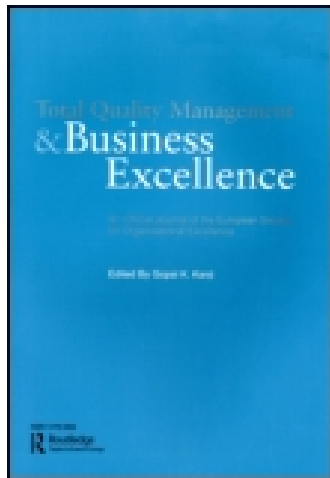


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## Organisational performance and innovation in the context of a total quality management philosophy: an empirical investigation

Mário Gomes Augusto<sup>a</sup>, João Veríssimo Lisboa<sup>a\*</sup> and Mahmoud M. Yasin<sup>b</sup>

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The literature emphasises the need to integrate innovation initiatives under the umbrella of the total quality management (TQM) philosophy. Such integration is instrumental towards achieving and sustaining a superior organisational performance. Using a sample of 229 Portuguese manufacturing organisations, factor and regression analyses procedures were used to assess the impact on organisational performance of innovation for small and large organisations in the Portuguese TQM business context. The results of this study point to the significance of the size of the organisation, and product and process innovations for organisational performance. Organisational innovation was not found to have a significant impact on organisational performance. These results might be attributed to specific ownership, which is associated with process and product innovation. Based on the results of this study, it is concluded that small organisations might want to consider directing their innovation investments towards management aspects such as processes and products. In this context, top-down organisational innovation might take more time and effort.

**Keywords:** TQM; organisational performance; organisational innovation; product innovation; process innovation; organisational size

### 1. Introduction

In recent times, organisations have utilised different management quality tools to improve both processes and financial performance in order to face competitive challenges and respond to an ever-changing competitive environment. In this context, consistent with the total quality management (TQM) philosophy, innovation is one of these tools that could be applied to any organisation, regardless of size. As such, TQM promotes innovation throughout the entire organisation. This effort should include innovation related to organisational processes, systems, procedures, products development, and customer service, among others (Dervitsiotis, 2012). Also, it is well-accepted that different levels of strategic planning should support the management of innovation. This is especially true in countries which are increasingly facing a strong competitiveness in the global market, like Portugal (Matias & Coelho, 2011).

In pursuit of the competitive advantage, organisations, regardless of size, are attempting to adopt innovation as part of an organisational TQM philosophy. Kim, Kumar, and Kumar (2012) reported that practices of TQM are directly related to the types of innovation described above. As such, organisational innovation is becoming very popular in both literature and practice. However, some organisations are viewing organisational innovation as a me-too philosophy. In order for organisational innovation to be effective, it

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must be an integration of well-designed and carefully implemented specific innovations. In this context, organisational innovation should not be approached randomly, rather it should be used systematically. In the process, it must incorporate different parts, processes, products and services of the organisation according to a TQM philosophy.

When examining organisational innovation, the specific elements of such innovation must be examined. For example, product innovation, and process innovation must be examined. These two types of specific innovation are integral parts of the overall systematic organisational innovation. This approach must be used when studying the impact of innovation on organisational innovation. The adoption of innovative attitudes is also dependent on a comprehensive examination of risk and rewards evaluation by the decision-makers. When perceived innovation outcome is high, individuals tend to focus on the innovation rewards and give less emphasis on the associated risks (Wells, Campbell, Valacich, & Featherman, 2010). Innovative attitudes are also dependent on the top management team diversity, which influences a given strategic choice in order to facilitate a clear innovation focus aimed at sustaining competitiveness (Talke, Salomo, & Rost, 2010).

Motivated by the importance of understanding the effects of different facets of innovation (i.e. organisational, process, and product, among others) on organisational performance, this research attempts to investigate these dynamic relationships in the context of TQM. The Conceptual Framework depicted in Figure 1 is used to provide a context for the study. The framework might be used by other researchers in other business culture TQM settings in order to understand the dynamic relationships which link innovation to performance. Using a sample of 229 Portuguese manufacturing organisations and a well-established tested research methodology, the objective of this research is to study the relationships between the different facets (process, product, and organisational) of innovation, organisation size, and organisational performance. For this purpose, factor and regression analyses procedures are used. The findings of this study are presented and discussed and their implications are highlighted.

This preliminary investigation focuses on the four basic research questions below:

1. Is organisational innovation associated with higher organisational performance?
2. Is product innovation associated with higher organisational performance?

