TQM factors and organisational results in the EFQM excellence model framework: an explanatory and predictive analysis

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Abstract

Purpose – Within the framework of Total Quality Management (TQM) and the EFQM Excellence Model (EEM), the main objective of this paper is to develop a causal-predictive analysis of the relationships between soft and strategic-hard EFQM factors and the organisational results (customers, people, society and key results).

Design/methodology/approach – From a causal-predictive perspective, four EEM models, designed for each organisational result, are compared applying partial least squares structural equation modelling (PLS-SEM) and using a sample with 225 Spanish organisations.

Findings – The results confirm that soft and strategic-hard EFQM factors constitute a socio-technical system in which there are multiple direct and indirect relationships, between these factors and the results. Finally, the predictive nature of the proposed models is confirmed, highlighting the predictive performance of the people results model.

Practical implications – The results can lead to an improvement in organisational performance, as the developed models enable managers to anticipate the effects of their management decisions on those results concerning customers, people, society and key business results.

Originality/value – First, a novel way of grouping TQM enabler factors has been proposed within the EEM framework. Second, four research models have been generated, which allow carrying out an in-depth study of the direct and indirect relationships, between soft and strategic-hard EFQM factors and result variables. Finally, this contribution has applied the most updated techniques in order to assess the prediction performance of the four research models posited.

Keywords TQM, EFQM, Business excellence, Partial least squares, PLS-SEM, Predictive modelling, Out-of-sample prediction

Paper type Research paper

1. Introduction

The latest research trends in the field of quality management have focused on defining its paradigms and perspectives. This has intensified the academic debate and opened new research lines to clarify the theoretical foundations of quality management and to contextualize the findings obtained (van Kemenade and Hardjono, 2019). One of the novel contributions has recently been made by Carnerud (2020), who suggests that there are three

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complementary paradigms that must be mixed, according to the organisational environment, in order to reach the organisational objectives. First, the "*backend quality*" paradigm is focused on the manner of integrating total quality management (TQM) into the organisational culture, the human resources and the values. This paradigm incorporates a strong subjective component that revolves around the soft (social) factors. Second, there is the "*frontend quality*" paradigm, which is targeted on the hard (quantifiable and tangible) aspects, such as reliability, costs and process control. Third, the *"middle-way quality"* paradigm attempts to integrate both the soft and the hard aspects of TQM. Under this paradigm are found the quality management systems (ISO 9000 standard) and the business excellence models (BEMs), one example being the EFQM excellence model (EEM). Therefore, the EEM enables management to be analysed as a socio-technical system, where both soft and hard factors interact, and where the knowledge of these interactions is a key variable to optimize the performance of the system and to reach the goals (Sciarelli *et al.*, 2020).

In this vein, the literature has studied the relationship between TQM key or critical factors (soft and hard) and organisational results. However, as proposed by Elshaer and Augustyn (2016), research that uses the EEM as a theoretical framework, or adopts a multidimensional approach to analyse the relationships between soft and hard factors and results, is still scarce. Both Elshaer and Augustyn (2016) and Escrig-Tena *et al.* (2018), have highlighted the relevance of considering TQM as a multidimensional practice which includes several related but different factors. Indeed, an efficient implementation of TQM depends on a balanced combination of soft (social) and hard (technical) management factors, as both dimensions are needed to reach the organisational objectives (Rahman and Bullock, 2005; Gadenne and Sharma, 2009; Calvo-Mora *et al.*, 2014). In turn, there are different positions regarding the relationships between soft and hard TQM factors, and between these enablers and the organisational results, generating confusion caused by mixed empirical findings in the sphere of BEMs (cf. Flynn *et al.*, 1995; Samson and Terziovski, 1999; Gadenne and Sharma, 2009). Therefore, to reach a deep understanding of these factors and their connections, an in-depth study is required of the direct and indirect relationships, which arise between soft and hard factors, and on how they influence organisational performance (Zeng *et al.*, 2017; Sciarelli *et al.*, 2020). Indeed, greater knowledge about this socio-technical system may help managers and organisations that use the EEM as a management framework, to understand the interdependencies and different functions of the soft and strategic-hard practices and their influence on the organisational results (Sciarelli *et al.*, 2020).

From a methodological perspective, Suarez *et al.* (2017) emphasised the need for further quantitative research on the EEM, carrying out not only explanatory analyses but also predictive studies. Thus far, it has been more frequent to find studies which analyse the causal relationships between enabler variables and results in the EEM. Although there are some studies which have used PLS-SEM and have stressed the predictive nature of their analyses, the assessment has been based exclusively on techniques designed to evaluate the in-sample predictive power of the models (Shmueli *et al.*, 2019). Therefore, this paper seeks to advance within this emerging line of research. With this aim in mind, a causal-predictive analysis is made of the relationships between the soft and strategic-hard EFQM factors and the results linked to the organisation's main stakeholders (customers, employees, managers, owners and society).

In this context, this study intends to achieve the following objectives:

(1) To deepen the knowledge on the direct and indirect relationships between the soft and strategic-hard EFQM critical factors and the results.

(2) To analyse if the afore-mentioned relationships differ in the four models developed for each of the outcomes included in the EEM (customer, people, society and key results).

(3) To assess whether the soft and strategic-hard EFQM critical factors are capable of generating accurate predictions of the different outcome measures.

The study proceeds as follows. The next section presents the theoretical framework, together with the research model and hypotheses. The third section provides a description of the research methodology. The fourth section indicates the results of the different data analyses carried out. The fifth section brings together the discussion and implications and, finally, the sixth section includes the conclusions made from this research.

2. Theoretical framework and research hypotheses

2.1 The EFQM excellence model and quality management critical factors

The fundamental premise of the EEM is that excellent results, with respect to customers, people, society and key business results (four *results criteria*), are achieved through leadership that directs and drives the organisation's strategy, people, alliances and resources and processes (EFQM, 2012). These are the five *enabler criteria,* which guide the implementation of the management system. In turn, each criterion contains a variable number of *sub-criteria* (Calvo-Mora *et al.*, 2015). The *RADAR Logic (Results-Approaches-Deploy-Assess and Refine)* provides a structured approach to perform EEM-based self-assessment. Finally, the EEM has a dynamic nature, indicating that activities, such as innovation, learning or creativity, will drive and enhance the impact of the enablers on the results (Bou-Llusar *et al.*, 2009).

The critical or key factors for quality and excellence management are those that condition success in design, implementation, development and improvement of the management system (Jabnoun and Sedrani, 2005). In a comparative study, Sila and Ebrahimpour (2005) identified a series of critical factors that are systematically repeated in research: leadership, training, teamwork, worker involvement, people management, data analysis, supplier management, strategic planning, process management, product design, benchmarking, continuous improvement and empowerment.

