Management innovation, drivers and outcomes: the moderating role of organizational size

Abstract

This article proposes a conceptual model to analyse the role of quality orientation and collaborations in firms' management innovation, and also the impact of management innovation to product, process and marketing innovation. Moreover, the analysis considers organizational size as a key moderating factor in order to investigate whether the relationships among the model factors vary between small and medium size firms. To achieve these objectives an empirical survey was conducted among 429 firms. The structural relationships among the latent factors were determined through SEM. The findings show that the probability of success increases when firms use quality orientation and collaboration to support management innovation efforts. In addition, the findings suggest that management innovation positively affects product, process and marketing innovation while the organizational size acts as a moderator in the relationships among quality orientation, collaborations, management innovation, - product, process and marketing innovation respectively.

Keywords: Management innovation, Quality orientation, Collaborations, Technological innovation

Introduction

Management innovation (MI) is an increasingly covered topic in strategic management research and literature. It's driven by the realization that innovation represents one of the most important and sustainable strategies which lead to increased performance and economic success (Le Bas et al., 2015; Akman and Yilmaz, 2008). This type of innovation usually arises without a special infrastructure and is relatively abstract and intangible, which means it can be complex and ambiguous (Vaccaro et al., 2012) having little possibility of being replicated, given its internal and intangible nature (Nieves, 2016). Theoretically, MI is a broad concept that encompasses strategies, as well as structural and behavioural dimensions as the result of strategic decisions taken by management (Le Bas et al., 2015). Keupp et al. (2012) suggest that MI is about using appropriate strategic management techniques and measures to augment the impact of a firm's innovation activities on firm growth and performance. Without understanding the structures, processes, and behaviours that enable and support innovation, it cannot be systematically adopted (Asif, 2017).

Nevertheless, MI is one type of innovation for which studies have been comparatively rare (Damanpour and Aravind, 2012; Crossan and Apaydin, 2010). A blind spot on the MI research map concerns to little systematic understanding referring to the role of specific drivers in encouraging MI (Kafetzopoulos and Skalkos, 2019; Hecker and Ganter, 2013). There is no guidance on factors contributing to successful MI for a specific sector (Laforet and Tann, 2006). Some studies suggest that firm collaborations (González-Benito et al., 2016; Bassiti and Ajhoun, 2013; Colombo and Rabbiosi, 2014) and quality orientation (Kafetzopoulos and Psomas, 2015; Moura Sa and Abrunhosa, 2007; Singh and Smith, 2006) are antecedents of MI, but there is a general agreement that there is considerable scope for further research in this area (Zeng et al., 2015; Kafetzopoulos and Psomas, 2015; Prajogo and Sohal, 2006). Moreover, little is known about the impact of MI practices on the other innovation dimensions such as product, process or marketing innovation (Haneda and Ito, 2018). In fact, whether or how MI influences the companies' innovation dimensions remains an open research question (Walker et al., 2015; Vaccaro et al., 2012; Volberda et al., 2013; Damanpour and Aravind, 2012).

This paper, responding to a call for more research on the topic of MI (Wei and Bu, 2019; Nieves and Segarra-Cipres, 2015; Walker et al., 2015; Cerne et all., 2013; Vaccaro et al., 2012) contributes to the literature on innovation evaluating the degree to which two key MI drivers (quality orientation and collaboration) relate positively to MI and the degree to which MI relates positively to the rest of the innovation dimensions. Also, it is claimed in literature that different

size firms do not have always the same innovative behavior or face the same challenges and problems (Serrano-Bedia et al., 2016). In fact, previous studies have offered conflicting evidence regarding larger, more complex, organizations and innovation outcomes (Vaccaro et al., 2012). For this reason, in this study, we focus on organizational size as a contextual variable that may affect both the impact of the two drivers under study on MI, as well as the impact of MI to the rest of the innovation dimensions in firms. Thus, this study expands current knowledge regarding the importance of MI in four ways.

First, it empirically validates two possible drivers of MI (quality orientation and collaborations) that shape the degree of MI in firms. The study is a response to calls by Kafetzopoulos et al. (2015), Palm et al. (2014) and Kim et al. (2012) for multifaceted research examining the relationship between different drivers on MI. Second, it investigates how MI is related to product, process and marketing innovation. Scholars have started emphasizing that, in order to capture the full benefits of innovation, technological innovation needs to be combined with MI (e.g. Damanpour and Aravind, 2012). Although it has been argued that MI is often an antecedent of technological innovation (Mol and Birkinshaw, 2009) the role of MI in enabling technological and marketing innovation in the organizational context, remains largely unexplored (Camisón and Villar-López, 2014; Volberda et al., 2013; Hollen et al., 2013; Armbruster et al., 2008). Third, the paper aims to investigate whether the relationships and effects among the two main drivers of MI, the degree of MI and the rest types of innovation vary under different organizational sizes (testing size as a moderator in these relationships). Although several moderators for innovation success have been empirically uncovered by prior work (e.g. market orientation, IT system development or organization absorptive capacity (Guimaraes et al., 2016; García-Zamora et al., 2013; Cerne et al., 2013), possible moderators of MI are yet to be explored (Crossan and Apaydin, 2010). In fact, several scholars have argued that organizational size may be an important boundary condition for MI (Tsinopoulos et al., 2019). Fourth, this paper uses a large sample of firms operating under circumstances of environmental uncertainty and provides up-to-date empirical evidence to validate a model not examined in previous studies.

Summing up, the novelty of the present study is that it contributes to the important area of small and medium size firms because they constitute the backbone of European economics and growth representing 99 per cent (99%) of the enterprises (Moeuf et al., 2020). Moreover, these firms have different decision-making structures than large organisations and they face different challenges with regard to internationalisation. Dilemmas about which antecedents to adopt in order to promote MI, or which directions of MI implementation are more important

for these firms in order to increase innovation capability dimension. Answers to such questions would have important implications on the type of capabilities that small and medium size firms should seek to develop (Salavou et al., 2004).

The rest of the paper is organized as follows. In section 2, a review of the literature is presented resulting in the formulation of the research hypotheses. Section 3 describes the research framework and the methodology used in this study, while section 4 presents the results of the empirical study. In section 5, the results are discussed, while in the final sections of the paper, conclusions, limitations and suggestions for future research are also presented.