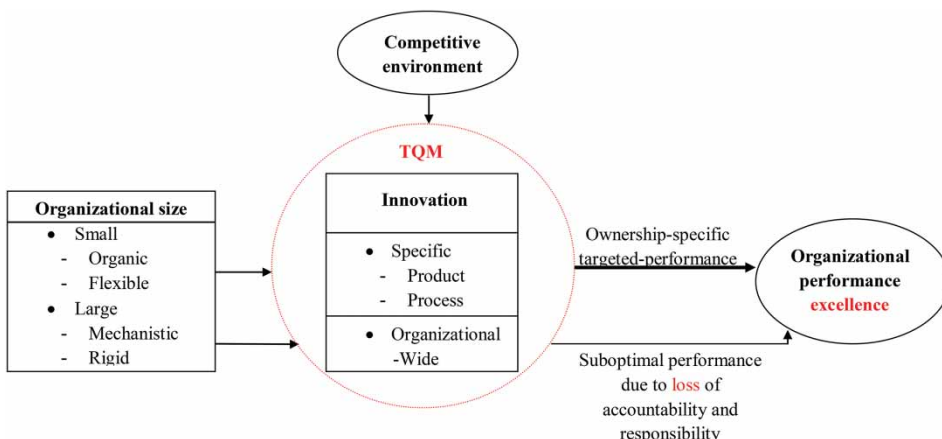


Figure 1. Impact of innovation and firm's size on organisational performance in the context of TQM.

3. Is process innovation associated with higher organisational performance?
4. Is organisational size (small vs. large) associated with higher organisational performance?

This research has both theoretical and practical contributions. At the theoretical front, it builds on and integrates the existing fields of innovation and performance in a TQM philosophy context. At the practical front, it helps executives in understanding the role of specific components of innovations on organisational performance. At a time when resources are very scarce in many organisations, it is rather important to invest in innovation, which yields the best performance results.

## 2. Background

Innovation capabilities have been widely discussed as more organisations are beginning to make innovation part of their strategic planning efforts. The degree of innovation in a given organisation reflects the capacity of its managers to incorporate value-added ideas which impact the organisation, its production and quality capabilities. It is not sufficient simply to have innovative ideas concerning process, product or the organisation. Rather, the outcome of innovation must be reflected in the performance of the organisation to justify the innovation expenditure in terms of the competitiveness of the organisation. The incorporation of such innovations must be verified continuously to assess the cost and benefits of such procedures in the context of the implementation of TQM (Pires, Cociorva, Saraiva, Novas, & Rosa, 2013). This assessment ensures the consistency between the innovation efforts and investments with that of the broader TQM philosophy and practices.

The willingness and ability of business leaders to integrate innovative procedures into well-implemented strategic orientations should contribute to the fostering of effective organisational productivity which in turn, should lead to higher organisational performance (Jansen, Curseu, Vermeulen, Geurts, & Gibcus, 2011). However, the literature is not unanimous with regard to the relationship between innovation and performance. The studies carried out by Ferreira (2010), Forsman and Annala (2011), and Kostopoulos, Papalexandros, Papachroni, and Ioannou (2011) suggested that organisations with higher levels of innovation show better financial performance. Valmohammadi (2012) investigated the innovation management practices in Iranian organisations. Customer centricity, organisational structure, bureaucracy, and excessive administrative regulations were identified as the main barriers to innovation. The study concluded that both appropriate innovation inputs and effective innovation processes are related to business performance. Tung (2012) stressed the importance of both continuous product innovation and innovation leadership to assure competitiveness, customer loyalty, and organisation survival. The study also concluded that product innovation was directly related to an organisation's performance. Dadfar, Dahlgaard, Brege, and Alamirhoor (2013) examined the relationship between organisational innovation capability and performance in pharmaceutical small and medium enterprises in Iran. He concluded that a positive relationship between innovation capabilities and performance existed. He attributed this relationship to the effective innovation management and commitment all across the organisation.

Another approach to innovation is advocated by Forsman and Temel (2011). These authors concluded that during periods of recession, non-innovative organisations and high-diversity, developed-innovation organisations are less vulnerable to economical

crises. Therefore, managers should consider the time period and nature of innovation necessary to compensate for innovative expenditure.

