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Determinants of innovation performance: a resource-based study

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Abstract

This study aims to investigate the determinants of innovation performance in firms. Hence, the relationship between several constructs that are innovation strategy, formal structure, customer and supplier relationships, innovation culture, and technological capabilities and innovation performance were tested. A survey that was conducted on a total of 194 firms revealed that innovation strategy and technological capabilities contributed more greatly to innovation performance. However, in contrast to the proposition of innovation literature that suggests a positive and significant relationship between formal organizational structure and innovation performance, a significant and negative relationship was found. The implication is that firms are likely to improve their innovation performance as they increasingly reconfigure their resource-base with regard to strategy development and technological investments.

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1. Introduction

With the influence of certain changes in the business environment, such as the growing importance of services, knowledge, creativity, the developments in information technology, digitalization, globalization, and the surge of intellectual property, a new kind of economy has been created. In this new economy, value creation ability has shifted from tangible resources to intangible resources such as knowledge, creativity, unique organizational culture, corporate reputation, innovation, brand and design (Carmeli & Tishler, 2004; Surroca et al., 2010; Kor & Mesko, 2013). Indeed, because of competitive pressure, many businesses have replaced their product and service concepts with more creative and innovative ways so as to achieve competitive advantage in the markets. As an example, Apple has changed its business from selling hardware to selling design and emotions with its aesthetically pleasing products such as the candy-colored iMac, the diminutive iPod Nano and the legendary iPhone and iPad. These innovative products enabled Apple to double the price of its shares over the last five years. Although hi-tech industries are mostly discussed in the context of new economy, unique intangible resource trends are evident in all industries. In new economy, organizations have always looked for improved and unique ways of business to address the requirements of highly competitive markets and sustain competitive advantage. Among these unique ways of business, the development of innovative products and services has become essential for achieving and retaining competitiveness in global markets (Miron et al., 2004; Atuahene-Gima & Murray, 2007).

In recent years, there has been widespread acceptance among scholars and practitioners that innovation is crucial for firms seeking to find their place in the market and ensuring long-term survival (Drach-Zahovy et al., 2004; Molina-Castillo & Munuera-Aleman, 2009; Anderson et al., 2014). Barney (1991) claims that firms can compete in rapidly changing business environments via heterogeneous intangible resources (such as innovation skills) that are likely to be rare, valuable, and imperfectly imitable. Since “innovation is a vehicle of economic growth and a potential source of firm-level performance heterogeneity” (Grigoriou & Rothaermel, 2014, p. 587), investigation of the factors that influence innovation performance should be an academic and managerial concern. Therefore, this study aims to explore the key drivers of innovation that lead to improved innovation performance within the context of the resource-based view (RBV) of the firm.

2. Literature Review and Hypotheses

In essence, the resource-based theory explores the origins of competitive advantage and superior performance (Amit & Schoemaker, 1993; Michalisin et al., 1997; Barney et al., 2011), and “intangible resources are of its focal concern in examining the factors that account for performance variation” (Galbreath & Galvin, 2006, p. 151). RBV explains the performance differences among firms in relation to internal or firm-level factors (Wernerfelt, 1984) and the effects of innovation as a firm-specific resource on firm performance were frequently examined in strategy literature. However, Lippman and Rumelt (2003) who highlight the importance of this type of research, suggest that “because the heart of business strategy concerns the creation, manipulation, administration, and deployment of specialized resource combinations” (p. 1085), as many RBV studies as possible should be conducted in different settings and countries. Besides, this research aims to provide valuable insights regarding the factors that influence innovation performance of firms.

In fact, importance of innovation was not only mentioned within the context of RBV and its roots trace back to the classical economic thought. Schumpeter (1934) regarded “technological innovation” and “creative destruction” as the basis of competitive advantage. For Schumpeter (1934), firm success is not necessarily associated with market power or industry structure, but rather is the result of innovation and new technologies which are critical in influencing the dynamics of external environment and competition. Since innovative activity became the key driver of growth, and countries that create and adopt new technologies and which generate innovation grow faster than those that do not, organizations should have a thorough understanding about the antecedents of innovation to be able to increase innovation performance. In fact, organizational research on the antecedents of innovation performance yielded noteworthy results. Whilst Butlin and Carnegie (2001) stated the antecedents of innovation performance as

