assets will be related to profitability while IT support for strategy will be related to market performance.

In terms of industry effects, our model follows Spanos and Lioukas' contention that industry forces impact business performance (γ_2). In terms of IT support for strategy effects, the model first posits that IT support for strategy has a direct impact on performance (γ_3) in that the model assumes that IT can be used to support both cost leadership strategies and differentiation strategies. Several examples of such uses have been suggested in the literature (Ives and Learmonth, 1984; Porter and Millar, 1985; Ives and Mason, 1990; Mata et al., 1995). The model hypothesizes that IT support for strategy also influences performance via its relationship with industry forces. As portrayed by the model, and along with the competitive strategy perspective, IT support for strategy is hypothesized to influence industry forces (γ_1), which themselves have a direct effect on the firm's market performance ($\gamma 2$). Hence, IT support for strategy will have an indirect effect on market performance ($\gamma_1 * \gamma_2$), which results from the combined effects of its relationship with industry forces, and of the relationship between industry forces and market performance.

In this research model, in line with the strategic necessity perspective, IT support for firm assets effects (the third type) pertain to the impacts of the support provided by IT to the resources possessed by the firm. The first relationship is that between IT support for firm assets and IT support for strategy (γ_5). In line with the resource-based view, with the idea of complementarity between the resource-based view and the market driven perspective, and with the strategic necessity perspective, the model hypothesizes that the degree of IT support provided to firm resources—be they organizational, marketing, or technological—will enhance the firm's ability to provide better IT support for the strategies that it will formulate and implement, both in terms of cost leadership and differentiation (Mata et al., 1995). The resource-based view also contends that assets, in and of themselves, can have an impact on firm performance if they outperform those

possessed by competitors. In view of the strategic necessity perspective, this translates into path $\gamma 4$, which hypothesizes that the quality of support provided by IT to firm specific assets will have a direct impact on the firm's profitability. Finally, the model posits that IT support for firm assets will have an indirect effect on profitability via its impact on IT support for strategy ($\gamma_5 * \gamma_3$).

4. Research method

A questionnaire was developed as a survey instrument and, after pre-testing, was mailed to the chief-executive-officer (CEO) of 700 small- and medium-sized enterprises (SMEs) whose number of employees ranged from 30 to 500, randomly chosen from a repertory of business firms in the province of Quebec, Canada. CEOs were chosen as respondents because they are most knowledgeable overall of their firm's strategy, IT strategy, and performance (Bergeron et al., 2001). After sending a follow-up letter two weeks after the first mailing, a total of 101 questionnaires were returned. The final sample numbered 96 as five questionnaires were removed because they were incomplete, thus giving a 13.7% response rate that is relatively typical for small business survey research (Karimabady and Brunn, 1991). The median number of employees for the sampled organizations is 155. More than half (57%) are in the manufacturing sector, while the rest are in services (25%), distribution (5%), and other sectors such as construction, mining and transportation (13%).

Non-response bias was ascertained by comparing, in terms of size and industry, the 66 firms whose CEO answered the first mailing with the 30 who answered after receiving the reminder. No significant differences were found between these two groups of firms with regard to their number of employees, sales revenue, and major industry classification (manufacturing, commercial, services). Follow-up phone calls were also made to a random sample of 100 CEOs among the 599 who had not yet returned their questionnaire. The main reasons invoked for not participating in the study were time constraints, too many solicitations to answer surveys, and privacy concerns. The dislike of SME managers for bureaucracy or red tape would thus be a more plausible cause for non-response than the characteristics of the sample or the nature of the question under study (Assael and Keon, 1982).