Given this diversity of factors, the literature has endeavoured to classify them according to their nature and to study their relationships with result variables or performance (Table 1). Table 1 shows there is no complete agreement on the classification and naming of the key factors. However, a detailed analysis of the different opinions seems to make it clear that the soft factors refer to social and behavioural aspects, such as culture, leadership and managerial commitment, and human resource management. TQM hard factors include aspects of a technical nature, such as strategic planning, management of processes, resources and relationships with suppliers and other partners (Rahman and Bullock, 2005; Bou-Llusar *et al.*, 2009; Calvo-Mora *et al.*, 2014). In addition, there is also no consensus on the relationships between soft and hard factors, and between these and the results. For example, Flynn *et al.* (1995) found no direct relationship between soft factors and performance, while Samson and Terziovski (1999) noted that soft factors are the best predictors of performance. In turn, Gadenne and Sharma (2009) pointed out the need to integrate both types of practices to achieve effective implementation of TQM. In this vein, the most extended position in the literature is that soft and hard factors are related to each other, and that this combination of factors is what produces the best results (Ho *et al.*, 2001; Gadenne and Sharma, 2009; Calvo-Mora *et al.*, 2014).

As described previously, the EEM does not establish an explicit distinction between soft and hard factors among the enabler criteria. Despite this, the significance of the EEM enablers makes them conform to the classifications of soft and hard factors (Bou-Llusar *et al.*, 2009; Calvo-Mora *et al.*, 2014). In this way, the leadership and people criteria would fit the definition of soft EFQM critical factors, while strategy, partnerships and resources, and processes, products and services criteria would make up the strategic-hard EFQM critical factors. The reason for adding the term "strategic" to the hard factors is to highlight the special relevance of strategic elements in the EEM (Bou-Llusar *et al.*, 2009; Suarez *et al.*, 2016).

Table 1.
Summary of the most relevant studies on the relationship between soft–hard TQM factors and results/ performance

Study	Soft TQM factors	Hard TQM factors	Impact on results/performance
Flynn *et al.* (1995)	QM infrastructure practice (QMIP): Customer and Supplier relationship; Work attitudes; Workforce management; Top management support	Core QM practice (CQMP): Process flow management; Product design process; Statistical Control	CQMP has a direct effect on quality and plant performance QMIP has an indirect effect on quality and plant performance through the CQMP
Dow *et al.* (1999)	Workforce commitment; Shared vision Customer focus; teamwork; Training	Benchmarking; Advanced manufacturing systems; Just-in-time principles; Co-operative supplier relations	Soft quality practices combine to yield a positive correlation with quality outcomes Hard quality practices do not contribute to superior quality outcomes
Samson and Terziovski (1999)	Leadership; Human resources management; Customer focus	Information and analysis; Strategic planning; Process analysis	TQM soft factors are better predictors and have a more direct and positive relationship to performance than hard factors
Ho *et al.* (2001)	Top management commitment; Role of quality department; Employee relations; Training	Product design; Process management; Quality data and reporting; Supplier quality management	Soft TQM factors do not have a direct effect on quality performance Hard TQM factors partially mediate the relationship between soft TQM factors and performance Integration of hard and soft TQM practices are necessary for the successful implementation of TQM
Rahman and Bullock (2005)	Workforce commitment; Shared vision; Customer focus; Use teams; Personnel training; Cooperative relations	Computer based technologies; Just-in-time principles; Technology utilization; Continuous improvement enablers	Soft TQM factors have positive relationships to hard TQM elements Soft TQM factors have an indirect effect on performance through their effect on hard TQM factors
Fotopoulos and Psomas (2009)	Top management commitment; Strategic quality planning; Employee involvement; Supplier management; Customer focus; Process orientation; Continuous improvement; Facts-based decision making; Human resource development	Cause and effect diagram; Scatter diagram; Affinity diagram; Relations diagram; Force-field analysis; Run chart; Control charts; Quality function deployment; Failure mode and effect analysis	Soft TQM factors are positively related to quality improvement and customer satisfaction Hard TQM factors are positively related to quality improvement and market benefits The relationship of the soft factors with quality improvement is more intense than the relationship of the hard factors
Gadenne and Sharma (2009)	Top management commitment and supplier support; Employee training and increased interaction with employees and customers	Benchmarking and quality measurement; Continuous improvement, and efficiency improvement	Organisational performance appears to be favourably influenced by a combination of hard and soft TQM factors
Yunis *et al.* (2013)	Leadership; Employee relations	Product/process management; Customer/supplier management	Soft TQM factors have a higher impact than hard TQM factors on operational performance
Calvo-Mora *et al.* (2014)	Leaderships; Human resources management	Strategic management of partnerships and resources; Process management	Soft and hard TQM factors make up a management system that has a significant effect on key business results Process management has a direct effect on key business results Leadership, Human resources management and Strategic management of partnerships and resources have an indirect effect on key business results Soft TQM factor has a direct effect on hard TQM factors
Escrig-Tena *et al.* (2018)	Management commitment; Adopting the philosophy; Closer to customers; Closer to suppliers; Increased training; Open organisation; Employee empowerment	Benchmarking; Zero-defects mentality; Process improvement; Measurement	Hard QM dimension has a direct influence on product and process innovation The effects of the soft QM dimension are channelled via proactive behaviour

Furthermore, for the EEM, strategy refers to long-term planning processes that lead to the definition and updating of mission, vision, strengths, weaknesses or competitive strategies and is not directly linked to people (Yunis *et al.*, 2013).

With regard to results, the EEM analyses the impact of management on the organisation's main stakeholders. Thus, perception and performance measures, relating to customers, individuals and society, are included (EFQM, 2012). These should provide a clear understanding of the effectiveness of the deployment and outcomes on the organisation's customers, people, societal and environmental strategy and supporting policies and processes. The internal measures are used by the organisation to monitor, understand, predict and improve the performance of the organisation and to predict its impact on the perceptions of its customers, people and society, respectively.

Finally, key business results (hereinafter key results) include key financial and non-financial business outcomes, which demonstrate the success of the organisation's deployment of their strategy, and key financial and non-financial business indicators are used to measure the organisation's operational performance. These help monitor, understand, predict and improve the organisation's likely business outcomes.

The relationships between EFQM critical factors, and between these and results, are described below. The hypotheses that integrate our research models are depicted in Figure 1.

2.2 Relationships between soft EFQM critical factors and organisational results

The soft factors of the EEM are represented by the leadership and people criteria. Regarding leadership, this must be personal, visible, permanent and effective and should be extended to all levels (Soltani and Wilkinson, 2010). In addition, it is considered one of the most important factors for the success and improvement of the organisation's results (Calvo-Mora *et al.*, 2014). With respect to the people criterion, the organisation must try to achieve the commitment and involvement of all personnel and, in return, they should be empowered to participate in decision making (empowerment), resource and process management and the organisation's improvement activities (Sabella *et al.*, 2014).

