The relationship between EFQM enablers and business performance: the mediating role of innovation

Abstract

Purpose – The purpose of this paper is to examine the extent to which the five EFQM model enablers, as the latent factor "*enabler excellence"*, are associated with business performance, taking into consideration the mediating role of innovation in this relationship.

Design/methodology/approach – The analysis followed in order to investigate the relations among the various constructs of the proposed model, includes an initial exploratory factor analysis (EFA), followed by confirmatory factor analysis (CFA) and finally structural equation modelling (SEM)

Findings – According to the study findings, "*enabler excellence"* and innovation performance directly contribute to business performance. Moreover, this paper concludes that innovation performance partially mediates the effect of excellence enablers on business performance.

Research limitations/implications – This study does not separate between radical and incremental innovation, thus, it would be very interesting to explore this issue in future research. Moreover, it might be useful for researchers to reassess the proposed relationships examining the mediating role of organizational culture.

Practical implications – Our study offers clear implications for managers, proving that they should give higher emphasis on QM and the four dimensions of innovation in order to achieve increased performance.

Originality/value – Based on the multi-dimensional structure of the EFQM model, this empirical study determines the contribution of QM to business performance taking into consideration the role of innovation performance as a mediator in this relationship.

Keywords: EFQM model enablers, innovation performance, business performance

Paper type: Research paper

1. Introduction

The direct relationship between Quality Management (QM) and business performance has been widely investigated in literature (Suárez et al., 2017). Some researchers find positive results (Shenaway et al., 2007; Hendricks and Singhal, 2001), while others fail to find any significant relationships (Westphal et al., 1996; Powell, 1995). One reason for the conflicting results might be negligence of specific quality practices and relationships in the QM models (Zeng et al., 2017). QM practices are all present in the frameworks used for the national quality awards, such as the European Foundation for Quality Management (EFQM) Excellence Model, which is used as a guide to Total Quality Management (TQM) implementation by a large number of organizations (Bou-Llusar et al., 2009). Conflicting evidence exists if QM in general and in particular the EFQM enablers, as a single factor, have a more positive and significant influence on business performance (Gadenne and Sharma, 2009). Moreover, many authors highlight the need for a deeper investigation regarding the effect of various mediating variables on the above relationship, creating further bridges between organizational theory and QM theory (Sila, 2007; Sousa and Voss, 2002). One such very important mediating variable may be innovation performance, which is doing things differently in relation to quality that is doing things better (McAdam et al., 1998).

While firms make effective use of quality practices across various functional areas to improve operations practices, they may need to possess a higher level of innovation performance to ensure effective outcomes of such integration (Aboelmaged, 2014). Many authors point out that garnering the impact of TQM on business performance is closely tied to the firm's innovation performance (Bernardo, 2014; Santos-Vijande and Alcarez-Gonzalez, 2007; Bossink, 2002). These kinds of relationships have rarely been examined in one single study and have important implications for academics and managers in today's dynamic and competitive environment. Previous contributions have shown the lack of consensus over the potential effects of QM on innovation and business performance (Escrig-Tena et al., 2018; Raja and Wei, 2014; Santos-Vijande and Álvarez-González, 2007). The idea is that firms' performance is embedded on their innovation capability and can be strengthened through effective implementation of EFQM enablers. Although both the implementation of EFQM enablers and the promotion of innovation individually promote business performance, it is interesting to further investigate how EFQM enablers and innovation performance, as two single latent factors, jointly affect business performance, and whether a mediating relationship exists. In this sense, more practical research is needed in order to provide a clear answer

(Zeng et al., 2015). Taking into consideration the above view, this paper attempts to fill the above research gap, investigating the related relationships in a sample of Greek firms. The main objective of this study is to determine how the five EFQM model enablers, as a single latent factor, effect on business performance, taking into consideration the mediating role of innovation in this relationship. The contribution of this paper is to provide insights into how advanced QM, implemented through the EFQM model's enablers, leads to advanced business performance through the enhancement of innovation performance. Even more, this study aims to show that the relationship between QM and business performance increases significantly as innovation performance, described through the main four types of innovation, increases. Thus, this study extends current knowledge on QM in four ways. First, it allows to empirically investigate the relationship between the EFQM model enablers as a single latent factor and its effect on business performance (market, financial and non – financial performance). Second, it provides theoretical justification and empirical evidence of the mediating role of innovation in the relationship between EFQM model enablers and business performance, considering a wider perspective of innovation dimensions (product, process, organisational and marketing innovation) as these are described in literature (Tavassoli and Karlsson, 2015; Kafetzopoulos and Psomas, 2015; Avermaete et al., 2003). Third it reveals the relationship between QM - through the five EFQM model enablers - and innovation performance. Despite the fact that the aim of the EFQM model is to support organisations to achieve business excellence, the extent to which it can also promote innovation is not still clear (Gómez et al., 2015), since the related studies are scarce, partial, and limited to only a few empirical studies (Santos-Vijande and Álvarez-González, 2007). For this reason, Kafetzopoulos et al. (2015), Kim et al. (2012) and Martinez-Costa and Martínez-Lorente (2008) suggest that various types of innovation need to be tested to correctly understand the real value of QM on innovation. Fourth, this paper reveals how influential innovation performance can be on business performance.