ambitious business agenda, clear purpose, attacking rule-based bureaucracy, customer intimacy, leadership, organizational culture, systems, infrastructure, skills and people, Felin and Hesterly (2007) indicated that innovation performance was linked to knowledge and actions of the individuals who manage this knowledge. Similarly, the study of Palacios et al. (2009) that was carried out in 222 from the Spanish biotechnology and telecommunications industries showed that knowledge assets and effective knowledge management had a positive impact on innovation performance of the firms. According to Rouse and Daellenbach (2002), knowledge, routines, strategy, technology, structure and culture are the most important determinants of innovation performance. Hence, several innovation-related constructs have emerged as potential independent variables for inclusion in the theoretical model. In this study, the model of Terziovski (2010) was used to establish the theoretical framework. Terziovski (2010) adopted the integrative definitions of innovation proposed by Freeman (1982) in Bessant and Tidd (2007, p. 12), which defined innovation as, “the technical, design, manufacturing, management and commercial activities involved in the marketing of a new (or improved) product or the first commercial use of a new (or improved) process or equipment” in his model. The model involved innovation strategy, formal structure, customer and supplier relationships, innovation culture, and technological capabilities as independent constructs which predict innovation performance.

In strategy literature, there is a consensus among researchers that organizations with formal strategies show better performance than those without strategies (O'Regan et al., 2005; Terziovski, 2010). Structure is also related to innovation performance. Some theorists (e.g., Benner & Tushman, 2003; Camison-Zornoza et al., 2004) suggest that functionally specialized organizational structures can improve the level of cost efficiency in firms. Additionally, learning ability which emerges from close working relationships with customers, suppliers, and distributors affords a firm access to new ideas and innovations that can lead to advantages over competitors (Kogut, 2000; Lavie, 2012). Another construct that can affect innovation performance is unique organizational culture (Itami & Roehl, 1987). O'Regan et al. (2005) considered organizational culture to be one of the most common impediments to the implementation of innovation. Lastly, Terziovski (2010, p. 895) suggests that “organizations with the ability to redesign their work processes continuously by taking advantage of advanced technology and such continuous improvement methods as total quality management and just-in-time are received recognition for being innovative”. Therefore, the potential impact that each construct would be likely to have on innovation performance, leading to the formulation of research hypotheses are presented in table 1.

Table 1. Research hypotheses.

Hypotheses
Hypothesis 1 (H ₁): There is a positive relationship between innovation strategy and innovation performance.
Hypothesis 2 (H ₂): There is a positive relationship between formal structure and innovation performance.
Hypothesis 3 (H ₃): There is a positive relationship between customer and supplier relationships and innovation performance.
Hypothesis 4 (H ₄): There is a positive relationship between innovation culture and innovation performance.
Hypothesis 5 (H ₅): There is a positive relationship between technological capabilities and innovation performance.

3. Methodology

3.1. Research Goal

The aim of this study is to test the relationship between innovation-related constructs that are innovation strategy, formal structure, customer and supplier relationships, innovation culture and technological capabilities, and innovation performance. In order to address this aim, a field survey using Terziovski's (2010) innovation practice and performance questionnaire was conducted.

3.2. Sample and Data Collection

The sampling frame of this study comprised only profit-making firms operating in free markets and excluded firms or industries that were particularly regulated, protected or controlled by government. Firm size in terms of employee number was also considered to ensure a minimum operating structure (Galbreath & Galvin, 2006). More specifically, some researchers (Spanos & Lioukas, 2001; Galbreath & Galvin, 2006) suggest that firms which employ less than 50 people are not likely to be able to answer questions relating to the relationship between resource and capability constructs and innovation performance. Finally, in order to overcome the problem of having biased firm performance results that may emerge from relying on only one single year performance figures (Rouse & Daellenbach, 2002; Galbreath & Galvin, 2006) and to proximate the sustainability of firm performance, average of the last three years' (2011–2013) performance evaluations is used. The sample was selected from the database of Istanbul Chamber of Industry (ISO) that announced the largest 1,000 firms of Turkey (ISO-1000) from different sectors annually. Based on the criteria of sample frame, 4 firms that have less than 50 employees, 32 firms that operate in other than manufacturing and services industries (e.g., public administration and community services controlled by the government), and 2 firms that had been in business less than three years were excluded from the target sample. A final sample which consists of 962 firms in total was used to administer the questionnaire.