Theoretical background and hypotheses development

Management innovation

Various types of innovation have been described in literature and researchers have explored its classification in different ways. The Organization for Economic Co-operation and Development (OECD) has provided a general framework – the Oslo Manual which defines four types of innovation: product, process, marketing and MI (OECD/Eurostat, 2005). The same classification has also been adopted in the studies of Tavassoli and Karlsson (2015) and Kafetzopoulos and Psomas (2015). Extant literature on innovations has primarily focused on its technological content (Cerne et al., 2013) which encompasses both product and process innovation. But innovation is not only restricted to the firm's technological system, it has also been equally recognized for changes within the organization itself and its structure (Cozzarin et al., 2017). Thus, scholars have started emphasizing that, in order to capture the full benefits of innovation, the technological content needs to be combined with the managerial content (e.g., Damanpour and Aravind 2012). The types of innovation that have successfully been introduced by academic literature outside the domain of technology (Volberda et al., 2013) include management and marketing innovation (Kafetzopoulos et al., 2015; OECD, 2005).

Many scholars use the terms management, administrative or organizational innovation in order to refer to management practices, processes, organizational structure and management techniques to increase innovation (Mol and Birkinshaw, 2009; Birkinshaw et al., 2008). The term MI has recently gained currency in the organization management literature, overtaking the terms organizational and administrative (Damanpour and Aravind, 2012). More specifically, Table 1 represents the definitions of these terms.

Insert table 1 about here

From the above it is apparent that these definitions overlap markedly and they can be considered equivalent to MI (Hecker and Ganter, 2013). Thus, in the present study the term MI is applied for administrative, organizational or managerial innovation, encompassing the essence of both the traditional and the more recent definitions. Moreover, this term proposed and adopted in previous researches (Volberda et al., 2013; Walker et al., 2011; Birkinshaw et al., 2008).

MI involves the introduction of novelty in an established organization, and as such it represents a particular form of organizational change (Birkinshaw et al., 2008). Therefore, MI refers to the generation or adoption of management processes, practices, structures or techniques that are new to the company and affect its performance in terms of innovation, productivity and competitiveness (Birkinshaw et al., 2008; Volberda et al., 2013). Specifically, MI is basically introduced to improve the efficiency of the organization's internal administrative processes (Nieves and Segarra-Cipres, 2015) and has little possibility of being replicated, given its internal and intangible nature. It is a form of innovation that can only be copied with important modifications that allow it to be compatible with the structure, culture and systems of the adopting company (Damanpour, 1996). MI relates to changes in how managers set directions, make decisions, coordinate activities, and motivate people (Hamel, 2006). These changes become part of the organization as MI manifests itself through new management practices, processes, or structures (Vaccaro et al., 2012). This non-technological nature of MI means that the firm's managers play a more important role than technicians or researchers do (Hecker and Ganter, 2013). Furthermore, Birkinshaw et al. (2008) identify four perspectives on MI: institutional, fashion, cultural, and rational perspective. The present study aims to contribute to the emerging scholarly discourse by analysing quality orientation and collaboration as antecedents of MI in order to improve the organization’s innovation in small and medium-sized firms.

Quality orientation and management innovation

Quality orientation refers to the extent to which a firm lays emphasis on quality; fosters quality commitment among its employees, and the development of Total Quality Management practices (Sethi and Sethi, 2009). Quality orientation conceptualized as an organization’s philosophy or culture for eliminating defects and improving processes, representing the shift of corporate vision and value toward quality at all organizational levels (Wang and Wei, 2005). The operationalization of quality orientation was to assess top management leadership on

quality, continuous quality improvement, and inter-functional design efforts for products and services. Quality orientation emphasizes the attention that quality should permeate at all levels of the organization from top management down to all corporate functions (Forza and Filippini, 1998). Companies in general use a quality orientation strategy in an effort to develop "perceived quality" in the mind of existing and potential customers (O'Neill et al., 2016). Prajogo and Sohal (2006) after an extensive review of the related literature, reached the conclusion that the relationship between quality orientation and innovation is rather complex and ambiguous. Many studies contend that quality orientation could be one of the prerequisites for IM (Kim et al., 2012; Perdomo-Ortiz et al., 2009; Hoang et al., 2006). It creates a favourable atmosphere or platform for developing MI, as many of the determinants of innovation are found to be affected by specific quality management dimensions (Perdomo-Ortiz et al., 2006). Hoang et al. (2006) confirm that quality orientation considered as a set of quality management practices and has a positive impact on a firm's innovativeness. A commitment to quality can drive firms to make significant improvements in competitiveness and especially in innovation practices. Organizations with a quality orientation may gain above average returns due to their ability to understand the market needs before their competitors (Kalmuk and Acar, 2015). According to Kafetzopoulos and Skalkos (2019) quality orientation can be one of the organizational factors that influence MI, creating a fertile environment for the development of innovation, since many of the necessary internal factors affecting innovation are developed to the required level. Also, the work of Matias and Coelho (2011) points out that quality orientation strategically supports MI and Prajogo and Sohal (2003) confirmed the relationship between quality orientation and innovation, showing that quality enhances innovation performance. Moreover, Suárez et al. (2016) and Calvo-Mora et al. (2014) suggest that the effective implementation of quality orientation models turns out to be beneficial for organizations by fostering a quality culture that supports MI, boosts innovation development and novelty. Based on the above, the following hypothesis is developed:

H1: Quality orientation positively affects management innovation.

Collaborations and management innovation

As products become increasingly modular and knowledge is distributed across organizations, firms recognize an increasing need to collaborate with other firms both formally and informally (Fischer and Varga, 2002). Collaborations include active participation among companies or institutions on innovation activities that help manufacturers to build more and tighter

relationships with other companies to achieve greater external economies of scale and market strength, or exploit new opportunities. External relations and networks appear increasingly necessary to support innovative practices. Firms seek collaboration with suppliers in order to improve input quality and reduce production costs through innovations (Chung and Kim, 2003). Collaboration with customers and lead users is also important as a source of new ideas for product innovation (Von Hippel, 2005). Companies cannot depend exclusively on internal development of resources and knowledge (Swaminathan and Moorman, 2009). Resources alone cannot lead to innovation advantage. Decision making should consider the resources that are available and how they can be combined with each other to create value. In other words, instead of focusing on who owns the resources, more focus should be paid on possible combination with other resources in the business network (Harrison and Håkansson, 2006). Relations with consumers, competitors and suppliers are key for accessing the knowledge required to implement MI, as these agents have a wealth of information about developed practices and industrial processes (Kim and Lui, 2015). Therefore, relationships with external agents enable the improvement of a company's ability to implement management processes, to have a higher propensity to break with conventions and develop MI (Ruef, 2002).