The rest of the paper is organized as follows. In the next section, a review of previous literature is presented, followed by the research hypotheses and the related research model. Section 3 describes the methodology used in this study, including data collection, measurement scales, measurement analysis, and hypothesis testing. Section 4 presents the results of the empirical study. Finally, the paper concludes with a discussion of the main findings, conclusions and implications from this study, providing suggestions for future research.

2. Literature review and research hypotheses

2.1 The EFQM excellence model enablers

The EFQM model can be considered as a holistic and integrative approach, in which strategic, managerial and operational control processes are implemented (Dahlgaard-Park et al., 2001). It presents a nonprescriptive framework that analyses the relationships between what an organisation does and the results that it achieves, assuming that there are different approaches to reaching excellence (Suárez et al., 2017). It comprises nine elements grouped under five "*Enablers*" criteria (Leadership, People, Policy & Strategy, Partnerships & Resources and Processes, Products & Services) and four "*Results*" criteria (Customer Results, People Results, Society Results, and Key Results). "Results" are caused by "Enablers". The "Enablers" criteria cover what an organization does and how it does it. In this study, the five EFQM model enablers are considered as the essential principles and practices for QM to produce the desired effects on an organization's innovation results and performance (Calvo-Mora et al., 2015). Bou-Llusar et al. (2009) point out that previous studies do not fully capture the complexity of the EFQM Excellence Model, as they do not consider the complete set of enablers criteria. Research focused on isolated criteria does not allow a holistic assessment of the EFQM model as a TQM framework, thus, it is necessary to test whether all enablers, as a single latent factor, explain the excellence in the result domain (Bou-Llusar et al., 2009). Based on the above, in this study, the EFQM enablers are interpreted as the overall approach that firms should adopt when they implement the EFQM model for business excellence, and they are represented by the common latent factor "*enabler excellence"*. This conceptualization is in line with the study by Bou-Llusar et al. (2009) who conclude that the enabler's side in the EFQM model could be presented as the latent factor *"enabler excellence"* that produces the complementarities between their components.

2.2 Innovation performance

Various types of innovation have been described in literature and researchers have explored its classification in different ways. Some studies examine only a single type of innovation such as process innovation (Abrunhosa and Sa, 2008) or product innovation (Zeng et al., 2017; Prajogo and Sohal, 2006), whereas others explore both process and product innovation (Prajogo, 2016; Camisón and Villar-López, 2014; Martinez-Costa and Martinez-Lorente, 2008), while others conceptualize marketing and organizational innovation (Chang et al., 2012; Gunday et al., 2011; Evangelista and Vezzani, 2010). In the Organization for Economic Co-operation and Development (OECD) Oslo Manual, innovation is distinguished

between four main types, namely: product, process, organizational and marketing innovation. The current study is based on the above classification of innovation, as described in the OECD Oslo Manual (OECD and Eurostat, 2005). The same classification has also been adopted in the studies of Tavassoli and Karlsson (2015), Kafetzopoulos and Psomas (2015) and Avermaete et al. (2003).

- Product innovation: significant changes in the capabilities of goods or services;
- Process innovation: the implementation of a new or significantly improved production or delivery method, including significant in techniques, equipment and/or software;
- Organizational innovation: the implementation of a new organizational method in the firm's business practices, workplace organization or external relations;
- Marketing innovation: the implementation of new marketing methods.

Moreover, innovation performance is directly related to innovation management system. According to Edquist (1997) an innovation management system is defined as: “all important economic, social, political, organizational, and other factors that influence the development, diffusion, and use of innovations”. It is important to take into consideration the various types of innovation systems appearing in the relevant literature. Bernardo (2014) point out that the implemented TQM enhances innovation management system while Bossink (2002) also argues that quality management can provide strategic support for the management of innovation systems and finds that TQM tools contribute to the management of innovation processes.

2.3 Business performance

Organizational performance is considered to be a multidimensional construct that is defined in relation to the quality of the organization’s results (Lakhal et al., 2006). Gunday et al. (2011) set three different aspects of business performance, including production, market and financial performance. Tsai and Yang (2013) measured business performance as a firm's financial, market, and global performance relative to those of its major competitors. Shan et al. (2016) and Camisón and Villar-López (2014) measured business performance as a firm's financial and market performance. In this line, Volberda et al. (2013) distinguish between two performance outcomes of management innovation: (1) hard outcomes such as profitability, productivity, growth, and competitive advantage which are named economic; and (2) soft or non-economic outcomes such as customer satisfaction, employee turnover, stakeholder relation, and environmental impact. Cegarra-Navarro et al. (2015) operationalize firm performance using items from previous research on financial and non- financial performance.