More recently, in a study developed by Aboelmaged (2014) using a sample of 400 Arabic manufacturing and service industries, it was found that high levels of administrative innovation contribute to increase the level of production quality and the overall performance of the studied organisations.

The importance of innovation in small- and medium-sized enterprises (SMEs) firms was emphasised by Laforet (2011) using interviews with entrepreneurs from across industries. This concluded that positive outcomes of four types of innovation (product, process, organisational innovation, and new ways of working) cause an enhancement of SMEs' reputation, image, an increase in operational efficiency and cost benefits, thus resulting in a better financial performance, recruitment of a more skilled workforce, and a higher in-house expertise, leading to further innovation. In the same line of research, Gunday, Ulusoy, Kilic, and Alpakan (2011) explored the effects of the product, process, marketing, and organisational innovation on the organisational performance using a sample of 184 Turkey manufacturing firms. They concluded that the innovations have positive effects on firm performance in manufacturing industries. Also, Comacchio, Scapolan, and Bonesso (2007) investigated the types of innovation adopted by firms in a sample of 147 Italian micro/small enterprises (MSEs) and analysed the relationship between the adoption of different approaches to innovation and sales, as a measure of a firm's performance. According to Bughin and Jacques (1994), small firms tended to have an advantage with regard to the management of their innovation, confirming Rothwell's (1986) findings. However, Aspara, Hietanen, and Tikkanen (2010) analysed the differences in average profitable growth across firms that differ in size and in their innovative strategic orientations. These authors reported that firms that emphasise innovation have higher profits than firms that did not. Large firms with a high emphasis on business model innovation, but low level of emphasis on replication tended to have a weaker profitable growth than large firms with low emphases on both business model innovation and replication. Small firms that underscored the importance of the innovation business model but not replication had a stronger profitable growth than small firms with low emphasis on both the innovative business model and replication.

While the number of studies related to the impact of innovation on the small- and large-sized organisation's performance is relatively small, there is abundant literature that simply analyses the relationship between financial performance and a firm's size. In this category of studies, however, the findings are not conclusive. In a study conducted by Rei and Lisboa (1993) covering a sample of 350 Portuguese firms, in the period 1989–1990, firm size was not a relevant factor when evaluating firm performance concerning either profitability or sales growth. More recently a similar study conducted by Serrasqueiro and Nunes (2008), using a set of 51 Portuguese SMEs, concluded that there was a positive relationship between size and performance. Based on their results, these authors argued that economies of scale are an important factor in determining organisational performance. However, in this same study of large organisations a statistical significance between size and performance was not found.

Many other authors have studied this relationship with contradictory findings. For instance, while Weber and Jenny (1974) and Whittington (1980) found a negative relation between profitability and firm size, Salamon (1985) and Schmalensee (1989) found a positive one. More recently several authors have addressed this problem. Ozgulbas, Koyuncuoglu, and Yilmaz (2006), in a study covering 697 small- and medium-sized Turkish firms,

reported that firm size affects financial performance. Medium-sized organisations tended to have a better financial performance than either micro or smaller enterprises. Kim and Kim (2009) examined the effects of firm size on performance for Korean SMEs. They found that small- and medium-sized organisations have lower performance when compared with large firms both in terms of productivity and profits per worker. Using a survey of about 7000 US publicly held firms during the period 1987–2006, Lee (2009) found a positive non-linear correlation between profit rates and firm size, within a specific industry. Table 1 summarises the results found in the literature.

The brief literature cited above tends to confirm that there have been many studies that attempted to relate innovation to performance. In addition, some of these studies took firm size into consideration. However, fewer studies tended to integrate the elements of innovation with size and performance. The current study attempts to assess the impact on organisational performance of the different facets of innovation, for small and large organisations.

Table 1. Synthesis of the literature.