Several theories aim to justify the relationship of collaboration, MI, and business performance (González-Benito et al., 2016) pointing out that collaboration supports MI and new business creations (Powell et al. 1996; Teece et al. 1997). With collaboration, MI is more likely to be effective, because it creates junctures that companies could not attain alone, thus, offering a key to MI success (González-Benito et al., 2016). It appears that companies working together have more facility to adapt their products, services, and operational processes to satisfy market demands (Wilkinson, Young 2002). Also, the role of collaboration varies with the size of companies (González-Benito et al., 2016). Collaborations are also critical to MI for accessing external knowledge to create in-house innovations, allowing the diffusion of technological innovation, and helping to learn about innovative work practices that other organizations have already developed or adopted (Pittaway et al., 2004). Higher levels of collaboration generate stronger innovation performance compared to the lower levels of collaboration as companies working in collaboration become more capable to adapt their products, services, and operational processes to satisfy market demands (Wilkinson and Young, 2002). Collaboration affects MI activities as it allows the complementary exploitation of resources, especially between small and large firms and even between firms belonging to different sectors (Ciliberti et al., 2016). Transforming an idea into a product or process implies interaction between the different actors at the heart of this process and among different disciplines or management decisions. People

transform these ideas into value. Consequently, MI is largely a process of managing people, along with managing the principles and practices according to which their work is organized, which subsequently leads to managing also their collaboration process (Bassiti and Ajhoun, 2013). Hence, the ability and willingness of firms to build and participate in networks represents an important factor and determinant of MI (Rampersad et al., 2010). The above discussion leads to the following hypothesis:

H2: Collaborations positively affect management innovation.

Management innovation in enhancing product and process innovation

Product innovation implies the creation of new products, based on new or combined technologies, which are being sold in the market. In contrast, process innovation implies the introduction of new input materials, physical equipment or software systems in a firm's production or service operations in which products and services are delivered (Meeus and Edquist, 2006). By some authors, product and process innovation constitute the technological innovation (Hollen et al., 2013). Firms that are active in product or process innovation usually adopt complementary MI or marketing innovation practices. According to the socio-technical system theory, any change in an organization's technological system requires changes in its administrative system, in order to adjust to the demands created by the technological system. MI is crucial in enhancing flexibility and creativity – that in turn facilitates the development of product and process innovation (Mothe and Nguyen-Thi, 2012). Thus, the findings of some studies, such as Wong (2013) among manufacturing sector workers, or Ceylan (2013) in a sample from various industrial sectors, support a significant positive relationship between MI, product and process innovation.

MI in terms of structural improvements and organizational changes (e.g., policies, practices and communication) leads to enhanced intra-organizational coordination and collaboration, which, in turn, creates an appropriate environment for the adoption and utilization of product and process innovations. Haned et al. (2014) studied the role of MI regarding persistence in both, product and process innovation. They have shown that continuous implementation of MI is more likely to induce product innovation, but not process innovation. Similarly, the results of a study of Nieves (2016) shown that MI activities favour the introduction of product innovation. In contrast, Camisón and Villar-López (2014) assessed the relationship between MI and both product and process innovation capabilities, and analysed their effect on firm performance. They found that the direct effect of MI on process innovation

was positive and highly significant, while the effect on product innovation was negative, quite small, and moderately significant.

The research stream that MI enhances flexibility and creativity, which facilitates the development of product and process innovation capabilities was also supported by Lokshin et al. (2008). Teece (2010) argues that, to profit from product and process innovations, enterprises must adopt new organizational forms, new management methods, and new business models that are of equal (if not greater) importance to the business enterprise. Moreover, Cozzarin (2017) founds that MI impacts product and process innovation in a positive manner. According to Mothe and Nguyen-Thi (2012) the effects of MI on product and process innovations differ with regards to the phase of the innovation process: MI can increase the likelihood of a product and process innovations but not its commercial success. Lam (2005) explains that MI is a necessary precondition of product and process innovations, while Ganter and Hecker (2013) add that MI appears to increase a firm's capability to flexibly adapt to dynamic market environments and/or to drive change by enhancing its ability to technologically innovate. The core of MI is a systematic approach to implementation of changes that should lead to improvement of the products, processes or position of the whole company (Havlíček et al., 2013). Finally, Armbruster et al. (2008) argue that MI is a prerequisite and a facilitator of the efficient use of technological product and process innovation. According to Schubert (2010) the relationship between MI, product and process innovation is a question that has yet to be clarified. Thus, the following hypotheses are developed:

H3: Management innovation positively affects product innovation.

H4: Management innovation positively affects process innovation.

The impact of management innovation on marketing innovation

Marketing innovation is the implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing (OECD, 2005). Examples of such innovations are the improvement of customers' perception of a firm's products (Tavassoli and Karlsson, 2016). To adapt to ever changing customer needs and satisfy them, organisations need to provide quality and innovative products (Kafetzopoulos and Psomas, 2016). Genuine MI must involve substantial changes in how the organization is managed, reflected in the introduction of new practices, processes, structures and techniques in marketing. Bigliardi and Dormio (2009) describe MI as the changes in marketing, purchases, sales, administration, management and staff policy. It introduces new administrative control

systems and processes, resulting in immediate and useful feedback from the manufacturing process, which is instrumental in speeding up new products to the market (Flynn 1994). Kafetzopoulos and Skalkos (2019) point out that MI based on introduction and implementation of new strategies on quality and processes is a significant predictor of marketing innovation in small firms. In this sense, it has been observed that MI activities favour the development of marketing innovation (Schubert, 2010). Activities related to MI can help to facilitate responses to changes in the market, so this innovation may be related to marketing innovation (Armbruster et al., 2008; Schubert, 2010). Battisti and Stoneman (2010) suggest that MI objectives could lead to new management practices, new marketing concepts and new corporate strategies. Different kinds of product promotion, such as advertising strategies or preannouncement strategies are linked to advantages of being a pioneer in the market (Naidoo, 2010). A company's ability to introduce new marketing methods, especially innovations in product promotion, highlights the need to manage and change the way it interacts with its customers, partnerships and networks (Ajayi and Morton, 2015). Therefore, marketing innovations related to product promotion could be derived from MI objectives (Totterdell et al., 2002). To sum up, MI is a broad concept that fulfil the expectations of customers and other stakeholders, and finally lead to marketing innovation (Sila and Ebrahimpour, 2003). Based on the above, it is logical to assume that MI activities assist firms to improve their marketing innovation performance, therefore, the following hypothesis is developed:

H5: Management innovation positively affects marketing innovation.