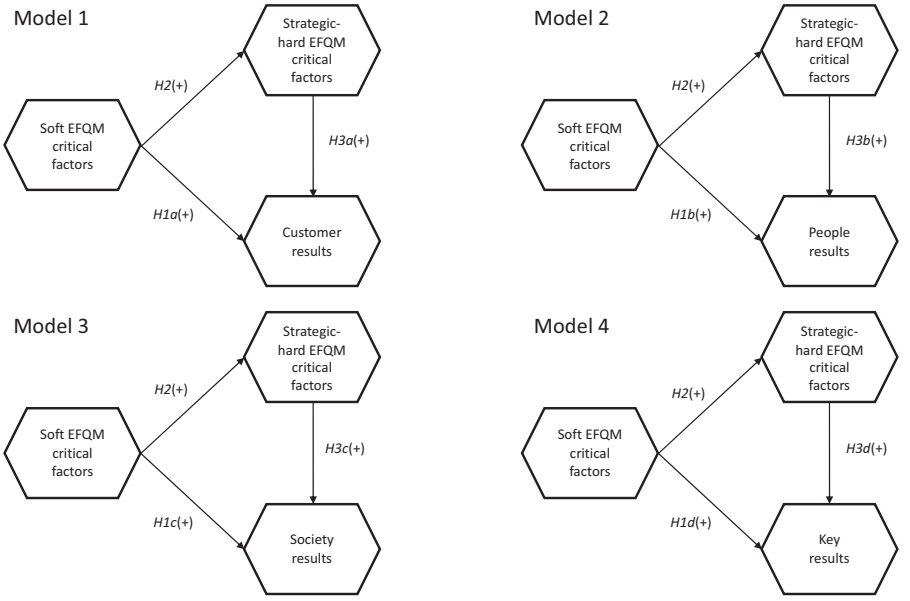


Figure 1.
Research models and hypotheses

Regarding the impact of soft TQM factors on results, Samson and Tersziovski (1999), Rahman and Bullock (2005), Fotopoulos and Psomas (2009) and Gadenne and Sharma (2009) identified a positive and significant relationship, between these factors and the ability of organisations to better serve their customers and meet their needs. Similarly, Yunis *et al.* (2013) and Calvo-Mora *et al.* (2015) indicated that leadership and human resources, which prioritise a customer focus, allow the organisation to focus on the current and future needs of customers, and thus improve customer relations and satisfaction. This leads to the formulation of the following hypothesis:

H1a. Soft EFQM critical factors are positively related to customer results.

In addition, as pointed out by Ooi *et al.* (2008), leadership and human resources are factors on which an important part of quality and excellence success depends, as the improvement process is an organisational learning process, where the human factor is a critical resource. This means that people become less substitutable and more interchangeable, within the organisation. Thus, under the premises of the EEM, soft factors can contribute to improving people's performance when they involve policies and practices that promote commitment and efficiency (Teh *et al.*, 2009). In this vein, Rahman and Bullock (2005) found positive relationships between soft TQM factors and increased worker motivation and morale, and Ooi *et al.* (2008) found positive relationships between these factors and increased worker involvement and creativity. Thus, the following hypothesis is proposed:

H1b. Soft EFQM critical factors are positively related to people results.

For Martín-Castilla (2002), it was not possible to find a single management factor to determine the impact that the organisation has on its social environment. Thus, it is a set of decisions and activities that will contribute to forming the organisation's image within, and impact on, society. In this regard, the organisation's leaders and people play a crucial role in its social impact (Calvo-Mora *et al.*, 2018). Managers must create the ethical principles and values for all members of the organisation. They must set an example, get involved and comply with the principles and values, as a cultural basis, through action and behaviour. Finally, these principles and values must be translated into actions by employees, in response to society's demands (Martín-Castilla, 2002). In light of the above arguments, the following hypothesis can be stated:

H1c. Soft EFQM critical factors are positively related to society results.

Finally, the EEM includes economic-financial and non-economic measures and indicators in the key results, which demonstrate the success achieved in the implementation of the strategy and its operational performance (EFQM, 2012). For Flynn *et al.* (1995) and Yunis *et al.* (2013), the effective implementation of soft TQM factors produces fewer errors, lower costs and higher quality products, due to the fact that people are more motivated and involved, better trained and perform better in their work. In addition, this helps processes to be more efficiently developed (Dow *et al.*, 1999; Escrig-Tena *et al.*, 2018). On the other hand, Gadenne and Sharma (2009) identified a direct and positive relationship between soft TQM factors and measures, such as profitability and productivity. Based on these arguments, the following hypothesis is proposed:

H1d. Soft EFQM critical factors are positively related to key results.

2.3 Relationships between soft and strategic-hard EFQM critical factors

The literature suggests that soft and hard TQM factors are connected. Thus, Fotopoulos and Psomas (2009) considered that a manager should act as a guide and catalyst, and ought to create and disseminate the values of this management philosophy, establish goals and objectives, consistent with these values and design a proper management system (objectives, strategies, plans, responsibilities, processes and resources) to obtain them. However, in order

to achieve success, leadership and people are not enough. Involvement must be demonstrated, through investment in material, technological and financial resources that support the achievement of the objectives, the implementation of the strategy and improvement of all the processes (Jabnoun and Sedrani, 2005; Calvo-Mora *et al.*, 2014). In addition, the literature indicates that strategic-hard factors mediate the relationship between soft factors and organisational results (Ho *et al.*, 2001), so there is a direct and positive relationship between soft and hard factors. Within the scope of the EEM, Calvo-Mora *et al.* (2015) found a positive and significant relationship between leadership and people (soft factors) and strategy, and between the management of resources and partners, and processes. Thus, the following hypothesis is proposed:

H2. Soft EFQM critical factors are positively related to strategic-hard EFQM critical factors.

2.4 Relationships between strategic-hard EFQM critical factors and results

The strategic-hard factors of the EEM are represented by the strategy, partnerships and resources, processes, products and services criteria. In this regard, there is no doubt among researchers that quality and excellence management is a strategic issue for organisations (Bou-Llusar *et al.*, 2009; Suarez *et al.*, 2016). Regarding partnerships and resources, cooperation with suppliers and partners is a necessity of any management system that seeks to achieve success, as it is a key link in the value chain. Companies must make efforts to engage suppliers and partners in internal processes and work closely with them (Calvo-Mora *et al.*, 2014). In addition, in current environments, organisations must plan and manage their internal resources (economic-financial, infrastructure, materials, technology, information and knowledge) to support the implementation of the strategy and the effective execution of the processes (Laosirihongthong *et al.*, 2013). Finally, for Sila and Ebrahimpour (2005), organisations act more effectively in achieving their objectives and obtain better results when all their activities are systematically developed, managed and improved through processes.

With regard to these relationships, it should be pointed out that the EEM establishes that organisations must permanently add value for their customers, for which it is essential to understand, anticipate and satisfy their needs and expectations (EFQM, 2012). Thus, organisations must focus their strategy on those needs and expectations, deploy it through key processes and have the resources and partnerships to ensure success (Yunis *et al.*, 2013; Calvo-Mora *et al.*, 2015). Based on these arguments, the following hypothesis is proposed:

H3a. Strategic-hard EFQM critical factors are positively related to customer results.