The scales used to measure Industry Forces, Market Performance, and Profitability were the ones developed and validated by Spanos and Lioukas (2001) as reported in their study. The first four Industry Forces are measured by four single item measures in which the respondent is asked to evaluate the level of environmental hostility faced by the firm with respect to barriers to entry (1: very easy to enter… 5: very difficult), threat of substitutes (1: not at all… 5: extreme), bargaining power over suppliers (1: very strong… 5: very weak), and bargaining power of buyers (1: very weak… 5: very strong). A fifth force, competitive rivalry, is measured with four items that evaluate the intensity of competition with respect to product characteristics, promotional strategies among rivals, access to distribution channels, and service strategies to customers (1: very weak competition… 5: very fierce competition). Market Position and Profitability were evaluated with four and three items respectively, the respondent being asked to evaluate

the firm's performance relative to competition for the last three years with respect to annual revenue, growth in annual revenue, market share, growth in market share, profit margin, return on investments, and financial liquidity (1: much below average… 5: much above average).

The scales for the IT Support for Strategy construct were developed through a self-typing approach, well accepted in strategy research. This direct approach had been previously used by Teo and King (1997) and by Tallon et al. (2000) to measure the alignment between IT and business strategy. In this approach, alignment is measured directly by asking respondents to evaluate the extent to which IT supports each element of the business strategy. An alignment measure based on Spanos and Lioukas (2001)) operationalization of Strategy was developed. The measure evaluates the extent to which IT supports the firm's use of three competitive methods, namely innovative differentiation (4 items), marketing differentiation (4 items), and low cost (3 items). Such a direct approach was also used by Ravichandran and Lertwongsatien (2002) to measure IT support for firm resources. In the present study, Spanos and Lioukas' operationalization of Firm Assets was adapted by evaluating the extent to which IT supports three of the firm's strengths relative to competition, namely organizational capabilities (7 items), marketing capabilities (4 items), and technical capabilities (3 items) (1: no support provided by IT… 5: enhanced by IT). Individual items for these two measures are presented in Figs. 4 and 5. As Spanos and Lioukas, and other researchers such as Chattopadhyay et al. (1999), argue there exist both practical considerations (e.g. the unavailability or inadequacy of balance sheet data in the case of SMEs) and a strong theoretical rationale, based on a constructionist perspective (e.g. that

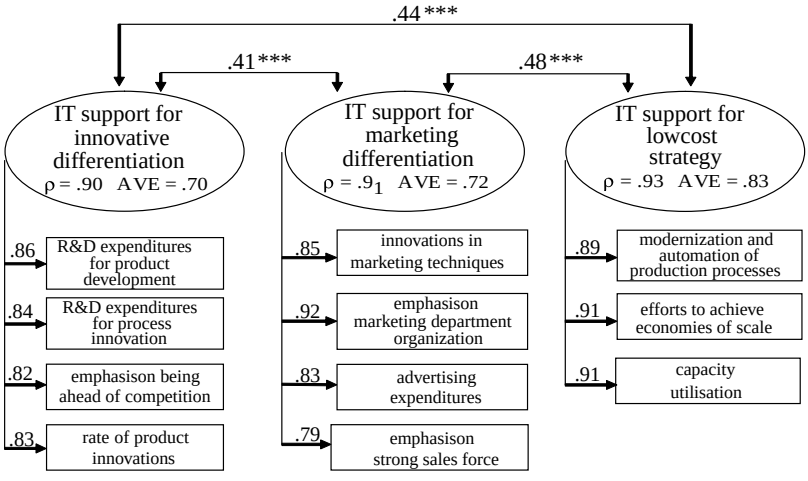


Fig. 4. Confirmatory factor analysis of IT support for strategy.