Table 2 represents the relevant literature on the relationships of the constructs.

Insert Table 2 about here

The moderating role of the organizational size on the relationships of management innovation

Numerous scholars have attempted to explain why some firms are more likely to innovate than others (Roper et al., 2008). Empirical studies of organizational and environmental characteristics and their moderating roles in the relationship between innovation and performance produce inconclusive results (García-Zamora et al., 2013). Previous studies have contemplated different types of antecedents of innovation (e.g. human capital, integration capability, strategic orientation, promoting a corporate culture) and they have compared large and smaller firms in order to reveal if the relationships between antecedents , innovation and performance differ between the two groups of enterprises (Nieves and Segarra-Cipres, 2015;

Salavou et al., 2004). A review of these studies has shown that organisational size, which is reflected by the number of employees, is the major organisational factor that effect MI (Khosravi et al., 2019). Company size exerts an inherent influence on the formation of quality, collaborations and innovation capabilities since they are developed cumulatively and build each individual member of the organization (Akgun et al., 2007). Mol and Birkinshaw (2009) state that large companies are more likely to introduce new management practices, given that they have more resources, including knowledge about management practices and human capital. Medium-sized organisations are also successful in adopting innovations because of the availability of organisational resources such as sophisticated ICT facilities and control systems as well as professional and skilled workers (Cerne et al., 2013; Akgun et al.,2007). By contrast, small companies typically suffer in compare to medium-sized in terms of money and personnel as well as heterogeneity regarding organizational members (Gruber, 2003; McGrath, 1996). Thus, the ability of accumulate knowledge and experience is an aspect that differentiates small from medium-sized firms (Flatten et al., 2011). Nevertheless, a number of scholars argue that small organizations are more innovative because they can make quicker decisions to go ahead with new and ambitious projects; they have less bureaucratic and more flexible structures, and greater ability to adapt and improve, and, they have less difficulties in accepting and implementing changes (Damanpour, 1991). In strategic collaborations, each company must have specific quality and innovation standards and routines. These standards and routines are more likely to exist in medium-sized companies than in smaller ones (Troy et al., 2008). Medium-sized firms have considerable economic advantages and experience over their smaller counterparts to pursue multiple goals, but they also suffer the disadvantages of being more bureaucratic and less flexible (Damanpour 1996). By contrast, small firms are usually nimble and more receptive to changes with their high resource manoeuvrability, but they lack resources and the capacity to meet multiple challenges. Thus, different and conflicting arguments have been presented in literature regarding the moderating role of firm size on innovation results. In addition, there are no studies that examine the impact of MI on each of the dimensions of innovation in different size firms. Following the same methodology by Flatten et al. (2011) this paper introduces organizational size as a moderating variable in all the relationships described previously in this paper. The sample was spited into two parts (small and medium-sized firms) for the purpose of the size-moderated analyses. Thus, the following research hypotheses are formulated:

H6a: Organizational size moderates the impact of quality orientation on management innovation.

H6b: Organizational size moderates the impact of collaborations on management innovation.

H6c: Organizational size moderates the impact of management innovation on product innovation.

H6d: Organizational size moderates the impact of management innovation on process innovation.

H6e: Organizational size moderates the impact of management innovation on marketing innovation.

The conceptual framework

In summary, our analysis of MI drivers – MI – innovation dimensions and organizational size has led to the structural model illustrated in figure 1. With respect to drivers, this study examines two key drivers: quality orientation and collaborations and their effect on management innovation. Furthermore, the empirical validation of the proposed structural model will enable us to determine whether MI effectively affects the rest types of innovation, that is product, process and marketing innovation. The role of the organizational size will also be tested in all of these relationships.

Insert Figure 1 about here

Research framework and methodology

Data collection and sample characteristics

In order to meet the aims of this study, a research project was carried out among Greek firms, using a structured questionnaire as the data collection method. A sample of 1,750 companies was randomly selected from the list of companies that were recorded in the database of ICAP (the largest business information and consulting firm in Greece), in order for the sample to be representative of the population. The questionnaire consisted of three sections: firms' basic information; information related to the innovation drivers regarding quality orientation and collaborations; and information regarding the four types of innovation. Questionnaires were addressed via mail to senior and middle managers who were considered (by their role in top and middle management) to have adequate knowledge about innovation in their firms (Cerne et al., 2013). When no response was received, follow up calls were made (Tsinopoulos et al., 2019). Two waves of responses were received including 305 and 154 valid questionnaires

respectively, a final total of 459, yielding a response rate of 26.2 percent. The sample covered a broad range of industries (food and beverages 28%; agricultural products 12%; metal products 7%; plastic, chemical and associated products 5%; various industrial products 17%; services 31%) and it was restricted to privately held firms, employing between 10 and 250 employees. Regarding the size of the firm, this paper employs the standards of the European Commission, considering as Small Firms those employing from 10 up to 49 employees, and Medium Firms those employing from 50 up to 249 employees (García-Zamora et al., 2013).

Measures

Literature review in section 2 provides the basis for the survey design. In order to assess quality orientation, four items were adapted from Maletic et al., (2014), Wang and Wei (2005), and Forza and Filippini (1998). In order to assess collaborations, three items were adapted from Ferreira et al. (2015). In order to measure MI five items were adapted from Camisón and Villar-López (2014), Yam et al. (2011) and Forsman's (2011). Product and process innovation were measured using the scales proposed by Kafetzopoulos et al. (2015), and Camisón and Villar-López (2014) respectively. Finally, marketing innovation was measured by the scale proposed by Kafetzopoulos et al. (2015) and Yam et al. (2004). For all these variables, the individuals surveyed were asked to indicate their degree of agreement or disagreement with the related items on the questionnaire, using a response range from 1 = strongly disagree to 7 = strongly agree. The study statistically controlled the effect of the firm size, measured through the logarithmic transformation of the number of employees (Nieves and Segarra-Cipres, 2015). The specific questionnaire items for each measured variable appear in the appendix.