Innovation and performance	
Authors	Findings
Dadfar et al. (2013)	Positive relationship between innovation capabilities and organisational performance
Valmohammadi (2012)	Appropriate innovation inputs and effective innovation processes are related to business performance
Tung (2012)	Product innovation directly related to organisational performance
Valmohammadi (2012)	Effective innovation process are related to business performance
Ferreira (2010)	
Aboelmaged (2014)	High levels of administrative innovation increase the level of overall performance
Jansen et al. (2011)	Innovative procedures integrated into the strategic orientations, contribute to innovative organisational performance
Forsman and Annala (2011)	Organisations with higher level of innovation show better financial performance
Kostopoulos et al. (2011)	
Gunday et al. (2011)	Innovation have a positive effect on firm performance in manufacturing industries
Comacchio et al. (2007)	Using a sample of micro/small firms, analysed the relation between different approaches to innovation and sales revenue
<i>Size, innovation, and performance</i>	
Aspara et al. (2010)	Average profitable growth are related with innovative strategic orientations and firm size
Rothwell (1986)	
Lee (2009)	Positive non-linear relation between profit rates and firm's size
Kim and Kim (2009)	Small- and medium-sized organisations have a lower performance than large firms
Serrasqueiro and Nunes (2008)	Positive relationship between size and performance, but no significant difference were found
Ozgulbas et al. (2006)	Firm's size affects financial performance
Bughin and Jacques (1994)	Small firms have advantage in the management of innovation
Rei and Lisboa (1993)	Firm's size was not relevant when evaluating firm's performance
Salamon (1985)	Negative relationship between profitability and firm's size
Schmalensee (1989)	
Whittington (1980)	
Weber and Jenny (1974)	

### **3. Research methodology**

#### **3.1. Data collection and sample**

##### *3.1.1 Stage 1*

To collect the data needed for this study, a research instrument adapted from the survey conducted by Camisón and López (2010) in a Spanish context was used. Before e-mailing the survey to the Portuguese senior-level managers, the survey was sent to a panel of nine Portuguese experts in order to establish the face validity of the proposed scales. The results provide by these panel of experts do not differ substantially from the descriptive statistics obtained from the survey. Also, since a considerable number of authors have identified different types of innovation (Francis & Bessant, 2005; Oke, Burke, & Myers, 2007), it was relevant to evaluate the items used by Camisón and López (2010) in order to rate the relative importance of each item in the measurement of product, process and organisational innovation. Table 2 provides the mean and standard deviation of each item, showing that all the items used in the scales are important to measure innovation and therefore should be used to identify the different types of innovation.

##### *3.1.2. Stage 2*

Using a modified version of a research instrument proposed by Camisón and López (2010) to collect the data, some basic demographic data were obtained. The categories of such data included the number of workers, percentage of sales of the organisation abroad, and the standard industrial classification code. In addition to the demographic data, the research instrument was designed to gather information regarding product innovation, process innovation, organisational innovation, and organisational performance. This instrument was pre-tested using a sample of five general manger/chief executive officers of Portuguese manufacturing firms to assess its practical relevance and face validity. The obtained feedback was used to make some modifications to the instrument to improve its practical relevance to Portuguese firms. The research instrument utilised a seven-point Likert scale.

The final instrument and a cover letter addressing the nature of the study encouraging participation and ensuring confidentiality were e-mailed to Portuguese manufacturing organisations included in the database supplied by Compagnie Française d'Assurance pour le Commerce Extérieur (COFACE). This database included contact information of 2120 Portuguese manufacturing firms. Of the 2120 surveys that were e-mailed to the senior-level managers, 256 questionnaires were received. Twenty-seven surveys were returned as incomplete and therefore were not included in the study. After deletion of incomplete questionnaires, 229 usable responses were obtained. This resulted in a response rate of about 12%.

#### **3.2. Research model**

In the first phase of the data analysis, factor analysis was used to extract the underlying dimensions (factors), representing the types of innovation followed by the studied organisations.

The second phase of the data analysis was focused on investigating the existence of a relationship between organisational performance, and organisational process and product innovation, as well as the corresponding interaction effects among these variables. The

Table 2. Experts' opinions.

Indicator	Mean (Product innovation)	Mean (Process innovation)	Mean (Organi. innovation)	SD (Product innovation)	SD (Process innovation)	SD (Organi. innovation)
My firm is able to replace obsolete products	5.11	4.50	4.75	1.45	1.07	0.71
My firm is able to extend the range of products	5.25	4.86	4.89	1.28	1.21	1.45
My firm is able to reduce the time to develop a new product until it is launched to the market	5.44	5.25	5.75	1.24	0.46	0.46
My firm is able to create and manage a portfolio of interrelated technologies	4.75	5.11	5.00	1.04	0.60	1.20
My firm is able to master and absorb the basic and key technologies of business	4.50	5.00	5.50	1.77	1.12	1.07
My firm continually develops programmes to reduce production costs	4.50	4.89	4.38	1.07	1.36	1.19
My firm has valuable knowledge for innovating manufacturing and technological process	4.88	5.33	5.25	0.83	1.00	1.28
My firm has valuable knowledge on the best process and systems for work organisation	5.00	5.67	5.00	1.07	0.87	1.31
My firm organises its production efficiently	3.86	4.50	4.43	0.90	1.31	1.62
My firm assigns resources to the production department efficiently	4.25	5.33	5.38	1.98	1.73	1.60
My firm is able to offer environmental friendly products	4.33	4.22	4.22	1.73	1.79	1.56
Use of databases of best practices, lessons, and other knowledge to improve the production process	4.38	4.70	4.63	1.06	1.25	0.92

(Continued)

Table 2. Continued.