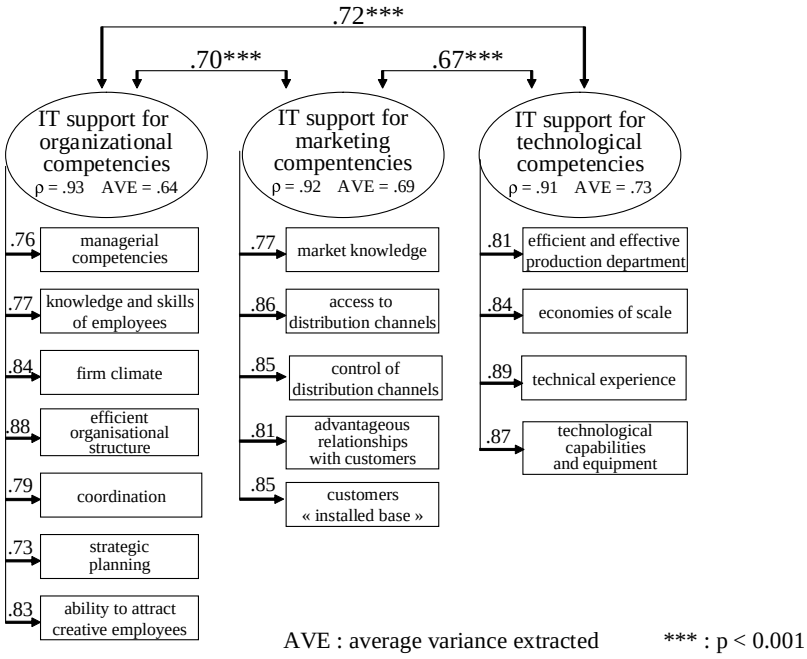


Fig. 5. Confirmatory factor analysis of IT support for firm assets.

there is no such thing as an 'objective' environment, Weick, 1979), that supports the choice of subjective data to test the research model.

5. Results and discussion

Structural equation modelling was used to assess the research model. The partial-least-squares (PLS) method was chosen for its robustness, as it does not require a large sample or normally distributed multivariate data in comparison with other methods such as LISREL (Fornell and Bookstein, 1982). As recommended by Anderson and Gerbing (1988), the data were analyzed in two steps. First, the validity of the research constructs was assessed from a separate estimation of the measurement model by confirmatory factor analyses. Second, the research model was tested by the simultaneous estimation of the measurement and theoretical (or structural) models.

5.1. Assessment of construct validity

The PLS method was first used to assess the construct validity of IT Support for Strategy, IT Support for Firm Assets, and the other three research constructs. Using the data from the 96 organizations sampled, estimates of the measurement model's parameters such as factor loadings and correlations were obtained. The primary aim here is to confirm

the unidimensionality, reliability, convergent validity and discriminant validity of the constructs' dimensions so that each of these dimensions can be treated as a single value when testing the research model.

5.1.1. IT support for strategy

A first-order confirmatory factor analysis (CFA) of IT Support for Strategy was conducted, aiming to validate a posteriori the hypothesized three-dimensional structure of this construct, namely IT support for innovative differentiation, for marketing differentiation, and for low-cost strategy. Unidimensionality was assessed by examining the strength of the loadings, using 0.5 as cut-off level. As shown in Fig. 4, these loadings range between 0.79 and 0.92 for the three dimensions, well above the required 0.7 level (Carmines and Zeller, 1979).

Reliability was assessed with the ρ coefficient, that is, the ratio of construct variance to the sum of construct and error variance, as follows: $\rho = (\Sigma|\lambda_i|)^2/(\Sigma|\lambda_i|)^2 + \Sigma(1 - \lambda_i^2)$, where λ_i is the standardized loading relating variable i to the construct. Similarly to Cronbach's α coefficient, ρ can be interpreted as acceptable when it is greater than 0.70, indicating that at least 70% of the variance in measurement is captured by the construct variance (Fornell and Larcker, 1981). Returning to Fig. 4, the 0.90–0.93 range obtained for the ρ values thus confirms the internal consistency of the three dimensions of IT Support for Strategy.

Convergent validity is confirmed by looking at the average variance extracted ($\text{AVE} = \Sigma\lambda_i^2/n$), i.e. the proportion of variance not due to measurement error (Fornell and Larcker, 1981). Here, as shown in Fig. 4, AVE values greater than 0.5 for all three dimensions support their convergent validity (Gerbing and Anderson, 1988). Discriminant validity is confirmed if the shared variance between a dimension and another dimension (i.e. the squared correlation between the two) is less than each dimension's AVE value (Fornell and Larcker, 1981). Looking again at Fig. 4 proves this to be the case, as the three shared variances between dimensions are in the 0.17 (0.41^2)–0.23 (0.48^2) range, whereas the three AVE values are in the 0.70–0.83 range.