Data preparation

The questionnaire was initially evaluated by six experts in the field and it was pilot - tested on 14 firms in order to ensure its interpretability, its reliability and the content validity of its measures. All respondents completed the survey instrument individually and independently. Examining each of the variables of the survey questionnaire individually for unique or extreme observations, 30 observations were deleted because they were defined as cases with a threshold value of a standard score up to 3 (Hair et al., 2006) leaving 429 observations for the analysis. The assumptions of multivariate analysis with regard to sample size, multicollinearity, and outliers were checked before proceeding with the data analysis. Regarding the normality of the data, all measured variables in this study exhibited univariate normality and did not suffer from skew and kurtosis ($<\pm 1$), indicating, but not guaranteeing, multivariate normality (Hair et al.,

2006). In addition, the scatter plot showed constant variance of error terms (homoscedasticity), while the histogram and normal P-P plots of the standardized residuals indicated normality of the error terms. From the above, it is obvious that the basic assumptions of multivariate analysis are not violated in this study. The responding companies comprised 151 medium-sized firms (35.2%) and 278 small firms (64.8%).

Non-response bias and common method bias

We followed a number of steps to reduce the risk of non-response and common method bias. To test for non-response bias, we first examined possible differences between respondents and non-respondents, based on the number of employees. The corresponding T-tests showed that there was no significant difference Additionally, we compared the answers between early group and late group of respondents (Vaccaro et al., 2012). The corresponding results proved that there are no significant differences between these two groups for all the variables measured in the survey (at $p > 0.05$). In order to avoid problems with common method bias, we first conducted Harman's one-factor test using the items included in our model. If common method variance was a serious problem in this study, we would expect a single factor to emerge from a factor analysis or one general factor to account for most of the covariance in the independent and dependent variables (Podsakoff et al. 2003). Following our analysis, we did not obtain such a single factor.

Method of data analysis

The analysis adopted in this study includes an initial exploratory factor analysis (EFA) and then, confirmatory factor analysis (CFA) is used to refine the resulting scales in EFA and to determine if the number of factors and the loadings of the measured variables (i.e. indicators) on them conform to what is expected on the basis of pre-established theory. Multicollinearity, unidimensionality, scale reliability and construct validity are undertaken for the study variables as suggested by Hair et al. (2006). The model and the hypotheses are tested using structural equation modeling (SEM) via path analysis, a multivariate analytic methodology that gives insights into the causal ordering of variables in a system of relationships. The statistical analysis software SPSS 22 (Statistical Package for Social Sciences) and AMOS 6.0 (Analysis of MOment Structures) were used for the statistical processing of the data.

Results

Assessment of the measurement model

First, EFA was applied in order to extract the latent constructs and the factor loadings of the items. The six latent factors extracted through EFA showed the existence of only one dimension in the scales used (Kaiser–Meyer–Olkin = 0.933, p = 0.00, eigenvalue > 1, MSA > 0.80, factor loadings > 0.614), explaining 68.37 percent of the total variance. The mean scores of each of the latent factors were computed and analysed to estimate the respondents' perceived level of implementation. Moreover, a correlation matrix for the six dimensions was produced in order to examine the bivariate relationships among the main variables. Table 3 displays the descriptive statistics and the results of the correlation analysis of the study variables. As can be seen, the correlation coefficients (r) among the variables are generally above 0.3 and below the cut-off of 0.90 for the collinearity problems. The results show significant and positive correlations at $p<0.01$, indicating the interdependence of all six factors.

Insert Table 3 about here

Next, to determine the scales' reliability, the Cronbach's alpha coefficient was calculated for all factors and it was found to be higher than the recommended value of 0.7 (Hair et al., 2006) (see Table 4). This indicates that all factors are measured by reasonably reliable items.

Insert Table 4 about here

After EFA, 27 items were used to apply CFA to establish the goodness of fit of each scale. The results of CFA confirmed the structure and the unidimensionality of the latent factors revealed by EFA, since the fit indexes for the measurement model indicate a good fit of the model to the data (see Table 5).

Insert Table 5 about here

The validity of the scales was assessed in terms of content, convergent and discriminant validity. The review of the literature as well as the results from the pilot study confirmed the content validity of the instrument. The convergent validity of each latent factor was assessed by evaluating the factor loadings of the measured variables and the average variance extracted (AVE), as suggested by Hair et al. (2006). Factor loadings of all items are greater than 0.5 and significant at p-values < 0.001. The AVE was above 0.508 on all the scales, surpassing the

recommended threshold of 0.50, demonstrating high convergent validity (Hair et al., 2006). Finally, discriminant validity was evaluated by comparing the AVE of each latent factor with the highest squared correlation between this and the remaining factors. In each case, the AVE is greater than the squared correlation, confirming the discriminant validity of all the latent factors (Hair et al., 2006). Thus, the results of the above analysis provide strong evidence that all the latent factors are reasonably reliable and valid. Table 4 shows the validity results of each latent factor. Moreover, the evaluation of formative measurement models at the indicator level involves test potential multicollinearity between items and weights analyses. The variance inflation factor (VIF) was examined for each independent variable in order to evaluate the risk of multicollinearity. The VIF values were well below the cut-off value of 10, indicating that collinearity and multicollinearity problems do not exist in this research (Hair et al., 2006).

Structural model

The SEM technique was applied (maximum likelihood method) to test the hypotheses of the study, using the model illustrated in Figure 1 as the base model. Table 5 shows that the overall fit statistics for the structural model, for the total sample, demonstrate an acceptable fit. Figure 2 presents the final structural model, depicting the SEM results regarding the relationship between the latent factors. Furthermore, Figure 2 indicates the estimated path coefficients, p-values and squared multiple correlations (R^2) for the depended constructs.

Insert Figure 2 about here

According to the analytical results, all the proposed relationships between the MI drivers - MI - innovation dimensions, for the total sample, are positive and statistically significant (see Table 6). More specifically, quality orientation and collaborations directly affect MI (coefficient: 0.555 and coefficient: 0.214 respectively). It is also apparent that MI positively and significantly affects product (coefficient: 0.683), process (coefficient: 0.821) and marketing innovation (coefficient: 0.789). The above results support hypotheses H1–H5.