Indicator	Mean (Product innovation)	Mean (Process innovation)	Mean (Organi. innovation)	SD (Product innovation)	SD (Process innovation)	SD (Organi. innovation)
Implementation of practices for employee development and improving worker retention	3.88	4.75	5.00	1.46	1.58	1.50
Use of the quality-management systems	4.88	5.11	4.88	1.55	1.27	0.83
Decentralisation in decision-making	3.50	4.50	4.78	1.31	1.07	1.64
Use of inter-functional working groups	3.75	3.88	5.00	1.49	1.25	1.41
Flexible job responsibilities	3.13	4.00	3.89	1.46	1.69	1.46
Collaboration with customers	4.88	4.75	5.44	1.55	1.83	1.51
Use of methods of integration with suppliers/ outsourcing	3.25	4.00	4.63	0.89	1.31	1.30

variable size was also included in the model to analyse the size effects, as empirical-based research exploring the impact of different facets of innovation SMEs remains relatively scarce (Soni, Lilien, & Wilson, 1993; Aspara et al., 2010; Laforet, 2011; Wynarczyk, Piperopoulos, & McAdman, 2014). The model was also designed to consider the interaction effects among the variables. The final multiple regression model to be tested is as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_1 X_2 + \beta_6 X_1 X_3 + \beta_7 X_1 X_4 + \beta_8 X_2 X_4 + \beta_9 X_3 X_4 + \beta_{10} X_1 X_2 X_3 + \varepsilon, \quad (1)$$

where  $Y$  is the organisational performance,  $X_1$  is the organisational innovation,  $X_2$  is the process innovation,  $X_3$  is the product innovation, and  $X_4$  is the a dummy variable size given as below

$$X_4 = \begin{cases} 1 & \text{large(workers} > 50), \\ 0 & \text{small(workers} \leq 50). \end{cases}$$

$\varepsilon$  is the random error normal distributes with expected value equal to zero and constant variance.

It is to be noted that the cut off number of 50 employees is consistent with both the practice in Portugal and with the SMEs classification (public law n° 372/2007).

From the above literature the authors could conclude that the relationship between firm's performance, innovation and size remains relatively unclear. Therefore, it seems to be relevant to test the following hypotheses:

*H1*: Organisational performance is related to innovation. This hypothesis is represented by the sub hypotheses below:

*H1a*: Organisational performance is related to organisational innovation.

*H1b*: Organisational performance is related to process innovation.

*H1c*: Organisational performance is related to product innovation.

*H2*: Organisational performance is related to firm's size.

The above two main hypotheses are consistent with the literature reviewed and the research questions posed earlier.

## 4. Results

### 4.1. Factor analysis results

The measures for organisational, product, and process innovation were extracted from the factor analysis, using the 229 usable responses. The Kaiser–Meyer–Olkin test was done, and sample adequacy for all variables was analysed. An overall value of 0.91 was obtained for the sample adequacy test. This value reached the value considered acceptable in the literature for this type of analysis (Hair, Anderson, Tatham, & Black, 1998). Then, the principal component method with varimax rotation was used to extract relevant factors. Based on this analysis, three factors were identified with eigenvalues greater than one. These three factors explained 64.62% of the total variance. All factors loading greater than or equal to 0.5 are reported. The Cronbach's alpha for each factor is greater than 0.7, indicating internal consistency. Although a formal typology for the different types of innovation could not be identified from the panel of the nine Portuguese experts, the

output provided by the factor analysis clearly identifies the variables associated with organisational, product, and process innovation (Table 3).