Similarly, strategy, processes, resources and relationships with key partners must also be mobilised to meet the needs and expectations of the people (EFQM, 2012). Thus, in order to achieve the involvement, motivation and development of people, the latter must see their objectives and needs reflected in the strategy and have the necessary resources to be able to carry out their work as efficiently as possible (Calvo-Mora *et al.*, 2014). Rahman and Bullock (2005) confirmed the positive relationship between hard TQM factors and worker productivity, motivation and involvement. Thus, the following hypothesis is proposed:

H3b. Strategic-hard EFQM critical factors are positively related to people results.

The EEM also notes that excellent organisations regard society as a key stakeholder. Therefore, society must be taken into account in the strategy when allocating resources, establishing relationships and developing processes (EFQM, 2012). In this regard, Calvo-Mora *et al.* (2018) recommend actions related to strategic-hard TQM factors to improve the social impact: identify and effectively manage the key processes involved in the relationships that the company maintains with society, and which can have the greatest impact on it,

assign specific resources to improve the social impact, or implement suitable channels for gathering information or evaluating their effectiveness. In light of the above arguments the following hypothesis can be stated:

H3c. Strategic-hard EFQM critical factors are positively related to society results.

Finally, it should not be forgotten that one of the basic principles of organisations is to make a profit, and to be profitable, in order to endure over time. However, they must also seek other key results that are strategic by nature for shareholders, owners and managers. Flynn *et al.* (1995) and Rahman and Bullock (2005) identified positive relationships between hard TQM factors and cost reduction; Samson and Terziovski (1999) did so with improved productivity; Fotopoulos and Psomas (2009) with the improvement of the profit and other economic-financial results; Gadenne and Sharma (2009) with the increase in market share; and Calvo-Mora *et al.* (2014) with improvements in product and process innovation. Accordingly, the following hypothesis is proposed:

H3d. Strategic-hard EFQM critical factors are positively related to key results.

3. Methodology

3.1 Sample and data collection

The population under study consisted of Spanish organisations which had undergone self-assessment and external assessment following the EEM guidelines. These processes enable companies to obtain Recognitions of Excellence, according to the score achieved. Based on information contained in the 23rd Annual Certification Report in Spain, as at April 2018, there were 438 organisations with EFQM Excellence Recognition Systems in force, using the EEM as a diagnostic tool and to improve management. These organisations form the population under study in this work.

The data were obtained from the scores reached by the organisations and are reflected in the assessment reports. From the beginning of 2015 to the middle of 2018, 225 assessment reports, with complete and valid scores (51.37% response rate), were collected. These organisations make up the definitive sample. This sample is composed of public (16.5%) and private (83.5%) organisations, small and medium-sized enterprises (64.8%), and large companies (35.2%).

3.2 Measures

All constructs analysed in this research were measured using indicators from different criteria and sub-criteria of the EEM (EFQM, 2012). The soft EFQM critical factors construct was measured using indicators from the following enabler criteria: leadership (criteria 1, five items) and people (criteria 3, five items). To measure the strategic-hard EFQM critical factors construct, this study took indicators from another three enabler criteria: strategy (criteria 2, four items), partnership and resources (criteria 4, five items), and processes, products and services (criteria 5, five items). Each construct of results was measured using two items from the following outcome criteria: customer (criteria 6), people (criteria 7), social results (criteria 8) and key business results (criteria 9) (Table 2).

The measurement scales of the RADAR matrices were used to obtain the scores for each indicator. For the EEM enablers (soft and strategic-hard factors), these matrices analysed three elements: approaches, deployment and assessment and refinement; and two elements in the results: relevance and usability, and performance. These elements have to be evaluated with a measurement scale from 0 to 100, divided into five segments: 0 (unable to demonstrate), 25 (limited ability to demonstrate), 50 (able to demonstrate), 75 (fully able to demonstrate), 100 (recognised as a global role model) (EFQM, 2012). These evaluations are reliable and valid sources of information, due to the training, specialisation and qualifications of the evaluators involved in the process (Suarez *et al.*, 2016).

Item description (construct/indicator)	Weight	Loading	Composite reliability	AVE
Soft EFQM critical factors (composite estimated in Mode A)			0.968	0.755
1a. The leaders develop the mission, vision, values and ethical principles and act as a reference model of an excellence culture	0.115	0.898		
1b. The leaders personally involve themselves to guarantee the development, introduction and continuous improvement of the organisation management system	0.117	0.878		
1c. The leaders interact with customers, partners and representatives of society	0.118	0.834		
1d. The leaders reinforce an excellence culture among the people within the organisation	0.119	0.909		
1e. The leaders define and boost change within the organisation	0.119	0.875		
3a. Planning, management and improvement of human resources	0.118	0.886		
3b. Identification, development and maintenance of people's knowledge and capacities	0.115	0.867		
3c. Involvement and assumption of responsibilities by people within the organisation	0.111	0.874		
3d. Existence of a dialogue between the people and the organisation	0.114	0.850		
3e. Rewards, recognition and attention to the people of the organisation	0.106	0.811		
Strategic-hard EFQM critical factors (composite estimated in Mode A)			0.961	0.642
2a. Policy and strategy is based on the current and future needs and expectations of the stakeholders	0.104	0.862		
2b. Policy and strategy is based on the information of the indicators of performance, research, learning and external activities	0.105	0.859		
2c. Policy and strategy is developed, reviewed and updated	0.102	0.867		
2d. Policy and strategy is communicated and deployed via a schematic of key resources	0.098	0.840		
4a. Management of the external alliances	0.078	0.741		
4b. Management of the economic resources	0.092	0.809		
4c. Management of the buildings, equipment and materials	0.084	0.758		
4d. Management of technology	0.081	0.797		
4e. Management of information and knowledge	0.083	0.746		
5a. Systemic design and management of the processes	0.053	0.593		
5b. Introduction of the necessary improvements via innovation, in order to fully satisfy the customers and other interest groups, increasingly generating a greater value	0.082	0.806		
5c. Design and development of the products and services, based on the needs and expectations of the customers	0.086	0.833		
5d. Production, distribution and attention service of the products and services	0.092	0.813		
5e. Management and improvement of the relationships with customers	0.099	0.849		
Customer results (composite estimated in Mode A)			0.951	0.907
6a. Perception measures	0.524	0.952		
6b. Performance indicators	0.526	0.953		
People results (composite estimated in Mode A)			0.929	0.868
7a. Perception measures	0.534	0.931		
7b. Performance indicators	0.539	0.932		
Society results (composite estimated in Mode A)			0.914	0.841
8a. Perception measures	0.499	0.903		
8b. Performance indicators	0.590	0.931		
Key results (composite estimated in Mode A)			0.953	0.911
9a. Key performance outcomes	0.516	0.953		
9b. Key performance indicators	0.532	0.956		

Note(s): All weights and loadings with p-value ≤ 0.05, two-tailed test

Table 2.
Measurement model

Finally, the variables included in this research were considered as design constructs, that is, variables which are the result of theoretical thinking and composed of a mixture of elements (Henseler, 2017). Consequently, the constructs included in the four research models were modelled as composites (Suarez *et al.*, 2017), which means that each construct was formed as a weighted linear combination of its respective indicators.