A top manager or at least a middle level manager who deal with strategy issues and have adequate knowledge to assess the firm's resource base and authority to answer the questions is chosen as the key informant (Hambrick & Cannella, 2004; Gruber et al., 2010). A total of 194 useable questionnaires were obtained from 962 firms yielding a response rate of 20.1%. Data obtained from those questionnaires were analyzed through the SPSS statistical package program and the proposed relations were tested through regression analyses.

3.3. Analyses and Results

To measure these relationships, a slight modification of Terziovski's (2010) innovation practice and performance scale was used. The scale was consisted of a total number of 37 questions to measure six dimensions: 9 questions for innovation strategy, 7 questions formal structure, 5 questions for customer and supplier relationships, 6 questions for innovation culture, 6 questions for technological capabilities and 4 questions for innovation performance. Additionally, 12 questions to control the effects of industry structure factors and 2 questions for the demographics (age and size) were included to the questionnaire. Overall, 51 items using 5 Likert-type scale are used to measure the aforementioned relationships. However, 12 items are deleted because they showed a weak loading (below 0.50) or loaded to two different factors. Hence, totally 39 questions including demographic items were used in this study. Factor loadings of the items along with the Cronbach's alpha values for each factors exceeds 0.70 were accepted as a threshold for the reliability of scales.

An exploratory factor analytic method using VARIMAX rotation was carried out to test the convergent and discriminant validity of the constructs, and to investigate the factor pattern of the scale. The analysis yielded seven factors as expected, five factors for independent variables, one factor for performance figures and one factor for control variable that uses Porter's (1980) five forces model of competition. Whilst the whole scale indicated a Cronbach's alpha reliability value of (0.816), Cronbach's alpha values of the constructs' scales were also fairly high: dependent variable–innovation performance (0.833), innovation strategy (0.812), formal structure (0.781), customer and supplier relationships (0.798), innovation culture (0.825), technological capabilities (0.804) and control variable–industry structure factors (0.793). Independence of the predictor (independent) variables is important in statistical testing since highly correlated independent variables can predict each other and may cause problems with multi-collinearity which influence the accuracy of the regression analysis negatively (Hair et al., 2009). Hence, inter-correlations between independent variables were examined. Although some significant inter-correlations between the independent variables were observed (table 2), none of the correlation coefficient was above the level considered to be serious, which is generally accepted as 0.80 or higher (Webb et al., 2006). Accordingly, moderate levels of correlations among the independent variables do not seem to create multi-collinearity problem.

Table 2. Inter-correlation matrix.

Factor	F1: Innovation strategy	F2: Formal structure	F3: Customer and supplier relationships	F4: Innovation culture	F5: Technological capabilities	F6: Industry structure factors	F7: Innovation performance
F1	1.000						
F2	0.196*	1.000					
F3	0.317**	0.238**	1.000				
F4	-0.184	0.109*	0.217	1.000			
F5	0.209**	-0.066	-0.183	0.076	1.000		
F6	0.293*	0.098	0.141	-0.147	-0.079	1.000	
F7	0.452**	0.397*	0.255**	0.268**	0.164*	0.107	1.000

* $p < 0.05$; ** $p < 0.01$

Multiple regression analysis was used as the quantitative analysis technique to test the established hypotheses. Multiple regression analysis is “a statistical technique that provides an index of the degree of relationship (1 = perfect relationship, 0 = no relationship) between the criterion variable(s), on the one hand, and the weighted combination of the predictor variables as specified by the regression equation”, on the other hand — that is, R (Hair et al., 2009, p. 73). According to the results, the established hypotheses are accepted or rejected. Table 3 shows the multiple regression analysis results of the innovation performance construct that were regressed on the model's five explanatory constructs and industry structure (control variable) construct.

Table 3. Multiple regression analysis.