Factor 1 has nine innovative items clearly identified with organisational innovation. This was consistent with the scale used by Camisón and López (2010). This factor includes variables related to organisational innovation in business practices, innovation in workplace and organisational external relations innovation. Factor 2 has eight items associated with process innovation. Basically, the variables included in this factor show a concern with the utilisation and domain of new manufacturing techniques, the continuous search for process efficiency and the utilisation of friendly environmental technologies. The variables included in this factor are also consistent with the scale used by Camisón and López (2010). Factor 3 consisted of three variables which included the firm's ability to replace obsolete products and to extend their range, and its ability to reduce the time between

Table 3. Factor analysis results.

Variables	Factors		
	F1	F2	F3
<i>Factor 1: Organisational innovation</i>			
Use of databases of best practices, lessons, and other knowledge to improve the production process	0.574		
Implementation of practices for employee development and improving worker retention	0.646		
Use of the quality-management systems	0.764		
Decentralisation in decision making	0.768		
Use of inter-functional working groups	0.823		
Flexible job responsibilities	0.774		
Collaboration with customers	0.698		
Use of methods of integration with suppliers	0.779		
Outsourcing of business activities	0.761		
<i>Factor 2: Process innovation</i>			
My firm is able to create and manage a portfolio of interrelated technologies		0.621	
My firm is able to master and absorb the basic and key technologies of business		0.743	
My firm continually develops programmes to reduce production costs		0.625	
My firm has valuable knowledge for innovating manufacturing and technological process		0.735	
My firm has valuable knowledge on the best process and systems for work organisation		0.821	
My firm organises its production efficiently		0.788	
My firm assigns resources to the production department efficiently		0.767	
My firm is able to offer environmental friendly products		0.615	
<i>Factor 3: Product innovation</i>			
My firm is able to replace obsolete products			0.752
My firm is able to extend the range of products			0.773
My firm is able to reduce the time to develop a new product until it is launched to the market			0.587
<i>Eigenvalues</i>	9.634	1.997	1.292
<i>Cronbach's alpha</i>	0.919	0.902	0.738
<i>Variance explained</i>	27.784	25.397	11.440
<i>Cumulative variance explained</i>	27.784	53.181	64.621

product development and its market accessibility. This factor is clearly associated with product innovation.

The variables used in our survey to measure organisational performance take the form of a subjective evaluation (managerial perceptions of the performance of their firms), related to economic performance, market share growth, labor productivity and customer satisfaction (Table 4). This method has been used by Lin and Germain (2003), Nahm, Vonderembse, and Koufteros (2003), Camisón and López (2010), among others. Factor analysis related to the organisational performance was also used to reduce the original variables. Only one factor was extracted, explaining 62.47% of the total variance. All the variables were included in this factor. The factor loadings were all greater than 0.5. The Cronbach alpha was equal to 0.88, indicating the internal consistency of the factor. Therefore, these results and the methodology reporting in this research appear to be consistent with the literature.

## 5. Regression results

With reference to the proposed regression model earlier (see Equation (1)), Table 5 shows that organisational innovation was not significant in explaining the variation in organisational performance. However, the results also reveal that size, production innovation, and process innovation were significant ( $\alpha = 0.05$ ) in explaining organisational performance. It seems that keeping the innovation elements constant, the firms' performance is inversely proportional to firm's size. Medium and small firms seemed to be more engaged in knowledge management practices. Perhaps, this points to the flexibility of smaller-sized firms (Aldrich & Auster, 1986). This result is also supported by Soni et al. (1993), who stated that 'smaller firms are more innovative than larger firms' (p. 365). Indeed, size has a key influence on the capacity to absorb innovation procedures for smaller firms. It appears to facilitate more knowledge management practices, and in the process promotes more related innovations.

In the analysis of the interaction effect, the interactions (process innovation product and innovation) were not included in the model because they were highly correlated (0.83) with the interaction effects (organisational innovation  $\times$  product innovation), which could cause serious problems of multicollinearity and as consequence inflated regression coefficients variances. The interactions between size and the subsets (organisational innovation  $\times$  product innovation, organisational innovation  $\times$  process innovation, and organisational innovation  $\times$  product innovation  $\times$  process innovation) were not included in the model because, besides not being significant, they also could cause

Table 4. Factor analysis for organisational performance.

Variables	Loadings
<i>Factor 1: Organisational performance</i>	
Market share growth	0.744
Labor productivity	0.783
Customers' satisfaction	0.744
Customers' retention	0.709
Mean economic profitability	0.887
Mean sales profitability	0.859
<i>Cronbach alpha</i>	<i>0.877</i>
<i>Variance explained</i>	<i>62.466</i>

Table 5. The regression model.