3.3 Data analysis

This study applied partial least squares structural equation modelling (PLS-SEM) (Khan *et al.*, 2019; Shiau *et al.*, 2019), as a composite model was estimated from a causal-predictive perspective (Hair *et al.*, 2020). This research used the following PLS software: SmartPLS 3.2.8 (Ringle *et al.*, 2015), SEMinR (Ray *et al.*, 2019) and plspm (Sánchez *et al.*, 2015).

4. Results

4.1 Measurement model

Our composite variables were estimated in Mode A due to the presence of high correlations between indicators in each construct (Rigdon, 2016). This scenario was expected as constructs are design constructs, which means that indicators of components would usually be correlated (Henseler, 2017). Therefore, traditional measures of internal consistency, reliability and validity could be applied (Henseler *et al.*, 2016).

Firstly, the existence of indicator reliability was assumed, given that all the outer loadings were higher than the threshold of 0.7 (Hair *et al.*, 2019) (Table 2). Secondly, internal consistency was assessed using composite reliability (CR). All constructs were reliable as their CR was higher than 0.7.

Thirdly, the average variance extracted (AVE) was used to evaluate convergent validity (Table 2), and as AVE values were greater than 0.5, all constructs attained convergent validity.

Fourthly, the discriminant validity was tested analysing both the heterotrait-monotrait ratio of correlations (HTMT) and the traditional Fornell–Larcker criterion (Hair *et al.*, 2019). As displayed in Table 3, the value for each HTMT was equal to or less than 0.883, lower than

	Model 1				Model 2		
	SEFQMCF	SHEFQMCF	CR		SEFQMCF	SHEFQMCF	PR
SEFQMCF	***0.869***	0.883	0.709	SEFQMCF	***0.869***	0.883	0.769
SHEFQMCF	*0.854*	***0.801***	0.688	SHEFQMCF	*0.854*	***0.801***	0.709
CR	*0.660*	*0.648*	***0.952***	PR	*0.696*	*0.651*	***0.932***
	Model 3				Model 4		
	SEFQMCF	SHEFQMCF	SR		SEFQMCF	SHEFQMCF	KR
SEFQMCF	***0.869***	0.883	0.567	SEFQMCF	***0.869***	0.883	0.682
SHEFQMCF	*0.854*	***0.801***	0.622	SHEFQMCF	*0.854*	***0.801***	0.724
SR	*0.506*	*0.552*	***0.917***	KR	*0.637*	*0.683*	***0.954***

Note(s): The diagonal elements (bold and italics) are the square roots of the AVEs; Fornell–Larcker criterion in italics in the lower left corner and heterotrait-monotrait ratio (HTMT) in the upper right corner; off-diagonal lower elements are the correlations between constructs

SEFQMCF: Soft EFQM critical factors; SHEFQMCF: Strategic-hard EFQM critical factors; CR: Customer results; PR: People results; SR: Society results; KR: Key results

Table 3.
Discriminant validity assessment

the cut-off (0.90). The Fornell-Larcker criterion was also met (Table 3). Accordingly, it can be affirmed that all variables included in the models had discriminant validity.

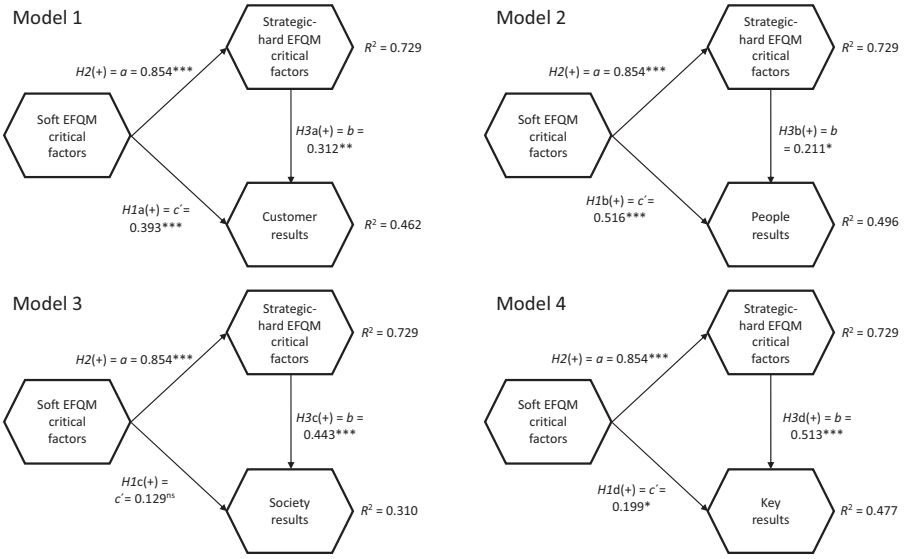
4.2 Structural model

As displayed in Table 4 and Figure 2, the findings show a positive direct effect of soft on strategic-hard factors, which remained constant (0.854) for the four EFQM models. These path coefficients were seen as being statistically significant, by using the bootstrapping procedure with 10,000 resamples. These results therefore confirm H2. On the other hand, the R^2 for the strategic-hard variable reached 0.729 in the four models, indicating that all models practically achieved a substantial level of in-sample predictive power (Hair *et al.*, 2019).

Similarly, the direct effects of the soft and strategic-hard factors on the result variables were positive, ranging from 0.129 to 0.516, for the effects originating from soft factors, and 0.211 to 0.513, for those from strategic-hard factors. All these effects were significant for all the EFQM models, except for the relationship between soft critical factors and society results (Model 3), where there was no significant relationship. Consequently, based on the above findings, support was found for H1a, H1b, H1d and H3a-d.

Finally, it is worth emphasising the explanatory power of the four models, in terms of R^2, for each result construct, which ranged from 0.310 for society results to 0.496 for people results. These results support the explanatory power of all models under study.