Insert Table 6 about here

R^2 values (see Figure 2) indicate the percentage of variability accounted for by the precursor latent variables in the model. The model's predictability is evaluated by means of R^2 values for the dependent latent variables. The R^2 value indicates that the theoretical proposed model explains 45.4% of the variance in the MI construct, 46.7% of the variance in the product

innovation construct, 67.5% of the variance in the process innovation construct and 62.2% of the variance in the marketing innovation construct. These values offer a very satisfactory level of predictability (Camisón and Villar-López, 2014).

Furthermore, the size of a firm was introduced as a moderating variable, since it is contended that the relationships between these factors are likely to vary depending on the firm size (Yam et al., 2004). Thus, the overall sample of the firms was divided into two groups, based on their number of employees. More specifically, the first group included the small firms (278) and the second group included the medium firms (151). In each group of respondents, the SEM method was applied, in order to check the goodness of fit of the models to the respective data, and to make a two-group comparison to examine the existence or not of differences in structural parameters between MI drivers - MI - innovation dimensions. The results confirm the goodness of fit of the models to the data, given the acceptable fit indices presented in Table 5. Table 6 presents the results of the SEM method applied in each group of respondents. More specifically, the results based on the responses of small firms indicate that MI is positively and significantly affected primarily by quality orientation and then by collaborations. Moreover, based on the same responses, MI positively and significantly affects product, process and marketing innovation. On the other hand, the results based on the responses of medium size firms indicate that the relationships between all constructs are positive and significant, except for the structural relationship between collaborations and MI which was not found to be statistically significant. Based on these results, it becomes obvious that organizational size moderates the four out of the five examined relationships between the main constructs of the model, thus confirming accordingly the hypotheses H6a – H6d, while it does not moderate the relationship examined by hypothesis H6e, which is rejected.

Discussion and conclusion

Findings

This study contributes to new insights regarding the role and effect of MI on firms. It's based on a theoretically derived and empirically grounded study which explored three key basic issues on MI: (a) the relationships between MI – product and process innovation and MI - marketing innovation, (b) the role of quality orientation and collaborations as antecedents in enhancing MI and (c) the impact of organizational size on the above relationships. This research complements previous research studies, providing robust evidence on the impact of MI

(Kafetzopoulos and Skalkos, 2019; Nieves and Segarra-Cipres, 2015; Camisón and Villar-López, 2014; Ganter and Hecker, 2013; Mothe and Nguyen-Thi 2012)

The first important finding of this study is the direct impact of quality orientation and collaborations on firm's capability to introduce MI. Since the relationship between quality orientation and MI is rather controversial (Kafetzopoulos et al., 2019), this study provides new insights, enhancing our understanding of the interdependence between quality orientation practices and MI, proving that MI developments in many Greek firms rely heavily on quality orientation practices. Thus, quality orientation is an organizational factor that can influence innovation, since it helps develop many of the necessary internal factors that help boost innovation. The results of this study build on the work of Matias and Coelho (2011) who point out that quality strategically supports MI and Suárez et al. (2016) and Prajogo and Sohal (2003) who showed that quality orientation beneficial for organizations, by fostering a culture of management innovation (Calvo-Mora et al., 2014).

According to the survey findings, collaborations also contribute significantly to MI of the firms studied but not in a higher level than that of quality orientation. The idea that cooperating with customers, suppliers and competitors allows for a better understanding of new market needs and demands, enabling firms to define the rate and direction of MI as well as to anticipate market trends. The results are in line with the findings of other researchers who claim that a firm's capabilities/intentions to build or participate in networks constitutes an important factor for innovation (Rampersad et al., 2010).

Furthermore, this study confirms the importance of MI in the rest of a firm's innovation capabilities, namely product, process and marketing innovation, which were often explored in isolation in the literature. Implementing new practices or procedures, and new methods of work responsibilities, having access to new technologies and using databases of best practices, lessons and other knowledge all have consequences for designing newly structured products, improved processes or innovative marketing actions. More specifically, the study confirms the importance of MI, which is highly emphasized in literature. The above findings are in line with the results of previous studies regarding MI (Tavassoli and Karlsson, 2016; Ganter and Hecker, 2013; Mothe, and Nguyen-Thi, 2012; Lokshin et al., 2008; Lam, 2005).

Innovation researchers have been working for some time on the theoretical development of models, but there has been little work done to specifically identify how companies may adapt their MI strategies according to their organizational size. Encouraging innovation in small and medium sized firms remain at the heart of policy initiatives for stimulating economic development at the local, regional, national and European levels. Dividing the research sample

of the responding firms into small and medium size firms, the analysis reveals that the relationships between MI drivers - MI - technological and marketing innovation varies based on the organizational size. This study finds that quality orientation becomes more important for generating and implementing MI in medium size companies. A potential explanation for this is that in larger organizations quality orientation may be a priority for gaining competitive advantage while they usually have more resources to invest in quality and innovation than small firms do.

Surprisingly, this study shows that collaborations have no impact on MI in medium size firms, but only in small firms. Innovation of small firms were constrained by the lack of knowledge and resources, skills, training, external innovation partners, the lack of capital and the lack of information about new technologies. Small firms adhere to the traditional authoritative management style, often displayed by family owned firms (Salavou et al., 2004). Consistently with the literature small firms have advantages over medium size firms such as being close to customers and operating in a flexible and informal environment (Laforet and Tann, 2006). For these reasons, small firms become more open and as a result, they are more inclined or forced to collaborate with other organizations. The external resources and collaborations provide small firms with the stimulus and capacity to develop MI activities. Medium size firms depend less on channel collaboration, since their size offers them sufficient resources, without the need of external relationships (González-Benito et al., 2016).

Moreover, the present study's findings suggest that MI influences product and process innovation to a greater degree in small firms than medium forms, while the impact of MI on marketing innovation is about the same in all firms. This is explained because a smaller firm might be more technologically innovative as it would be expected to be more flexible in management practices and therefore be better able to accept and affect change (Damanpour 1992). In a larger firm, bureaucracy is at high levels, leading to more difficult communication and coordination of RandD (Stock et al., 2002). Another consideration is that in a smaller firm, the compensation of an individual may be more tightly linked to performance and it is likely to have a more visible impact on the firm's overall innovativeness than in a larger firm, which would also lead to a higher degree of motivation (Kamien and Schwartz, 1982).