Overall, organizations must measure the degree of effectiveness and efficiency that it is attained in different areas. Consistent with prior research, the present study relies on multiple measures of performance to assure robustness of the results. Thus, while QM was measured through the EFQM model's enablers, since this is a widely recognized model for QM implementation, business performance was measured through specific variables that are widely used in similar studies in literature. More specifically, three performance related dimensions were chosen: a) market performance, b) financial performance and c) non-economic performance. In the present study, the EFQM model enablers, the innovation dimensions and the performance dimensions are measured through indicators that have been drawn from previous studies. All references supporting the indicators of these constructs are presented in table 1.

Insert table 1 about here

2.4 EFQM model enablers and innovation performance

A review of the previous empirical studies shows that the implementation of QM creates a fertile environment for innovation development, as many of the necessary internal factors affecting innovation are developed to the required level. For example, Matias and Coelho (2011) state that QM strategically supports the management of innovation while Prajogo and Sohal (2003) identified the relationship between TQM and innovation and showed that TQM enhanced innovation performance. Suárez et al. (2016 suggest that the effective implementation of excellence models, such as EFQM, turn out to be beneficial for organizations, fostering a culture that supports all four innovation dimensions (Calvo-Mora et al., 2014). Santos-Vijandea and Alvarez-Gonzalez (2007) conclude that TQM practices and especially the EFQM enablers can be included among the organizational factors that influence innovation. While some studies (e.g. Feng et al., 2006; Prajogo and Sohal, 2004) contend that only soft QM dimensions (e.g. leadership) can foster innovation, Perdomo-Ortiz et al. (2006) assert that both hard and soft QM dimensions (e.g. process management and people management) play a significant role in building innovation capability. More specifically:

Leadership: Flynn (1994) found that top management leadership helps to speed up product innovation while Kim et al. (2012) evidenced a direct relationship between leadership and process innovation. Moreover, Kumar and Sharma (2017) note that the leaders' quality personality ensures that a suitable innovation process is chosen while Prajogo and Sohal (2004), in an examination of the impact of TQM on product innovation within Australian firms, concluded that two elements of TQM – leadership and people management – positively

influenced innovation. Hoang et al. (2006) also find that both leadership and people management, have a positive impact on the innovation performance of firms in Vietnam. Quality-oriented leaders spread the innovation vision and goals to the company's workforce (Ooi et al., 2012) and clarify the fact that innovation can be achieved only if everybody commits to that goal (Martinez-Roman et al., 2011).

People: People could nurture a fertile environment and supportive culture for all dimensions of innovation performance by enabling the efficient detection of customer needs, going beyond conforming to standards and promoting knowledge sharing (Escrig-Tena et al. 2018). Nguyen and Chau (2017) argued that employees can enhance products, processes and organizational innovation performance, while teamwork or the development of a share division promote absorptive capacity, which is considered to be an antecedent of innovation (Silva et al., 2014). Empowered trained employees are able to use new techniques to identify opportunities for new product development and may even provide a more rapid response by handling problems at the source enhancing innovation (Song and Su, 2015).

Policy & Strategy: This criterion manages the intellectual factors that contribute to the achievement of innovation performance and business success. Policies, plans, objectives and processes are developed and deployed to deliver strategy. The strategy needs to be translated into innovation plans, programs, operational objectives and measurable targets so that it can be successfully executed.

Partnerships & Resources: Excellent organisations plan to manage external partnerships and internal resources in order to support policy and strategy of innovation. A way for firms to foster their innovation capability and to shorten the time to market is to collaborate with other companies through an "open innovation" approach based on knowledge and resource sharing (Tepic et al. 2014). Partners stimulate the external focus of the organisation and bring in necessary expertise in order to increase the innovation dimensions. Partnerships affect innovation activities as it allows the complementary exploitation of the resource, especially between small and large firms and even between those belonging to different sectors (Ciliberti et al., 2016). Hence, firms building and participating in partnerships represent an important factor for all dimensions of innovation (Rampersad et al., 2010).

Process management: The existence of a positive relationship between process management and innovation is supported in literature (Kim et al., 2012; Ooi et al., 2012). According to Perdomo-Ortiz et al. (2006) the process management explains the results in

relation to product, process, organizational and marketing innovation. Kim et al. (2012) also point out that process management can develop innovation plans that have an impact on product and process innovation. Following Manders et al. (2016), the management of processes can lead to process innovation by identifying critical activities, while at the same time this QM practices is likely to contribute to product innovation. Manufacturing process is instrumental in speeding new product to the market, this attitude enhances marketing innovation (Flynn, 1994).