4.2.1 Post hoc assessment of indirect effects. The four research models contain an indirect effect, whereby the effect of soft EFQM critical factors on each of the four result variables is transmitted by a mediating variable, that is, via strategic-hard EFQM critical factors. Thus, a post hoc indirect effect analysis was performed to test the four indirect effects. With this aim in mind, the analytical approach proposed by Nitzl *et al.* (2016) was followed. The results show how soft EFQM critical factors always have a significant total effect (*c*) on all the result variables in the four models. When the strategic-hard EFQM critical factors variable was included as a mediator in each model, the direct effect (*c*') on each of the outcome variables



Note(s): *** $p < 0.001$,** $p < 0.01$,* $p < 0.05$, ns : non-significant

Figure 2. Results

Table 4.
Effects on endogenous variables

	Effects on endogenous variables	Direct effect (path coefficient)	*t*-value (bootstrap)	*p*-value	Percentile 90% confidence intervals	Theoretical sense (support)	Explained variance	f^2
Model 1	*SHEFQMCF (R^2 = 0.729)*							
	H2(+): SEFQMCF	0.854	35.310	0.000	[0.812; 0.891] Sig	Yes	72.9%	
	CR (R^2 = 0.462)							
	H1a(+): SEFQMCF	0.393	3.624	0.000	[0.223; 0.580] Sig	Yes	25.9%	0.078
	H3a(+): SHEFQMCF	0.312	2.940	0.002	[0.130; 0.478] Sig	Yes	20.2%	0.049
Model 2	*SHEFQMCF (R^2 = 0.729)*							
	H2(+): SEFQMCF	0.854	34.905	0.000	[0.811; 0.892] Sig	Yes	72.9%	
	PR (R^2 = 0.496)							
	H1b(+): SEFQMCF	0.516	5.487	0.000	[0.372; 0.679] Sig	Yes	35.9%	0.143
	H3b(+): SHEFQMCF	0.211	2.197	0.014	[0.046; 0.358] Sig	Yes	13.7%	0.024
Model 3	*SHEFQMCF (R^2 = 0.729)*							
	H2(+): SEFQMCF	0.854	35.174	0.000	[0.813; 0.891] Sig	Yes	72.9%	
	SR (R^2 = 0.310)							
	H1c(+): SEFQMCF	0.129	1.096	0.137	[–0.071; 0.318] NSig	No	6.5%	0.007
	H3c(+): SHEFQMCF	0.443	3.831	0.000	[0.258; 0.640] Sig	Yes	24.4%	0.077
Model 4	*SHEFQMCF (R^2 = 0.729)*							
	H2(+): SEFQMCF	0.854	34.793	0.000	[0.811; 0.892] Sig	Yes	72.9%	
	KR (R^2 = 0.477)							
	H1d(+): SEFQMCF	0.199	2.124	0.017	[0.051; 0.360] Sig	Yes	12.6%	0.020
	H3d(+): SHEFQMCF	0.513	5.558	0.000	[0.354; 0.655] Sig	Yes	35.0%	0.136

Note(s): SEFQMCF: Soft EFQM critical factors; SHEFQMCF: Strategic-hard EFQM critical factors; CR: Customer results; PR: People results; SR: Society results; KR: Key results. Bootstrapping based on n = 10,000 subsamples. Hypothesized effects are assessed by applying a one-tailed test for a t Student distribution (CI 90%). Sig: Significant; NSig: Non-significant

Table 5. Indirect effects on endogenous variables

Model 1	Total effect on CR			Direct effect on CR			Indirect effect on CR			
		Path	*p*-value		Path	*p*-value		Point estimate	LPBCI	UPBCI	Sig
	SEFQMCF (*c*)	0.660	0.000	H1a(+): SEFQMCF (*c*')	0.393	0.000	*ab* (via SHEFQMCF)	0.267	0.081	0.435	Yes
Model 2	**Total effect on PR**			**Direct effect on PR**				**Indirect effect on PR**			
		Path	*p*-value		Path	*p*-value		Point estimate	LPBCI	UPBCI	Sig
	SEFQMCF (*c*)	0.696	0.000	H1b(+): SEFQMCF (*c*')	0.516	0.000	*ab* (via SHEFQMCF)	0.180	0.012	0.328	Yes
Model 3	**Total effect on SR**			**Direct effect on SR**				**Indirect effect on SR**			
		Path	*p*-value		Path	*p*-value		Point estimate	LPBCI	UPBCI	Sig
	SEFQMCF (*c*)	0.506	0.000	H1c(+): SEFQMCF (*c*')	0.129	0.137	*ab* (via SHEFQMCF)	0.378	0.190	0.579	Yes
Model 4	**Total effect on KR**			**Direct effect on KR**				**Indirect effect on KR**			
		Path	*p*-value		Path	*p*-value		Point estimate	LPBCI	UPBCI	Sig
	SEFQMCF (*c*)	0.637	0.000	H1d(+): SEFQMCF (*c*')	0.199	0.017	*ab* (via SHEFQMCF)	0.438	0.275	0.578	Yes

Note(s): SEFQMCF: Soft EFQM critical factors; SHEFQMCF: Strategic-hard EFQM critical factors; CR: Customer results; PR: People results; SR: Society results; KR: Key results; LPBCI: Lower percentile bootstrap confidence interval; UPBCI: Upper percentile bootstrap confidence interval. Indirect effects (*ab*) are assessed applying a two-sided test (PBCI 95%). Bootstrapping based on $n = 10,000$ subsamples. Sig: significant

was still significant, except for the case of Model 3. On the other hand, the indirect effects (*ab*), through the strategic-hard critical factors, were significant in the four scenarios. This means the presence of a complementary partial mediation in Models 1, 2 and 4, whereas a full mediation was observed in Model 3, as the relationship between soft-critical factors and society results was only indirect, via strategic-hard critical factors.

4.2.2 Predictive model assessment. Following Hair *et al.* (2020), the out-of-sample predictive power of the four models was evaluated by assessing how well each model might predict unseen data (Danks and Ray, 2018). This was initially performed applying PLSpredict, a holdout sample-based approach, developed by Shmueli *et al.* (2016) and recently used in Shiau *et al.* (2020). This allows testing the generalisability of the model to other populations (Danks and Ray, 2018), critical in empirical research on the EEM. In this vein, the analysis was focused on the result variables of the four models.

In the PLSpredict routine, firstly a *k*-fold cross-validation was executed, setting $k = 7$ subgroups, with the aim of meeting the minimum size of $N = 30$ for the holdout sample (Hair *et al.*, 2020), repeating this procedure ten times. Secondly, a PLSpredict analysis was conducted in each model, completing the following steps (Shmueli *et al.*, 2019) (Table 6):

(1) Indicators of the four key endogenous constructs show values of $Q^2_{\text{predict}} > 0$, which mean all manifest variables meet the first requirement (Table 6).

(2) With the aim of evaluating the prediction error of the PLS-SEM analyses, the prediction error summary statistic values were compared to naive values obtained by a linear regression model (LM). In comparison with the LM results, the PLS-SEM results should have lower prediction error, e.g. in terms of root mean squared error (RMSE) or mean absolute error (MAE) values. Since all values of the skewness for prediction errors of results indicators were under|1| (Hair *et al.*, 2019), both for the PLS-SEM and the LM analyses (Table 7), RMSE was selected as a basis of the predictive power assessment, although MAE statistics are also shown. Table 6 shows that PLS-SEM analyses generated lower RMSE prediction errors (also for MAE), for all the indicators, than LM estimates in the four models. Therefore, it can be maintained that the four models have high predictive power.