	Unstandardised coefficient	SD	<i>t</i> -Value
Constant	.149	.105	1.42
Organisational innovation	.118	.115	1.03
Process innovation	.265	.129	2.05*
Product innovation	.504	.142	3.54*
Size	-.269	.137	1.96*
Organ. innov. × Proc. innov.	-.165	.073	2.27*
Organ. innov. × Prod. innov.	.170	.086	1.98*
Organ. innov. × size	.140	.195	0.72
Proc. innov. × size	-.037	.198	0.19
Prod. innov. × size	-.140	.185	0.76
Organ. innov. × Proc. innov. × Prod. innov.	-.059	.044	1.36
<i>F</i> $\alpha$ = 9.34; <i>p</i> < 0.00			
<i>R</i> <sup>2</sup> $\alpha$ = 41.1%			

\*Significant for a  $\alpha = 0.05$ .

multicollinearity problems and an increase in the complexity of the model without any gains in terms of  $R^2$ .

The analysis of the interaction effects between the different types of innovation shows that there is a negative and significant coefficient related to the interaction between organisational innovation and process innovation, which might show the subsidiary between these two dimensions. These results suggest that there is a substitution effect between organisational and process innovation. However, the interaction effect between organisational innovation and product innovation shows a positive significant coefficient, indicating that firms with a high organisational innovation commitment tend to reinforce product innovation. Finally, the results show that the interaction between size and the different types of innovation are not significant. It seems that size does not act as a moderator effect between the different types of innovation and organisational performance.

## 6. Conclusions and implications

Using a sample of 229 Portuguese manufacturing organisations, this research utilises factor and regression analyses procedures to provide insights into the relationships between organisational performance and the different facets of innovation (product, process, and organisational innovation). This paper is different from the existing research both in terms of the model used, and the research approach utilised. It incorporates the relationships between performance, types of innovation, and organisation's size, in addition to the correspondent interaction effects, based on a grounded and solid mathematical procedures. Based on the results of this study, the following conclusions and their implications are in order.

First, the smaller-sized organisations appear to achieve higher organisational performance due to their innovation efforts when compared to their larger counterparts. Perhaps, the organic, flexible structure, and the informal cultures of smaller organisations might encourage different facets of innovation. The sharing of firm's values between managers and employees tends to enhance organisational commitment and willingness of the members of the organisation to create innovative value-added for the customers (Edvardsson & Enquist, 2011). Therefore, executives of larger organisations should foster structural and

cultural changes in order to foster an organisational culture conducive to effective innovation.

Second, specific innovation such as product and process appears more significant on promoting organisational performance than organisational-wide innovation. Perhaps, a bottom-up approach which emphasises certain products and process is more useful in the short-term than a top-down approach focusing on organisation-wide innovation. A top-down approach is needed to champion any innovation effort. In this context, top management support is a must towards the initiation of innovation efforts. However, a top-down approach to the implementation of an organisational-wide innovation might be costly, and perhaps should be long-term oriented. In fact, organisational structure, bureaucracy, and excessive administrative regulations were identified by Valmohammadi (2012) as barriers to innovation, which might overwhelm the attempts towards organisational-wide innovation. In the process, this might lead to ineffective deployment of innovation, which in turn results in sub performance results. Also, accountability and responsibility, and the sense of ownership might be lost when innovation is approached from an organisational-wide perspective.

The interaction effects analysis enhances the importance of the organisational innovation fundamental role towards improving both process and product innovation, and consequently its effect on enhancing the organisational performance. These results also underline the importance of a top-down approach to the implementation of an innovation policy within the organisation.

Finally, while innovation is essential for organisations in order to remain competitive, it must be approached systematically and should be targeted at specific parts, products, and processes of the organisation. Once the specific innovations are proved effective, they should be integrated and incorporated through the entire organisation within the context of a well-established TQM philosophy. This approach allows for lessons to be learned, while going through the innovation learning curve.

The preliminary research presented in this study attempted to answer four basic research questions. In the process, two main research hypotheses were examined in order to integrate some existing parts of the literature. Future research should examine in more detail the dynamic and practical interactions between organisational performance and the multifaceted dimensions of innovation. Such research effort might benefit from the proposed relationships suggested based on the findings of this study, and the conceptual framework in Figure 1. Such future research is needed in order to understand the theoretical relationships between innovation and performance and their short-term and long-term practical implications.

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