Prajogo and Hong (2008) found also that all EFQM enablers are interrelated and facilitate innovative activities. Many studies conclude that some organizational results on innovation depend on the management of some EFQM enablers' criteria (Calvo-Mora et al., 2014), but they do not fully capture the complexity of the EFQM model. Therefore, research focused on isolated criteria or linkages does not allow a whole assessment of the EQFM model enablers and innovation performance. In order to avoid this limitation, it is necessary to test whether all enablers explain the excellence in the innovation performance domain. In our model, the holistic approach of the EFQM enablers is captured by the *"enabler excellence"* construct, thus, the influence of the enabler excellence on innovation performance and consequently on organizational result is addressed in the following research hypothesis.

Hypothesis 1: *Enabler excellence has a positive influence on innovation performance.*

2.5 Innovation performance and business performance

Taking into account the rapid market changes occurring constantly in consumers' preferences and demands, competitors and technology, those firms that possess greater innovation capability will be able to respond better to the turbulence in the environment (Jimenez Jimenez and Sanz Valle, 2011). Product and process innovation dimensions can be advantageous to a firm in improving its competitive position relative to its rivals, as well as its profitability in the market (Cheng et al., 2010). Producing innovative products is the only way to avoid pricing wars that reduce profitability, ultimately leading to shrinking markets and death for weaker companies. While product innovations offer strategic advantages in the marketplace, process innovations are equally important sources of competitive and strategic advantages. Indeed, process innovations have an advantage over product innovations since they are often hidden internally within organizations which make them difficult to be imitated by competitors (Maine et al., 2012). On the other hand, organizational innovation and market innovation deal with the changes in the organizational structure of a company and moves to

exploit new territorial markets or new market segments within existing markets (Cheng et al., 2010). Johne and Davies (2000) found that marketing innovations increase sales by increasing product consumption and yield additional profit for firms. According to Kim et al. (2012) organizational innovation and market innovation increase the efficiency and the effectiveness of managerial systems and processes by obtaining new resources or adopting new programs. Enhancing administrative systems and processes adds value for a firm directly and for its customers indirectly. In the same line of research, Gunday et al. (2011) explored the effects of the product, process, marketing, and organisational innovation on the organisational performance using a sample of 184 Turkish manufacturing firms. They concluded that the innovations have positive effects on firm performance in manufacturing industries. The importance of innovation was also emphasised by the study of Kafetzopoulos and Psomas (2015), they found that "innovation capability" directly contributes to product quality and operational performance. Thus, innovation is an opportunity for a manufacturing firm to improve its performance. Based on the above research, the following research hypothesis was developed:

Hypothesis 2: *Innovation performance has a positive influence on business performance*

2.6 EFQM model enablers and business performance

An important body of QM research deals with the attempt to identify the effect of QM on business performance (Bou-Llusar *et al*., 2005). The EFQM model can provide a useful assessment framework against which organisations can evaluate their QM practices and their business results (Santos-Vijande and Álvarez-González, 2007). The elements of the EFQM model create a reasonably clear path that the firm has to follow in order to improve its performance. Early attempts support the idea that working with the EFQM model can contribute positively to evaluations made by stakeholders and to key performance. The graphical structure of the EFQM model shows that enabler's criteria are responsible for the results criteria, thus excellence in enablers will lead to superior results. However, only few recent papers do not analyze each relationship separately but the factor *"enabler excellence"* and evaluate its effect in performance in a holistic way. For instance, Bou-Llusar et al. (2009) conclude that the enabler criteria of the EFQM model contain both the social and the technical factors of a TQM approach. These factors are mutually related and constitute the factor *"enabler excellence"*. Calvo-Mora et al. (2014) also classified the EFQM enablers in groups of factors corresponding to those that the literature specialized in TQM call social and

technical factors. They conclude that the EFQM model sets up a structured and systematic ordering of the critical factors for the functioning of the whole organization. That is to say, to attain excellent results it is indispensable to count on all the facilitating agents or critical factors. In a similar study, Bou-Llusar et al. (2005) highlight the fact that the set of enabler criteria is strongly related to the result criteria set and all the enabler criteria contribute in the same way to result improvements, consequently a balanced approach in the development of enablers allows correlation between enablers and results to be maximised. The conclusion of the study of Suárez et al. (2016) showed that the EFQM model enablers do not act independently within a QM system, all factors must be integrated effectively to improve business results. Therefore, it is important for deeper understanding in the relationship among TQM and business performance and to create a further bridge between them (Shan et al., 2016). Thus, the following hypothesis is developed:

Hypothesis 3: *Enabler excellence has a positive influence on business performance.*