Implications for theory and practice

Based on the present study, important implications can be derived for practitioners, policy makers and researchers. The originality of this study in relation to similar previous research is that it offers a reliable and valid model which presents simultaneously the relationships between

MI antecedents – MI - product, process and marketing innovation, improving our comprehension on the above impacts. Our main contribution to literature is in theoretically explaining and empirically examining, the link between quality orientation and collaborations with MI, and what this link might be contingent upon. Our study depicted quality orientation as the primary resource underlying value creation. Intangible assets, such as everyone's responsibility to quality or education for quality, were deemed as essential in enhancing MI. As this study shows, quality needs to be also accompanied with strong relationships with customers, other firms or competitors. Moreover, this study contributes to the literature by analysing the likely moderating effect of firm size in these relationships. The finding that organizational size moderates the impact of MI antecedents – MI - product, process relationships highlights the need to further investigate issues related to organizational size such organizational structural characteristics, ownership characteristics, organizational resilience dynamics, and technology orientation regarding future size determination.

The empirically validated conceptual model of the present study can guide company policy makers to select the appropriate strategy in order to increase its innovation performance. Since MI was theoretically demonstrated to lead to positive outcomes in all innovation dimensions, it is now proved that it can contribute significantly to a firm's success (Cerne et al., 2013). Managers should strive to understand innovation not only from a technological perspective, but also from a management and marketing innovation perspective.

The drivers under study play also a key role in the occurrence of MI. This research introduces quality orientation and collaborations as two important innovation drivers that have been playing a pivotal role in enhancing MI of firms. Thus, the promotion of quality orientation and collaborative networks should be a priority for managers for improving enterprise innovativeness. More specifically, the framework offered by this study can guide then on how to orchestrate MI by adopting them both. For example, managers can start with quality orientation, including quality responsibilities, quality and continuous improvement activities, quality education etc. and then focus on collaborations with clients, suppliers or competitors in order to develop and boost MI activities. Moreover, this paper offers empirical evidence on the effect of MI on technological innovation and marketing innovation of small and medium firms, shedding light on an area that is still unclear and limited in scope (Damanpour and Aravind, 2011; Mol and Birkinshaw 2009; Armbruster et al., 2008). Managers should concentrate on MI, as the results of this study confirm its effect on both technological and marketing innovation (Camisón and Villar-López, 2014) while it provides evidence for the argument that smaller firms are more technologically innovative.

Limitations and future research

This study has some limitations that should be taken into account when interpreting its results. First, the survey uses single informants as the source of information. Although the use of single informants remains the primary research design in most studies, multiple informants would enhance the validity of the research findings. Moreover, the sample of the responding firms is limited to Greek small and medium-sized enterprises. Empirical studies in large organizations within the manufacturing or service sector are necessary to better understand the role of size as moderator and generalize the findings further. Another limitation is that this study addressees only two drivers of MI. It is important to expand the model by taking into consideration more or different MI drivers. Finally, future research should examine in depth the effects of firm age, industry sector and environmental uncertainty on the relationships between innovation drivers, MI and innovation performance.

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Table 1. The definitions of management innovation

Study	Terminology	Definitions
Birkinshaw et al. (2008)	Management Innovation	The generation and implementation of a management practice, process, structure, or technique that is new to the state of the art and is intended to further organizational goals.
Damanpour and Aravind (2012)	Management Innovation	New approaches in knowledge for performing management functions and new processes that produce changes in the organization's strategy, structure, administrative procedures, and systems.
Mol and Birkinshaw (2009)	Management Innovation	The introduction of management practices that are new to the firm and intended to enhance firm performance.
Damanpour (1991)	Administrative innovation	Innovations in the administrative component that affect the social system of an organization.
Ravichandran (2000)	Administrative innovation	Administrative innovation embodies the adoption of administrative programs, processes, or techniques new to the adopting organization.
Armbruster et al. (2008)	Organizational innovation	Changes in the structure and processes of an organization due to implementation of new managerial and working concepts and practices, such as teamwork in production, supply chain management, or quality management systems.
Battisti and Stoneman (2010)	Organizational innovation	Innovation involving new management practices, new organization, new marketing concepts and new corporates strategies.
OECD/Eurostat (2005)	Organizational Innovation	The implementation of a new organizational method in the firm's business practices, workplace organisation or external relations.

Table 2: Relevant literature on the relationships of the constructs.

Relationships	Relevant literature
Quality orientation - MI	Kafetzopoulos and Skalkos (2019); Suárez et al. (2016); Kim et al. (2012); Matias and Coelho (2011); Perdomo-Ortiz et al. (2009); Hoang et al. (2006); Perdomo-Ortiz et al. (2006); Calvo-Mora et al. (2005); Prajogo and Sohal (2003).
Collaborations - MI	González-Benito et al. (2016); Ciliberti et al. (2016); Bassiti and Ajhoun (2013); Rampersad et al. (2010); Von Hippel (2005).
MI – Product Innovation	Haned et al. (2014); Ganter and Hecker (2013); Havlíček et al. (2013); Mothe and Nguyen-Thi (2012); Teece (2010); Lokshin et al., (2008); Armbruster et al. (2008); Lam (2005); Damanpour and Evan (1984).
MI – Process Innovation	Camisón and Villar-López (2014); Ganter and Hecker (2013); Havlíček et al. (2013); Mothe and Nguyen-Thi (2012); Teece (2010); Lokshin et al., (2008); Armbruster et al. (2008); Lam (2005); Damanpour and Evan (1984)
MI – Marketing Innovation	Kafetzopoulos and Skalkos (2019); Tavassoli and Karlsson (2016); Ajayi and Morton (2015); Battisti and Stoneman (2010); Bigliardi and Dormio (2009); Sila and Ebrahimpour (2003).

Table 3. Descriptive statistics and correlations

Factors	Mean	S.D	1	2	3	4	5	6
1. Quality orientation	5.93	0.89	-					
2. Collaborations	6.08	0.97	0.407	-				
3. Management innovation	5.49	1.24	0.617	0.391	-			
4. Product innovation	5.51	1.37	0.458	0.288	0.678	-		
5. Process innovation	5.49	1.17	0.545	0.338	0.654	0.652	-	
6. Marketing innovation	5.53	1.13	0.509	0.260	0.701	0.673	0.692	-

Remarks: S.D. = standard deviation; Correlation is significant at the 0.01 level (two-tailed)

Table 4: Latent factors, items, reliability and constructs validity

Factors	Cronbach' alpha	AVE*	CR**	(Corr)²***
Quality orientation	0.754	0.508	0.837	0.380
Collaborations	0.753	0.545	0.829	0.380
Management innovation	0.920	0.658	0.942	0.459
Product innovation	0.904	0.582	0.928	0.478
Process innovation	0.893	0.618	0.929	0.478
Marketing innovation	0.872	0.653	0.942	0.491

*: AVE = $\Sigma\lambda_i^2$ / n, (number of items i = 1…..n, λi = standardized factor loading);
**: CR = $(\Sigma\lambda_i)^2 / [(\Sigma\lambda_i)^2 + (\Sigma\delta_i)]$, (number of items i = 1….n, λi = standardized factor loading, δ_i = error term);
***: the highest squared correlation between the factor of interest and the remaining factors.