5.1.2. IT support for firm assets

A first-order CFA was similarly conducted for the IT Support for Firm Assets construct. As shown in Fig. 5, values for the loadings (0.73–0.89), ρ coefficients (0.91–0.93), and average variance extracted (0.64–0.73) on each dimension provide strong evidence of construct validity in terms of unidimensionality, reliability and convergent validity respectively. Discriminant validity is also confirmed by a shared variance between dimensions that ranges from 0.45 (0.67^2) to 0.52 (0.72^2), whereas AVE values are in the 0.64–0.73 range.

5.1.3. Industry forces, market performance, and profitability

First-order confirmatory factor analyses reconfirmed Spanos and Lioukas (2001) results as to the unidimensionality and reliability of the Industry Forces, Market Performance, and Profitability constructs, as all items loaded sufficiently on their associated construct (all loadings being greater than 0.6) and exceeded the 0.70 level for internal consistency.

5.2. Assessment of the measurement model

The second step in the data analysis consists in simultaneously estimating with PLS the measurement and theoretical models. The unidimensionality and reliability of the research constructs must first be evaluated. As shown in Fig. 6, whereas all loadings were adequate for four out of the five constructs, initial loadings inferior to 0.5 lead to the elimination of the 'barriers to entry' and 'power of suppliers' variables from the measurement model in order to preserve the unidimensionality of the Industry Forces construct, as unidimensionality is "a necessary condition for assigning meaning to estimated constructs" (Anderson and Gerbing, 1988). Remembering that in its final measurement, Industry Forces here entails threat of substitutes, competitive rivalry and power of buyers, but not barriers to entry and power of suppliers, further results of testing the research model must be interpreted with this meaning of the construct in mind. The ρ coefficient values presented in Table 1, ranging from 0.73 to 0.94, then provide evidence of the five constructs' reliability.

There is also evidence in Table 1 of the convergent validity of the constructs, as their AVE ranges from 0.49 to 0.85 in value. The fourth property to be verified is discriminant validity. It shows the extent to which each construct in the research model is unique and different from the others. Remembering that the shared variance between a construct and other constructs must be less than the average variance extracted by a construct from its measures (Fornell and Larcker, 1981), Table 1 shows this to be the case for all five constructs.