		PLS			LM		PLS – LM	
	Indicator	RMSE	MAE	Q^2_{predict}	RMSE	MAE	RMSE	MAE
Model 1	6a	12.956	10.523	0.394	13.207	10.584	−0.251	−0.061
	6b	11.212	8.829	0.383	11.306	9.012	−0.094	−0.183
Model 2	7a	13.618	10.791	0.415	13.632	10.831	−0.014	−0.04
	7b	11.38	9.078	0.411	11.433	9.172	−0.053	−0.094
Model 3	8a	12.301	9.502	0.161	12.671	9.774	−0.37	−0.272
	8b	11.21	8.566	0.252	11.663	8.833	−0.453	−0.267
Model 4	9a	12.525	9.615	0.337	12.675	9.902	−0.15	−0.287
	9b	10.984	8.709	0.388	11.061	8.723	−0.077	−0.014

Table 6. PLSpredict assessment of indicators

Note(s): RMSE: Root mean squared error. MAE: Mean absolute error. PLS: Partial least squares path model. LM: Linear regression model. $k = 7$ subgroups, number of repetitions = 10

	6a	6b	7a	7b	8a	8b	9a	9b
PLS-SEM	−0.383	0.229	−0.152	0.142	0.710	0.869	0.150	0.014
LM	−0.416	0.053	−0.332	0.091	0.889	0.959	0.129	−0.034

Table 7. Skewness of prediction errors

Finally, two predictive analyses were conducted at the construct level. First, the SEMinR package for *R* was used (Ray *et al.*, 2019) (Table 8). Comparing the four models, in terms of RMSE values, reveals that Model 2 outperforms the others, in terms of latent variable score-based prediction errors. Then, following Reguera-Alvarado *et al.* (2016), another prediction analysis was performed at the construct level, using the *R* package plspm (Sánchez *et al.*, 2015) (Table 9). The evaluation of the predictive performance of the four models was conducted by using both R^2 and the standard deviation. Thus, the average R^2 was divided by the standard deviation. The higher the value for the aggregate variable (R^2/*standard deviation*), the greater the predictive performance. In this respect, Model 2 also obtained the best performance, both in terms of accuracy ability, with an average R^2 of 0.518, and in terms of stability, with the lowest standard deviation (0.039). Figure 3 visually shows the prediction performance of the four models. Basically, the prediction results obtained by using PLSpredict (RMSE) and *R* (R^2) are mixed together in that graphic. Not surprisingly, Figure 3 supports the previous findings and reveals that Model 2 has the best performance, in terms of the lowest prediction error and the highest R^2. Consequently, the predictive capabilities of the four models were supported.

5. Discussion and implications

The results obtained in this research provide support for most of the hypotheses proposed. Regarding H2, the analysis of the values obtained in the different models shows how soft

	Dependent variable	RMSE	MAE
Model 1	Customer results	0.757	0.610
Model 2	People results	0.719	0.574
Model 3	Society results	0.863	0.658
Model 4	Key results	0.770	0.600

Note(s): RMSE: Root mean squared error. MAE: Mean absolute error

Table 8. Construct level prediction

General model (by using complete sample)	Model 1	Model 2	Model 3	Model 4
	$R^2_{\text{Customer results}}$	$R^2_{\text{People results}}$	$R^2_{\text{Society results}}$	$R^2_{\text{Key results}}$
	0.462	0.494	0.305	0.477
Cross validation (7-fold)				
k-fold	$R^2_{\text{Customer results}}$	$R^2_{\text{People results}}$	$R^2_{\text{Society results}}$	$R^2_{\text{Key results}}$
1	0.383	0.487	0.319	0.523
2	0.545	0.596	0.453	0.673
3	0.260	0.520	0.061	0.495
4	0.573	0.500	0.370	0.383
5	0.472	0.475	0.301	0.413
6	0.567	0.522	0.599	0.604
7	0.527	0.527	0.235	0.412
Mean	0.475	0.518	0.334	0.500
Std. Dev	0.116	0.039	0.169	0.108
Mean/Std. Dev	4.095	13.282	1.976	4.630

Table 9. Benchmarking study by using *R* software

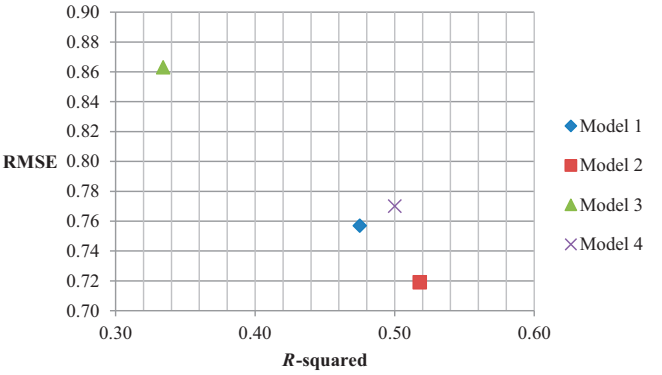


Figure 3.
Prediction error versus explanation power

factors exert a powerful influence on strategic-hard factors. This demonstrates that the exercise of leadership and the proper management of people constitute the essential basis for the strategy, processes, management of resources and alliances, to achieve their full importance for the generation of results (Flynn *et al.*, 1995; Rahman and Bullock, 2005; Calvo-Mora *et al.*, 2014).

Results also support hypotheses H3a-d, all of them alluding to the direct impact of strategic-hard factors on the different types of results posed by the EEM. This kind of relationship has generated more controversy in the literature than the relationship between soft and strategic-hard TQM factors. In fact, Dow *et al.* (1999) stated that hard quality practice does not contribute to superior quality outcomes. However, there is also evidence in the literature of a positive relationship, between strategic-hard TQM factors and customer results (Yunis *et al.*, 2013; Sabella *et al.*, 2014; Calvo-Mora *et al.*, 2015), people results (Samson and Terziovski, 1999; Rahman and Bullock, 2005), society results (Calvo-Mora *et al.*, 2018) and key results, mainly economic and financial (Rahman and Bullock, 2005; Fotopoulos and Psomas, 2009).

In this study, the greatest effect between strategic-hard factors and outcome variables is for key results in H3d (0.513). H3c follows at a distance, with the impact of strategic-hard factors on society results (0.443). Even more distant are H3a, with the effects on customer results (0.312), and H3b, with people results (0.211).

The analysis of the results obtained for hypotheses H1a, H1b, H1c and H1d requires a more detailed debate. The direct influence of soft factors on organisational results varies, depending on which of the results are being analysed. The impact of soft factors on society results (H1c = 0.129) (Model 3) is not statistically significant, whereas, in the other cases, the data show that soft factors have a significant impact on people results (H1b = 0.516) (Model 2), on customer results (H1a = 0.393) (Model 1) and on key results (H1d = 0.199) (Model 4). The study seems to indicate the importance of the relationship between soft TQM factors and organisational results, as previously confirmed in the works of Flynn *et al.* (1995), Dow *et al.* (1999), Rahman and Bullock (2005), Fotopoulos and Psomas (2009) and Yunis *et al.* (2013).