2.7 The mediating role of innovation performance

The effect of QM on innovation, as well as the effect of innovation on business performance has widely been discussed in literature (Kafetzopoulos et al., 2015; Zeng et al., 2015; Kim et al. 2012; Martínez- Costa and Martínez-Lorente, 2008; Santos-Vijande and Álvarez-González, 2007). Despite the fact that the aim of the EFQM model is to support organisations to achieve business excellence (Calvo-Mora et al., 2015), only a few researchers have investigated the influence of EFQM model enablers on the innovation performance - business performance relationship (Raja and Wei, 2014; Santos-Vijande and Álvarez-González, 2007). Innovation performance can be the key mediating role that plays in the EFQM model (Martínez- Costa and Martínez-Lorente, 2008; Santos-Vijande and Álvarez-González, 2007). QM research shows that product quality has an influence on innovation. For example, Zeng et al. (2015) conclude that product quality expressed by conformance to specifications (defect rates, new product yield, scrap and rework, etc.), as the most basic among quality criteria, can play an essential role in determining innovation performance. Prajogo and Sohal (2003) provide also empirical evidence that product quality is associated to process and product innovation. Kafetzopoulos and Psomas (2015) point out that firms' high innovative performance is rewarded by high product quality. Moreover, Prajogo et al. (2008) found a significant link between product innovation and product quality, while Koufteros and Marcoulides (2006) report that firms that have higher product innovation capability also have

higher levels of product quality. Because of that, TQM is a good way of improving quality while facilitating the innovation process. Therefore, as Calvo-Mora et al. (2015) propose, future research should be focused on exploring the EFQM model enablers and investigate the relationships that are produced between these criteria with the business results. Thus, there are needs to identify the mediator for the relationship between TQM and business performance (Shan et al., 2016). In this paper, we argue that innovation performance mediates the relationship between the effect of the enabler excellence and business performance. Based on the discussion above, the following hypothesis is proposed:

Hypothesis 4: *Innovation performance partially mediates the relationship between enabler excellence and business performance*

Based on the above theory, a model of relations was formed, as illustrated in figure 1, in order to analyse the impact of the "*enabler excellence"* on business performance, using innovation performance as a mediator factor. Each relationship is double checked using prior empirical findings from the EFQM and innovation literature.

Insert figure 1 about here

3. Research methodology

3.1 Research population and sample

In order to answer the above formulated research questions, a research project was carried out in all sectors of economic activity of the Greek manufacturing industry, using a structured questionnaire as the data collection method. Greece has undergone a pronounced and protracted economic recession since 2008. Fiscal consolidation, a growing public debt burden, negative inflation and uncertainty additionally weighed on investment and economic performance. Greece's framework conditions for innovation are far from favorable as indicated by the lack of venture capital and the low Ease of Entrepreneurship Index, compared to the OECD median. All these make Greece a very important case for examining our research hypotheses. Thus, a sample of 2330 companies was randomly selected from the list of manufacturing 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 research project was conducted in two successive phases, and finally, a total of 580 companies responded, constituting the population size, giving a response rate equal to 25% which is acceptable compared to the response rates of similar research studies.

Responding manufacturing companies belong to the sector of metal & machinery (15%); plastic and chemical (6%); food and beverages (39%); agriculture products (14%); drugs and cosmetics (3%); wood (7%); leather and textile (8%); and other industries, such as electrical equipment and food packaging (8%), while 90% of them are SMEs (companies with less than 250 employees). It is worth noting that none of the participating companies had EFQM recognition, while most of them (59 %) had been certified according to the ISO 9001:2008 standard.

3.2 Research instrument

A seven-point Likert scale was used throughout to measure all the items of the research instrument. The respondents were requested to indicate their level of agreement with the items, based on how well they reflected the actual situation at their work site, ranging from "1 = strongly disagree" to "7 = strongly agree" (Shan et al., 2016; Tsai and Yang, 2013). The questionnaire was thoroughly examined and improved by: a) a team of experts - consisting of 5 academics, 3 business executives with experience in manufacturing, and 2 business consultants - b) two pilot studies, the first through personal interviews with 12 top management executives and the second through a pilot postal survey of 50 enterprises. The results of the pilot survey showed the same trends as the results of the final sample. All respondents completed the survey instrument individually and independently. Examining each of the variables of the survey questionnaire individually for unique or extreme observations, 22 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 558 observations for the 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). The measurement items used in the survey after data analysis are listed in table 1.

3.3 Response bias

In order to determine whether there are differences between the two successive phases of the research project (early and late respondents) a t-test was performed on the scores of the variables relevant to the research hypotheses. No statistically significant differences ($p > .05$) were found between these groups. Additionally, the One-Way ANOVA test was used in order to detect possible differences (in the mean value of measured variables) among the manufacturing companies' sub-sectors based on their demographic profile (small, medium-sized and large firms). Similarly, no statistically significant differences were found between

these groups. Moreover, no statistically significant differences were detected comparing the responding and non-responding companies, in terms of the number of their employees (Mann-Whitney test). So, from the above it is apparent that non-response bias was not likely to be an issue in the final sample. Furthermore, the common method bias was checked. For this reason, the single-factor test was applied. This test is run by loading all the items of the dimensions into a principal component analysis and forcing them into one latent factor. The test produced poor results indicating 23 percent of the variance extracted, while many items suffered from poor factor loadings, below 0.4. Thus, common method variance is not a concern in this study.