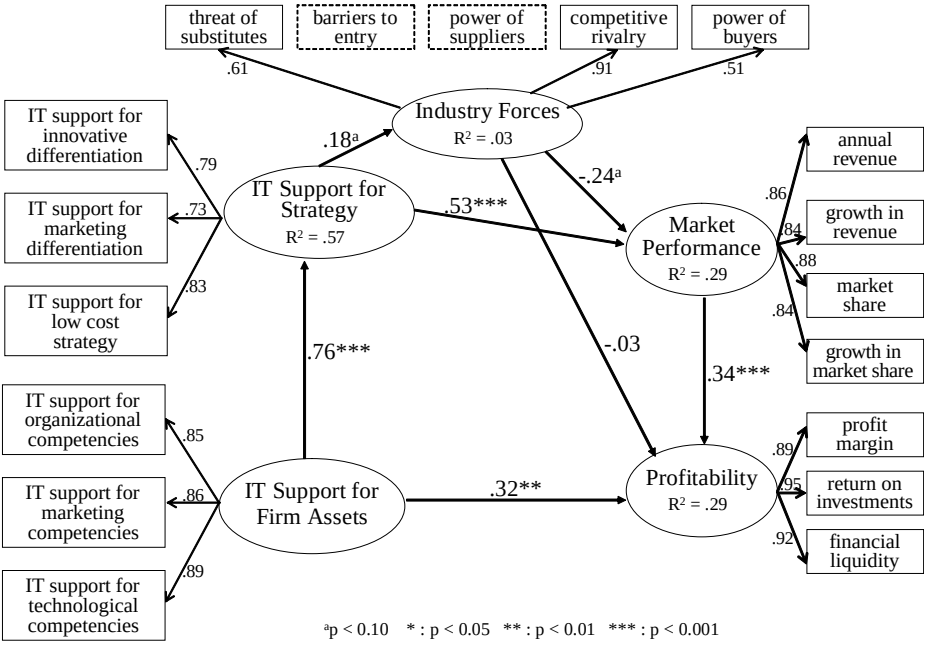


Fig. 6. Results of testing the research model (PLS, $n = 96$).

Table 1
Reliability, convergent and discriminant validity of the research constructs

		ρ[a]	1	2	3	4	5
1.	IT support for firm assets	0.90	0.86[b]				
2.	IT support for strategy	0.83	0.76	0.78			
3.	Industry forces	0.73	0.06	0.18	0.70		
4.	Market performance	0.92	0.36	0.49	−0.15	0.86	
5.	Profitability	0.94	0.44	0.39	−0.06	0.45	0.92

[a] Fornell and Larcker's coefficient of construct reliability $=(\Sigma\lambda_i)^2/((\Sigma\lambda_i)^2 + \Sigma(1-\lambda_i^2))$.
[b] Diagonal: (average variance extracted)$^{1/2}$ $=(\Sigma\lambda_i^2/n)^{1/2}$. Sub-diagonals: correlation = (shared variance)$^{1/2}$.

5.3. Assessment of the theoretical model

The research hypotheses are tested by assessing the direction, strength and level of significance of the path coefficients estimated by PLS, as shown in Fig. 6. Descriptive statistics and correlations of the research variables are found in Appendices 1 and 2.

5.3.1. Relationship between IT support for strategy and industry forces

A positive path coefficient ($\gamma_1 = 0.18$, $p < 0.1$) indicates that increased IT support for strategy is associated with an environment perceived to be more threatening in terms of competitive rivalry, threat of substitutes, and power of buyers. The relative weakness of this relationship also means there are no indirect strategy effects between IT Support for Strategy and Performance ($\gamma_1 * \gamma_2 = -0.043$ for market performance and -0.005 for profitability), a result similar to that obtained by Spanos and Lioukas.

Subject to the limitations inherent to the cross-sectional nature of this study and to the measure of Industry Forces, a tentative explanation of these results could lie in reversing the direction of the causal link hypothesized between strategy and industry forces in Spanos and Lioukas' model. Traditional economic research, based on a market power imperative, considers industry structure as the primary cause of strategy (Henderson and Mitchell, 1997). Also, from an information processing view of the firm, greater uncertainty or hostility in the firm's competitive environment leads to strategic change which creates the need for more information and greater information processing capabilities (Tushman and Nadler, 1978). Hence, industry forces perceived as more threatening would 'cause' firms to provide greater IT support for strategy.

5.3.2. Relationship between industry forces and performance

As indicated by paths coefficients (γ_2) equal to -0.24 ($p < 0.1$) and -0.03 (non-significant), greater environmental hostility is somewhat associated with lower performance in terms of market performance but not in terms of profitability. Given the previous result on the absence of indirect strategy effects, it thus seems plausible that a threatening environment has a direct negative effect on the external dimensions of performance on which the firm has less control, e.g. what its competitors do to

increase their market share, as opposed to the internal dimensions more under its control, e.g. what it does to lower its costs. Note also that greater market performance is associated here with greater profitability as confirmed by a highly positive path coefficient ($\gamma_6 = 0.34$, $p < 0.001$), a result almost identical to that obtained by Spanos and Lioukas.