	β	t
Constant		2.371**
Size	0.096	0.052
Age	-0.042	-0.172
Control variable (industrial structure factors)	0.148	1.004*
<i>Factors</i>		
F1: Innovation strategy	0.873	1.296**
F2: Formal structure	-0.924	-0.839*
F3: Customer and supplier relationships	0.364	0.695*
F4: Innovation culture	1.097	1.693**
F5: Technological capabilities	1.836	2.358*
R^2	0.437	
Adj. R^2	0.419	
F	5.367*	
Std. error	0.724	

* $p < 0.05$ ** $p < 0.001$

The results of the analysis revealed significant relationships between all constructs and innovation performance. As hypothesized, innovation strategy demonstrated a positive relationship ($\beta = 0.873$, $t = 1.296$, $p < 0.001$) with innovation performance supporting Hypothesis 1 but its impact was moderate. Although formal structure has related to innovation performance significantly, the direction of the relationship was negative ($\beta = -0.924$, $t = -0.839$, $p < 0.05$), so Hypothesis 2 was rejected. The study found support for other hypotheses; H_3 ($\beta = 0.364$, $t = 0.695$, $p < 0.05$), H_4 ($\beta = 1.097$, $t = 1.693$, $p < 0.001$), and H_5 ($\beta = 1.836$, $t = 2.358$, $p < 0.05$) however, the effect of technological capabilities on innovation performance was the greatest. These findings are consistent with the literature on strategy and innovation generally but some differences were observed. Those findings are discussed within the context of the Turkish business environment.

4. Conclusion

The results show that apart from formal structure, innovation strategy, customer and supplier relationships, innovation culture and technological capabilities are positively related to innovation performance. Formal structure was significantly but negatively related to innovation performance. Although formalization is important to improve efficiency and cost structure of the firms (Bradley & Rubach, 1999; Bessant & Tidd, 2007), formal structures may prevent creativity and flexibility in organizations (Damanpour, 1992; Drucker, 1998). Damanpour (1992) states that firms operating in dynamic environments should have informal or complex structures rather than formal structures. Flat and informal organizational structures enable firms have open and flexible communication channels along with the joint and fast decision making processes and serve as the basis for synergistic development of service and product innovations across many departments, and even divisions, which cannot be easily imitated by competitors (Drucker, 1998; Karim, 2006). Environmental uncertainty and dynamism is quite high in the Turkish business context and this situation may have compelled Turkish firms to operate through informal organizational structures.

Turkey shows typical emerging market characteristics such as higher political risk, a relatively more dominant role of government in the economy and higher rate of volatility in financial markets and weaker institutional infrastructure (Cavusgil et al., 2013). Under these conditions, strategic management for firms is more important than ever. Hence, significant innovation strategy and innovation performance relationship within the context of Turkish business environment is not questionable. This study finds another significant relationship between innovation culture and innovation performance. This finding is not surprising, given that “the innovation culture construct consists of such soft items as rewards, informal meetings, and knowledge sharing” (Terziovski, 2010, p. 899). The effects of customer and supplier relationships on innovation performance can be explained through some specific features of Turkey. Turkey is called a network society where trust-based relations and longstanding connections are highly valued (Hoskisson et al., 2000; Black & Morrison, 2010) and social and business environment is highly affected from these relationships as a consequence of the dominant collectivist culture in the country (Hofstede et al., 2010). Therefore, well-established relations with suppliers and customers can provide superior advantages to firms in terms of obtaining precious information and knowledge leading to innovation performance.

The impact of technological capabilities on innovation performance was greater than any other factors in the study. Apart from turbulent and fluctuating business environments, the firms in Turkey must also deal with a high variety of market segments along with rapid and discursive consumer shifts that may emerge as a consequence of divergent income distribution, different local cultures, ethnic foundations, regional traditions and religious sects and varieties in lifestyles, social values, education levels and linguistics (Cavusgil et al., 2013). Therefore, in this dynamic environment, strategic flexibility which “allows firms to respond quickly to dynamic and unstable environmental changes by committing resources to new courses of action, and recognize and act promptly when it is time to halt or reverse existing resource commitments” (Liu et al., 2013, p. 82) is particularly important for the firms operating in Turkey. In this situation, technological capabilities such as IT skills, enterprise resource planning (ERP), electronic data interchange (EDI), and supply chain management (SCM) systems enable firms to have sufficient intelligence pertaining to current and future customer needs, competitor strategies and actions, channel requirements, and the broader business environment and provide them agility to respond market demands quickly (Ray et al., 2004, 2013). Hence, Turkish firms may have given priority to invest in technological capabilities to address their strategic flexibility requirements and after a while they may have acquired special skills to be able to operate in unreliable business environments. This study concludes that the key drivers of innovation performance are innovation strategy and technological capabilities. The implication is that firms are likely to improve their innovation performance as they increasingly reconfigure their resource-base with respect to strategy development and technological investments.

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