3.4 Method of data analysis

The analysis adopted in this study includes an initial Exploratory Factor Analysis - EFA (principal component extraction method with varimax orthogonal rotation), to uncover the underlying structure of the variables. 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 Lakhal et al. (2006) and Hair et al. (2006). The model and the hypotheses are tested using Structural Equation Modeling (SEM) via path analysis, as it is a multivariate analytic methodology that gives insights into the causal ordering of variables in a system of relationships. The Statistical analysis software SPSS 20 (Statistical Package for Social Sciences) and AMOS 6.0 (Analysis of MOment Structures) were used for the statistical processing of the data.

4. Measurement analysis and results

4.1 Unidimensionality, reliability and validity

According to Kafetzopoulos and Psomas (2015) and Hair et al. (2006) when there is a latent factor with several correlated dimensions and also the structural relationships between the dimensions and the latent factor are strongly supported by the literature, then a second-order factor model is applicable. The second-order model explains the co-variations among first-order factors in a more parsimonious way (Hair et al., 2006). So, in the case of the present study, three different measurement second-order models are constructed using *"enabler excellence", "innovation performance" and "business performance"* as second-order factors that explain the first-order factors.

First, EFA was applied in order to extract the latent constructs of *enabler excellence*. Five latent factors were established (Kaiser-Meyer-Olkin = 0.923, p = 0.00, eigen-value > 1, MSA > 0.80, factor loadings > 0.630), explaining 63.172% of the total variance, and they were named after the items that were loaded on them, following the names of the five EFQM model enablers. EFA was also applied to extract the latent constructs of *"innovation performance".* Four latent factors were established (Kaiser-Meyer-Olkin = 0.942, p = 0.00, eigen-value > 1, MSA > 0.80, factor loadings > 0.657), explaining 74.688 % of the total variance, and they were named after the items that were loaded on them, as follows: "product innovation", "process innovation", "organizational innovation", and "marketing innovation". Finally, EFA was applied on *"business performance"* dimensions, extracting three latent factors (Kaiser-Meyer-Olkin = 0.920, p = 0.000, MSA > 0.80, factor loading > 0.715), namely "market performance", "financial performance", and "non - financial performance", explaining 74.843 % of the total variance. Hence, multicollinearity type problems did not appear in the study. Based on the above, the unidimensionality of the measurement scales was well supported and it was then necessary to assess the reliability of the constructs. The most common method for measuring reliability of self-administered survey questionnaires is internal consistency. Cronbach's alpha coefficient is commonly used as a measure of internal consistency (Kafetzopoulos et al. 2015). Cronbach's alpha coefficient of all the extracted factors was > 0.774 indicating that all factors are measured by reasonably reliable items (Demirbag et al., 2006). With regards to ISO 9001:2008 certification, responding manufacturing firms were classified into two groups, the ISO 9001:2008 certified companies (330 cases) group and the non- ISO 9001:2008 certified companies (228 cases) group. Comparing the two groups (t-test), no statistically significant differences were revealed, thus indicating that there are no significant differences between certified and non-certified companies, in relation to innovation and business performance.

In order to determine whether the extracted latent factors show acceptable fit to the empirical data, the CFA (maximum likelihood estimation technique) was also applied in addition to EFA in each of the three sub-models (enabler excellence, innovation performance, business performance). The results of CFA confirmed the sub-models revealed by EFA, and the extracted latent factors showed acceptable fit to the empirical data. In addition, second-order CFA was conducted to assess the three measurement models. The fit statistics indicated a good fit and all the second-order factor loadings were positive and statistically significant (see table 2).

Insert table 2 about here

Furthermore, based on the results of CFA, this study calculated the composite reliability (CR) and the average variance extracted (AVE) for each construct of the three models. The results provided evidence that each construct had an acceptable level of reliability (see table 1). In the last stage, validity was assessed in terms of content, convergent and discriminant validity. The review of literature as well as the results from the pilot study provided reassurance about the content validity of the instrument. The convergent validity of each construct of the models was assessed by evaluating the factor loadings and the AVE in all cases as suggested by Hair et al. (2006). Factor loadings of all items were >0.5, significant at p values <0.001 and the signs were all positive. Furthermore, each item's coefficient was greater than twice its standard error, indicating significant items' loadings on their respective factor, thus demonstrating high convergent validity (Hair et al., 2006). The AVE values for all the constructs were above the 0.50 threshold proving adequate convergent validity for each construct. Discriminant validity, is evaluated by comparing the AVE with the shared variance (i.e. square of the correlation) between any pair of latent constructs. In each case, the AVE was greater than the squared correlation between each pair of constructs, confirming the discriminant validity (Hair et al., 2006). Thus, the results provided strong evidence that all of the study constructs were reasonably reliable and valid.

4.2 Hypotheses testing

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 2 shows that the overall fit statistics for the structural model demonstrates 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 associated hypotheses, as well as the estimated path coefficients, p-values and squares multiple correlations (R^2) for the depended construct.