5.3.3. Relationship between IT support for strategy and performance

Utility effects (γ_3) are demonstrated by a highly significant path coefficient that links IT Support for Strategy to Market Performance (0.53, $p < 0.001$). This result highlights the fundamental difference between the competitive strategy view and the resource-based view in understanding the nature and performance outcomes of IT alignment. Aligning IT with the firm's know-how addresses its strengths and weaknesses (e.g. through an intranet-based KM system in the case of a consulting firm), i.e. the 'internal' perspective of the SWOT formulation of strategy, whereas aligning IT with the firm's competitive methods addresses the threats and opportunities in its environment (e.g. through an extranet-based CRM system in the case of a manufacturing firm), i.e. the 'external' perspective. In turn, it also seems plausible that the main performance outcomes are more internal in nature in the first case, i.e. financial returns linked to a more efficient use of the firm's assets, as opposed to external in the second case, i.e. growth linked to a more effective strategy.

5.3.4. Relationship between IT support for firm assets and performance

A significant path coefficient linking IT Support for Firm Assets to Profitability (0.32, $p < 0.01$) confirms the presence of efficiency effects (γ_4). This result would again highlight the complementarity of the competitive strategy and resource-based views in understanding the enabling role of information technologies

Here, indirect firm assets effects come into play. Information technology's enhancement of the firm's core assets thus seems to only have indirect effects, to the extent that it is through the mediation of IT support for its strategy that the firm achieves market performance ($\gamma_5 * \gamma_3 = 0.40$, $p < 0.001$). For instance, it would be only because certain information technologies enable process reengineering and total quality management (e.g. ERP systems) or reduce the time-to-market of new products (e.g. e-meeting systems supporting product design teams) that other technologies can enable the implementation of differentiation or low cost strategies (e.g. through e-business models).

5.3.5. Relationship between IT support for firm assets and IT support for strategy

A highly significant path coefficient ($\gamma_5 = 0.76$, $p < 0.001$) confirms that increased IT support for the firm's assets is associated with increased IT support for its strategy as hypothesized. This indicates that there are pre-requisites to enhancing or developing the information processing capabilities of the firm as required by a change in its strategic posture. As greater IT support is provided to enhance existing resources or develop new ones, the firm should then have greater ability and be better equipped in resources to fulfil

the increased information processing requirements of a strategy that is more complex and has a greater (utility) effect on performance.

5.3.6. Total effect of IT support for strategy and IT support for firm assets on performance

Overall, the research model explains a significant part (29%) of the variance in the sampled firms' market performance, this percentage being due mostly to the direct (utility) effect of IT support for strategy and the indirect (efficiency) effect of IT support for the firms' assets. Whereas a significant proportion of variance in profitability (29%) is mostly explained by the direct (efficiency) effect of IT support for the firms' assets and by market performance.

In the end, this study's findings are in line with Tallon et al.'s (2000) assertion that there are two types of corporate goals for IT associated to business strategy, that is, internal goals aimed at enhancing operational effectiveness, and external goals aimed at the firm's strategic positioning. Thus an 'internal' view of alignment is evidenced by the strong link between information technology's support for firm assets and profitability. Whereas, the necessity of a complementary 'external' view is demonstrated by the even stronger link found between IT support for strategy and market performance.

5.4. Implications, limitations, and future research

The findings of this study have implications for both research and practice. In terms of research, the first implication of the study results is the importance of examining IT contributions to business performance by building upon the complementarity between the resource-based view of the firm and the competitive strategy view. Indeed, while researchers have examined the impact of IT support on business strategy and of IT capabilities on business performance, this is the first study to include both types of effects. The fact that both sets of variables were found to influence performance, and that IT support for firm assets was found to influence IT support for strategy strongly suggests that, rather than conceptualizing the two perspectives as competing views, IT researchers should further explore their complementarity.

Another implication of the study is related to the role of IT within a resource-based perspective. Several of the studies reviewed by Wade and Hulland (2004) examined the impact of IT capabilities on organizational performance. In the present study, the role of IT was rather conceptualized in terms of the strategic necessity perspective, that is, in terms of IT support of firm capabilities. This conceptualization is in line with Andreu and Ciborra (1996) and Jarvenpaa and Leidner (1998) who state that IT can play an important role in creating competitive value if it is deployed in such a way as to leverage firm capabilities. The results obtained in the present study suggest that this is a promising research direction.