Table 5. The fit indices of the sub-models and the overall measurement and structural model

Fit indices	*Measurement Model (CFA)*	*Structural Model*	*Small firms*	*SME*	*Levels of acceptance**
Chi-square (χ^2)	886.503	901.59	720.47	633.77	-
Chi-square/ degrees of freedom (χ^2/df)	2.926	2.899	2.317	2.038	<3.0
Root Mean Square Residual (RMR)	0.073	0.074	0.076	0.078	<0.08
Root Mean Square of Approx. (RMSEA)	0.067	0.067	0.068	0.076	<0.08
Incremental Fit Index (IFI)	0.928	0.928	0.923	0.921	>0.90
Tucker-Lewis coefficient (TLI)	0.917	0.918	0.913	0.904	>0.90
Comparative Fit Index (CFI)	0.928	0.927	0.923	0.920	>0.90
Parsimonious Normed Fit Index (PNFI)	0.773	0.792	0.773	0.724	>0.50

* Hair *et al*. (2006)

Table 6. Structural parameters

Relationships	Standardized regression weights		
	Total sample n=429	Small firms n=278	Medium sized firms n=151
H1: Quality orientation → MI	0.555*	0.433*	0.781*
H2: Collaborations → MI	0.214*	0.301*	0.060**
H3: MI → Product innovation	0.683*	0.713*	0.607*
H4: MI → Process innovation	0.821*	0.859*	0.723*
H5: MI → Marketing innovation	0.789*	0.783*	0.778*

Notes: n = sample size. *p<0.001; **n.s,; *** p<0.05.

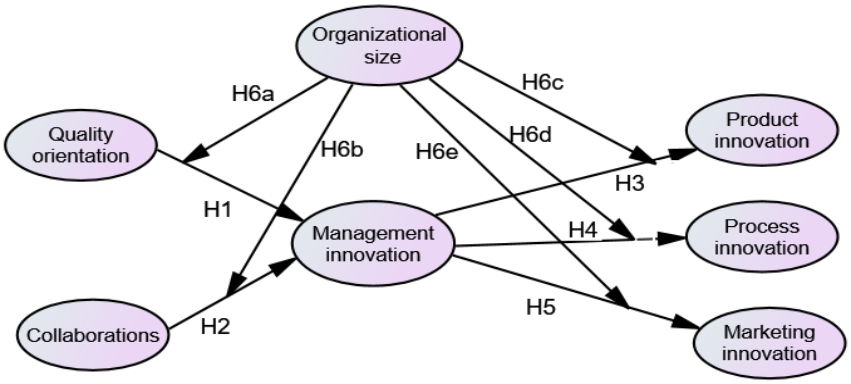

Figure 1: The conceptual model

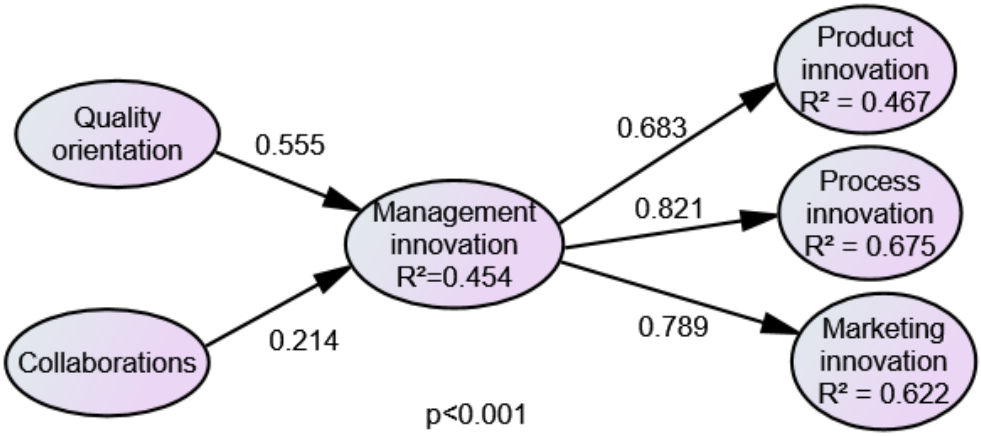

Figure 2: Structural equation modeling results

Appendix. Indicators and latent factors of the questionnaire

Latent factors/indicators
Collaborations
The firm develops strong relationships with our suppliers.
The firm develops strong relationships with our customers.
The firm collaborates closely with other firms or competitors
Quality orientation
All employees work as a team to continuously improve new design, existing products and services.
We dedicate a lot of money and time to education for quality.
Organizations should be proactive in anticipating their customers' needs.
Quality is everyone's responsibility in the organization.
Management innovation
My firm uses databases of best practices, lessons and other knowledge.
My firm implements practices for employee development and better worker retention.
My firm has a high capacity for developing and gaining access to new technologies.
My firm is highly capable of identifying external opportunities and threats.
My firm has good coordination and cooperation of R and D, sales, marketing and manufacturing departments.
Product Innovation
My firm is able to replace obsolete products.
My firm is able to extend the range of products.
My firm introduces new and innovative products into the market.
My firm has the capability to use new materials, new product function and improve product design.
My firm has the capability to bring in new knowledge or technologies to develop new products.
My firm enhances the manufacturing technology of new products.
Process innovation
My firm is more innovative than our rivals in process technology and in developing new production processes.
My firm has valuable knowledge for innovating manufacturing and technological processes.
My firm has valuable knowledge on the best processes and systems for work organization.
My firm is able to integrate production management activities.
My firm has the capability to adjust the processes at all levels concerning the production process, inventory, distribution, logistics, etc.
Marketing innovation
My firm introduces new and successful techniques approaching the market
My firm introduces new and effective product promoting techniques
My firm introduces new product distribution techniques
My firm has good knowledge of different market segments