Insert figure 2 about here

The analytical results of the causal relationships among the three key second order constructs are presented in table 3. The analytical results reveal that enabler excellence directly affects innovation performance (0.723) and innovation performance directly affects business performance (0.599), while enabler excellence also directly affects business performance (0.278). These analytical results indicate that introducing the EFQM model

enablers promotes both innovation performance and business performance, while enhanced innovation performance also enhances business performance. The above results support Hypotheses H1, H2 and H3.

Insert table 4 about here

4.3 An assessment of the mediator role of innovation performance

A simple mediation analysis exists in the structural model (Fig. 2), regarding the mediator effect of innovation performance on business performance (H4). Mediation arises when the relationship between an independent variable (in this case enabler excellence) and a dependent variable (in this case business performance) changes as a consequence of introducing a mediator variable (in this case innovation performance) (Calvo-Mora et al., 2014; Hair et al., 2006). The results reveal that overall; enabler excellence, without the mediator variable, has a significant direct effect on business performance (0.730). However, after introducing innovation performance as a mediator variable, enabler excellence strongly reduces its direct effect on business performance (0.278), while the effect of enabler excellence on business performance via innovation performance (indirect effect) achieves a point estimate of 0.433 (0.723 x 0.599), which is higher compared to the estimated direct effect, with a point estimate of 0.278 (Table 4). In order to better justify this indirect effect, a second nested competing non-mediating model could be run (Escrig-Tena et al., 2018; Hair et al., 2006; Prajogo and Ahmed, 2006) to ensure that our structural mediating model is better suited to the data than the non-mediating. Thus, a new non-mediating model was tested where the direct path between enabler excellence and business performance was deleted. The two nested models were compared. The result, as shown by the statistically significant ($p = 0.001$) difference of the χ^2 values ($\Delta\chi^2 = 16.406$ with $\Delta df = 1$) between the two competing models, suggests that the non-mediating model suffers a poor fit (larger χ^2 value) and hence the partial mediation of *innovation performance* is confirmed (Hair et al., 2006). If the relationship between enabler excellence and business performance is reduced, but remains significant, when innovation performance is included in the model as an additional predictor, then partial mediation is supported (Hair et al., 2006). Thus, the results of this analysis prove that *innovation performance* partially mediates the effect of the enabler excellence on business performance, supporting Hypothesis 4 of this study. Table 4 presents the analytical results including the total, indirect and direct effects of enabler excellence and innovation performance on the dependent variables.

Insert table 4 about here

5. Discussion and conclusions

QM, innovation and business performance has received significant attention from academics all over the world, providing interesting business insights. This study is a first attempt to provide a model considering simultaneously the effect of the EFQM enablers (through the enabler excellence construct) on innovation performance, measured through four specific types of innovation, and their consequences on business performance, measured through three specific types of performance. The development and examination of the proposed theoretical model offers a close examination and better understanding of these relationships contributing to the theoretical development of innovation of a firm and narrowing the corresponding literature gap.

The current study provides empirical evidence to support that the enabler's excellence has a significant and positive impact on innovation performance when they are collectively and not just individually implemented by firms. Thus, manufacturing companies that adopt the business excellence enablers' criteria tend to enhance their overall innovative performance. We also find strong evidence of the total relationship between enabler excellence and business performance. The high value of the regression coefficient (0.711) and the high proportion of variance of the performance explained by the enabler excellence (67.7%) indicate that the enabler criteria, when implemented together, have an effective influence on business performance. This assumption coincides with a number of studies on TQM and reinforces the importance of adopting a holistic view in the EFQM excellence model by taking into account all the elements of the model (Bou-Llusar et al., 2009).

The present study also contributes to the existing research as it is apparent that the embodiment of the innovation concept, as a single factor, into the products, processes, organizational and marketing practices of a firm, has direct and positive consequences for what it achieves from the financial, nonfinancial and market perspective, also as a single factor. In other words, the novelty, along with the differentiation of products, processes, organizational and marketing practices an innovative firm adopts, improves many aspects of firm performance. More specifically, the study introduces a second-order factor called "business performance", that can be assessed indirectly through the assessment of its sub-factors (market, non-financial and financial performance), which in turn can be indirectly assessed through the assessment of their indicators that are directly measured. Thus, the

current study offers a reliable and valid model which provides empirical evidence to support that innovation performance, measured through product, process, marketing and organizational innovation, has a significant and positive effect on business performance, measured through market, non-financial and financial performance. These findings are in line with the observations of Kafetzopoulos and Psomas (2015), Gunday et al. (2011), and Jimenez-Jimenez and Sanz-Valle (2011) who show that innovation performance can improve organizational performance.