For managers and IT practitioners, the results have two main implications. First, they reinforce the strategic importance of the roles played by IT in explaining business performance. In a context that conveys messages such as "IT doesn't matter" (Carr, 2003) the results provide IT practitioners with insights on the allocation of IT budget. The results suggest that in terms of competitive strategies, IT support plays two critical roles. First, when they are aligned with the firm's competitive strategies IT contribute to market

performance. Second, when they are used to leverage firm capabilities, IT have both an indirect and a direct effect on performance. They have an indirect effect in that they may contribute to fostering the formulation and the implementation of competitive strategies that impact market performance. When they are used to support the firm's valued assets, IT have a direct effect on profitability. In terms of practice, this suggests that an important criterion for either purchasing or developing a system should be the degree to which it supports and enhances one or several of the firm's valued resources. In such a context, the value to the firm of knowledge management and knowledge sharing tools would be worth examining (Hustad and Munkvold, 2005).

The second implication of our results for practice is that the research model could provide the conceptual foundation and methodological core of a SWOT-based approach to develop the strategic management of IT in small and medium-sized firms. While such approaches have been used previously to assist SMEs in formulating their business strategy (Houben et al., 1999) and their IT strategy (Sørensen et al., 2004), SWOT analyses most often lack coherent theoretical underpinnings and are thus quite shallow in terms of strategic issues and thrusts (Valentin, 2001). In contrast, a IT planning methodology built upon complementary resource-based and competitive strategy views would illuminate the comparative advantages and disadvantages in competencies that result from IT support for firm assets, that is, the firm's IT strengths and weaknesses, in relation to the engendered cost and differentiation advantages or disadvantages that result from IT support for strategy, that is, the firm's IT opportunities and threats. Also, the contextual complexities linked to industry forces that particularly affect SMEs, such as the power of customers, would not be slighted in this case. By allowing the firm to focus on and delve more deeply into strategic IT causal issues, such a methodology would provide more reliable and actionable insights on transforming IT investments into increased market performance and profitability.

The results and implications of this study must be considered in light of the intrinsic limitations of survey research. The nature and relatively small size of the sample limit the capacity to generalize research findings across all types of business organizations. The cross-sectional, as opposed to longitudinal nature of the research design, implies that true causal relationships between the research constructs cannot be inferred. Also, while these constructs were shown to be valid, there may yet be survey biases related to the subjective nature of the data. Relying on the perceptions of one key informant, the CEO, for the self-typing of the firm's IT-strategy alignment may also imply cognitive biases; however, previous empirical studies have demonstrated this type of measurement to be valid (James and Hatten, 1995).

While the items measuring performance, industry forces and alignment were placed in separate parts of the questionnaire to mitigate autocorrelation effects, other sources of common method or mono-method biases may yet remain in the survey instrument (Podsakoff et al., 2003). Adding secondary measures such as financial indicators of market performance and profitability would have been one way of remedying for such biases. A final limitation relates to the choice of PLS, imposed by the modest size of the sample, over covariance structure analysis (CSA) approaches such as LISREL and EQS. The PLS technique is more suitable for predictive applications than for theory testing (Anderson and Gerbing, 1988) and tends to underestimate structural paths when compared with

LISREL or EQS (Chin, 1995). Since PLS and CSA approaches tend to produce different results, it may not be entirely appropriate to compare this study's results with Spanos and Lioukas (2001) results obtained with EQS.

Notwithstanding these limitations, this study has demonstrated that integrating the resource-based and competitive strategy-based views can provide further understanding of information technology's contribution to firm performance. Further research along this new line is needed however, in order to gain knowledge on the processes by which firms use IT to support their core capabilities and their strategic moves. Process-based research, more qualitative in nature, will also be needed to further understand the causal dynamics between IT management processes, knowledge and strategic management processes, and performance. Such research should provide richer theoretical insights into the complex interplay between information technology, organizational knowledge and strategy.