Focusing on R^2 values, the models show differences between them (Table 4). In Models 3 (society results) and 4 (key results), the greatest amount of explained variance is generated by strategic-hard factors. Similar conclusions were reached by Calvo-Mora *et al.* (2014, 2018), when they analysed the impact of hard TQM factors on key results and society results, respectively. Specifically, in the model in which the impacts on society results are measured (Model 3), the direct effect (soft factors on results) produces only 6.5%, while the strategic-hard factors create 24.4%. With regard to the key results (Model 4), the situation is quite

similar: the effect from strategic-hard factors accumulates 35.0% of the explained variance, while the effect from soft factors attains 12.6%.

In the other two models, the results show just the opposite behaviour. Taking the model that analyses the impacts on customer results (Model 1), the greatest amount of explained variance is obtained by considering the direct effect from soft factors (25.9%), with the effect from strategic-hard factors at 20.2%. A similar situation is presented in the model on people results (Model 2). In this case, the explained variance by soft factors rises to 35.9%, while that effect from strategic-hard factors does not reach 14%. In this vein, there are studies that identified soft factors as better predictors than hard factors, for measuring customer satisfaction (Samson and Terziovski, 1999; Fotopoulos and Psomas, 2009; Yunis *et al.*, 2013) and employee performance (Samson and Terziovski, 1999).

Table 5 shows the post hoc assessment of indirect effects. The results suggest the existence of a partial mediation in three of the four models (Models 1, 2 and 4), and a full mediation for the model that analyses the effect of soft factors on society results, via strategic-hard factors (Model 3). Overall, these findings seem to indicate that soft factors are necessary to lead to the development of strategic-hard factors in organisations, to achieve a higher impact on each result variable. This is particularly important when society results are considered (Model 3). However, it should be highlighted that for Models 1 and 2, there is a greater degree of direct effects over indirect effects, which are still significant, indicating the marked direct role of soft factors when explaining both customer and people results. Taken together, our results are in line with the conclusions obtained in the studies developed by Flynn *et al.* (1995), Rahman and Bullock (2005), Ho *et al.* (2001) and Calvo-Mora *et al.* (2014), who identified the joint existence of direct and indirect effects between soft TQM factors and organisational results, through hard TQM factors.

Finally, the PLSpredict evaluation at the indicator level demonstrates, for the four models, how the models could be used to predict the four result variables, given new data, or in the future. In addition, the prediction performance assessments at the construct level have shown that the best predictive model is Model 2, where people results is the main dependent variable. In conclusion, the predictive analyses allow the models to be generalised to other populations.

5.1 Theoretical and managerial implications

From a theoretical point of view, the study presents an alternative methodology to assess the direct and indirect effects, between soft and strategic-hard EFQM factors and organisational results. Multiple interdependencies and synergies between these factors have been identified which must be implemented as a management system. In this system, the soft factors act as catalysts, by having a very important direct and indirect impact on the rest of the system's elements. The results also show how strategic-hard factors play a mediating role. In other words, good leadership and effective human resource management have a greater impact on results when supported by strategy, processes and management of key resources and partnerships. Furthermore, out-of-sample prediction is used for the first time as an evaluation method for the research model in PLS-SEM, in the field of TQM and EEM. Thus, it was analysed whether the models were able to predict new cases, since a robust model in explanatory terms may not work in terms of its predictive out-of-sample potential.

Regarding the implications for management, the following aspects are highlighted. Firstly, when analysing the relationship between strategic-hard factors and results, it was observed that the more personalised and identifiable the actors on which the results were analysed, the lower the impact capacity of the strategic-hard factors seemed to be (customers and people results). On the contrary, the more diffuse the group on which the results were analysed, the more intense the effects appear (key business and society results).

Secondly, the powerful impact identified between soft factors and customers was due to the fact that it is the organisation's people, and its leaders, who determine a large part of the

organisation's image, in the eyes of customers, and their satisfaction with the work carried out. It should not be forgotten that the proper exercise of leadership is not limited to actions regarding subordinates but must go further in terms of the commitment and involvement demonstrated towards the customers. In the same way, the results seem to corroborate that management of the organisation's personnel is the driving link between the business and its customers. A significant part of the customer results is induced by a leadership committed to the market and by personnel dedicated to achieving customer satisfaction. Thirdly, predictive analytics become critical in assessing the practical relevance of research models. Thus, managers can know in advance the potential effects of their management decisions and actions, on different outcomes, and, to some extent, anticipate the future and know what line of action is more or less profitable.

6. Conclusions

The main conclusions of this study are the following. Firstly, the four models analysed were shown to be highly explanatory in all their relationships, excepting the case of the direct effect of soft EFQM factors on society results (Model 3). This strengthens the research stream which holds that soft factors, strategic-hard factors, and results, jointly form a management system. However, the influence of these factors on each outcome variable is different. Thus, we find strong direct relationships between soft EFQM factors and customer and people results (Models 1 and 2). On the other hand, the most intense indirect relationships (via strategic-hard factors) are found between soft factors and society and key results (Models 3 and 4). In addition, strategic-hard EFQM factors have the strongest direct impact on outcome variables for society and key results variables (Models 3 and 4). Secondly, this study also found a powerful explanatory effect of soft EFQM factors on strategic-hard EFQM factors. This shows that leadership and people (soft factors) play a catalysing role within the management system. The existence of significant indirect effects between soft factors and result variables, via strategic-hard factors in the four models, means that soft factors should be promoted in order to lead the development of strategic-hard factors in organisations, allowing a higher impact on each outcome variable to be achieved. Finally, the four models proved to have powerful predictive performances, each demonstrating an ability to make predictions when including new data or observations. Therefore, generalising these models to other populations would be possible. This is particularly noticeable in the case of Model 2 (people results).

This study makes the subsequent contributions. First, a novel way of grouping TQM enabler factors has been proposed within the EEM framework. Second, four research models have been generated, which allow carrying out an in-depth study of the direct and indirect relationships, between soft and strategic-hard EFQM factors and result variables. Finally, this contribution has applied the most updated techniques in order to assess the prediction performance of the four research models posited.

6.1 Limitations and future research lines

This study has several limitations. First, PLS-SEM assumes that the relationships between variables are linear and one-way. For example, a direct linear relationship has been established between soft EFQM critical factors and strategic-hard EFQM critical factors. However, inverse relationships may also arise. This aspect can be dealt with in future research. Second, only data from Spain were used, which limits the potential generalisation of the findings to another geographical context. Third, future research may test the potential moderating effects that environmental factors, such as the organisation's size, its public or private nature (in this study there are not enough sample elements), might have on the models

developed here. Finally, to improve the robustness of the findings, the inter-temporal effects may be examined by using longitudinal data.

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