This study offers answers to significant issues of operations management, such as how can organisations work within a framework of controlled and repeatable quality practices, whilst at the same time allowing and enabling a culture of innovation and creativity? What are the challenges or opportunities that arise from this relationship and what should companies do in response? In the relationships among EFQM enablers, innovation management and business performance the important role of organizational culture should be taken in to account as it fills the gap between what is formally announced and what actually takes place. Hung et al. (2011) argued that TQM is not simply a management tool for promoting and improving quality, but it can also promote a culture of sharing, trust, openness and innovation when supported by top management, employee involvement, continuous improvement and customer focus. According to Ahmed (1998), a culture of innovation is a major determinant of innovation capability, having major facilitating and constraining effects on the successful implementation and maintenance of innovation. The EFQM model enablers can be determinants of the innovation climate which influencew creativity and innovation. Innovation climate should be developed to encourage open flow of communication, risk taking, self-initiated activity and teamwork. Without a culture for innovation, it is unlikely that creative ideas will be transformed into innovative products (Panuwatwan et al., 2008).

This research addresses also an issue largely ignored in the TQM literature, regarding the degree to which innovation performance may act as a key mediator variable between EFQM enablers and business performance. The findings of this study show that when innovation performance is considered as a mediator, the direct positive relationship between excellence enablers and business performance attenuates. It specifically implies that excellence enablers indirectly influence business performance by influencing innovation performance. Thus, innovation performance has a partial mediating role through which excellence enablers benefit business performance. The proof of innovation performance as a mediating variable enhances our understanding of enabler excellence - business performance

relationship. This finding helps managers realize that contrary to many beliefs, there are no tradeoffs between quality management and innovation performance. In fact, quality management practices are in line with innovation performance. Thus, managers should focus on them in order to improve their innovation performance and in turn, their business performance. Previous surveys (Suárez et al., 2016; Gómez et al., 2015; Calvo-Mora et al., 2014; Bou-Llusar et al., 2009; Bou-Llusar et al., 2005) investigated the enablers' relationship with the specific results of the EFQM model and thus with business excellence. This study differs from the previous ones, as it highlights different kinds of performance embedded in the EFQM model. To our knowledge, this is the first empirical study that associates the EFQM enablers with business performance based on three new suggested in this paper dimensions. This approach gives value to this study and to the EFQM model as it demonstrates the positive effect of enablers and hence of the related quality practices, on different business performance dimensions. In addition, our research model contains many potential indirect effects regarding the impact of the enabler excellence on the four types of innovation and on the three dimensions of business performance. The study shows that all indirect relationships are positive and significant while the enabler excellence has the highest indirect effect on product innovation (0.615). The other links are also high and they don't seem to vary significantly according to the particular type of innovation and performance. Moreover, innovation performance has significant indirect effect on financial, non – financial and market performance (0.443; 0.491 and 0.485 respectively). Thus, the results shed light into the effect of enabler excellence on innovation types and business performance dimensions.

From a managerial perspective, the empirically validated theoretical model can guide policy makers to select the appropriate strategy through which a manufacturing company can lay the foundations to increase its performance. This would include aligning strategies and programs to encourage quality practices in various levels and departments to boost innovation and sustain competitive advantages of the firm's core business. Managers should take into consideration that EFQM enablers are not simply a management tool for promoting and improving quality, when these enablers implemented as a whole, are a significant tool to boost overall innovation performance and as a result, further increase overall business performance of manufacturing firms. Following the requirements and adopting the principles of the EFQM model, helps managers of manufacturing companies to develop a clear and effective policy & strategy, encourage employees to develop and implement creative ideas,

offer the necessary resources and develop the appropriate partnerships that will enhance process management and support business performance and innovation. If managers want to promote innovation in their companies, they should invest on all QM initiatives as a QM environment in a company can foster all dimensions of innovation. Adopting quality practices is a mean to generate innovative ideas. Moreover, the role of innovation as a partial mediator between enabler excellences and business performance helps to explain the positive relationship between them. Thus, in order for firms to achieve greater advantages from the adoption of the EFQM model's enablers, their managers should focus on those QM practices that directly affect the various types of innovation. Firms that do not focus on the four innovation dimensions may have to look elsewhere to find ways to survive.

As in other empirical studies, this research acknowledges a series of limitations that is necessary to bear in mind when interpreting its results. A first limitation is caused by the definition of QM as a unidimensional construct. For example, a distinction between soft and hard elements of QM would be interesting to be considered, since they may have different effects in both innovation and overall performance of firms. Thus, we suggest extending this research considering separately the soft and the hard enablers of EFQM, which may lead to interesting conclusions. A second limitation is related to the kind of innovation that quality management boosts. This research does not separate between radical and incremental innovation, while it's not clear from previous research whether QM contributes mainly to incremental and less to radical innovation. Thus, it would be very interesting to explore this issue in future research, improving understanding of the relationship between QM and innovation. A final limitation of the article is related to the organizational innovation climate. It might be useful for researchers to further examine the mediating role of organizational culture and innovation climate in the relationship between EFQM enablers and innovation or business performance.

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