Appendix A. Descriptive statistics of the research variables

Construct variable	Mean	Median	SD	Min.	Max.
IT support for firm assets					
IT support for organizational assets	3.1	3.1	0.9	1.0	5.0
IT support for marketing assets	3.0	3.0	0.8	1.0	4.8
IT support for technological assets	3.3	3.3	0.9	1.0	5.0
IT support for strategy					
IT support for inovative differentiation	3.2	3.3	0.7	1.0	4.7
IT support for marketing differentiation	3.1	3.2	0.8	1.0	5.0
IT support for low cost strategy	3.3	3.3	0.8	1.0	5.0
Industry forces					
Threat of substitutes	3.1	3.0	1.0	1.0	5.0
Barriers to entry	3.3	3.0	0.8	1.0	5.0
Power over suppliers	3.3	3.0	0.8	1.0	5.0
Competitive rivalry	3.5	3.5	0.7	1.8	5.0
Power of buyers	3.8	4.0	0.8	2.0	5.0
Market performance					
Annual revenue	3.6	4.0	0.9	1.0	5.0
Growth in annual revenue	3.7	4.0	0.9	2.0	5.0
Market share	3.5	4.0	0.9	1.0	5.0
growth in market share	3.5	4.0	1.0	1.0	5.0
Profitability					
Profit margin	3.3	3.0	0.9	1.0	5.0
Return on investments	3.4	3.0	1.1	1.0	5.0
Financial liquidity	3.5	3.0	1.0	1.0	5.0

Appendix B. Correlations of the research variables

	Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1.	IT support for organizational assets	–																	
2.	IT support for marketing assets	0.70	–																
3.	IT support for technological assets	0.71	0.67	–															
4.	IT support for innov. differentiation	0.58	0.41	0.61	–														
5.	IT support for market differentiation	0.47	0.53	0.39	0.38	–													
6.	IT support for low cost strategy	0.62	0.62	0.78	0.50	0.48	–												
7.	Threat of substitutes	0.03	0.12	−0.01	−0.08	0.19	0.03	–											
8.	Barriers to entry	−0.01	0.09	0.04	−0.09	−0.01	0.07	0.21	–										
9.	Power over suppliers	0.16	0.19	0.20	−0.13	0.20	0.27	0.20	0.24	–									
10.	Competitive rivalry	0.01	−0.01	0.03	0.20	0.01	0.01	0.26	0.14	0.10	–								
11.	Power of buyers	0.11	0.11	0.13	0.04	0.06	0.08	0.25	0.12	0.22	0.27	–							
12.	Annual revenue	0.27	0.28	0.34	0.41	0.26	0.34	−0.06	−0.18	−0.07	−0.28	0.02	–						
13.	Growth in annual revenue	0.19	0.20	0.20	0.30	0.21	0.23	−0.12	0.01	−0.06	−0.24	−0.05	0.59	–					
14.	Market share	0.23	0.26	0.24	0.42	0.28	0.25	−0.11	−0.20	−0.08	−0.29	−0.07	0.68	0.59	–				
15.	Growth in market share	0.24	0.22	0.27	0.36	0.31	0.26	−0.13	−0.05	−0.13	−0.22	−0.11	0.53	0.69	0.65	–			
16.	Profit margin	0.29	0.29	0.41	0.27	0.16	0.37	−0.13	−0.17	0.25	−0.07	−0.07	0.37	0.15	0.25	0.18	–		
17.	Return on investments	0.35	0.35	0.40	0.30	0.23	0.44	−0.12	−0.19	0.16	−0.17	−0.01	0.49	0.35	0.39	0.28	0.81	–	
18.	Financial liquidity	0.30	0.22	0.24	0.21	0.04	0.26	−0.16	−0.16	0.14	−0.09	−0.01	0.36	0.20	0.30	0.15	0.69	0.76	–

Note. Correlations greater than 0.17 are significant ($n=96$, $p<0.05$).

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