Excellence management practices, knowledge management and key business results in large organisations and SMEs: A multi-group analysis

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Abstract

Following the total quality management (TQM) philosophy and the knowledge management (KM) approach, this contribution aims to study the influence of process methodology and partner management on KM, as well as the relationships between this variable and key business results. We also analyse the moderating role of organisational size in these previous relationships. The hypotheses proposed in our research model are tested on a sample of 225 Spanish companies with experience in TQM through evaluations using the EFQM Excellence Model. The partial least squares structural equation modelling (PLS-SEM) approach was used to test the research model. In order to assess the moderating effects of organisational size, we adopt a multi-group approach using two subsamples with large firms and small and medium-sized enterprises (SMEs). Our findings indicate that the use of process methodology and the involvement of partners are key factors for KM to have a significant impact on the key results of the business, both strategic and operational. Moreover, the organisational size is determinant when analysing the effect of process methodology and partner management on KM. In this sense, process methodology has a greater effect on KM in the SMEs. On the contrary, the relationship between partner management and KM is more intense in large firms. Finally, it is noted that KM can be effective and can improve the key business results independently of the size of the organisation.

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1. Introduction

Organisations must have an appropriate management system to succeed. The world is changing at an increasingly rapid pace, and the interdependence between organisations and economies is growing and becoming increasingly strong. To maintain competitiveness in this environment, an organisation needs to innovate, improve continuously and manage the needs and expectations of its stakeholders. Total quality management (TQM) proposes a philosophy of comprehensive organisational management that fits with the demands of the current environment, allowing management to be oriented towards stakeholders and a greater performance to be achieved (Prajogo & Sohal, 2006).

In addition, in this context of continuous changes and uncertainty, it is critical that companies develop abilities to create and to acquire knowledge, to learn, to share what is learnt and to put it into practice (Spender & Scherer, 2007). Knowledge management (KM) is associated with business success and with the capacity of adaptation of the company to the changing and challenging environment, where the threats can be turned into opportunities. Owing to knowledge, companies can innovate, create organisational routines, grow, be sustainable and obtain competitive advantages (Chen & Huang, 2009).

At this point, we can consider if both management approaches are compatible and complementary. In this regard, the literature contributes evidence of relationships and synergies between TQM practices and the KM process (Asif, de Vries, & Ahmad, 2013; Linderman, Schroeder, Zaheer, Liedtke, & Choo, 2004; Molina, Lloréns-Montes, & Ruiz-Moreno, 2007).

However, there is no clear evidence showing the models, reference frameworks and key factors with which to obtain an effective and efficient integration of TQM and KM. This aspect
would facilitate managerial work to a great extent, as it would help improve decision-making and reduce the time taken to reach the desired results. As Herman van Rompuy, ex-president of the European Council, said, ‘All European organisations, both in the public and private sectors, are facing new challenges. The increasing pressure to compete on a global stage with limited resources means we all have to work together to secure our future prosperity, and that of generations to come. The EFQM Excellence Model provides a framework that encourages the cooperation, collaboration and innovation that we will need to ensure this goal is achieved.’

Thus, Bou-Llusar, Escrig-Tena, Roca-Puig, and Beltrán-Martín (2009), Calvo-Mora, Picón, Ruíz, and Cauzo (2014) and Kim, Kumar, and Murphy (2010) show how excellence models offer a suitable reference framework for the implementation of TQM. However, as Gómez Gómez, Martínez Costa, and Martínez Lorente (2015) indicate, excellence models and TQM are not the same frameworks, but they do follow a similar path, and it can be expected that a company with high scores in excellence models will have high odds of being a TQM company.

In the literature, theoretical works can be found which analyse synergies between the EFQM model and KM (Benavides-Quintana, 2005; Martín-Castilla and Rodríguez-Ruiz, 2008; Mohsen-Allameh, Khazaeei-Pool, Jaberi, & Mazloomi-Soveini, 2014; Westerveld, 2003). Case studies of companies that manage knowledge or some of its components, such as intellectual capital, through the EFQM model are also frequently found (Chourides, Longbottom, & Murphy, 2003; Kim, Kumar, Kumar, & Hwang, 2009; Moradi, Ramazanian, & Momeni, 2011; Senová & Antosová, 2015; Tabari, Gholipour-Kanani, & Tavakkoli-Moghaddam, 2012).

However, there is a lack of research proposing a model that can be tested empirically on the suitability of the EFQM model as a reference framework for a KM implementation, and how it can positively influence the key results of the organisation. Studies that use a horizontal reading of the EFQM model to analyse questions related to TQM and KM are also limited.

This way of interpreting the EFQM model is a powerful tool for analysing important concepts of the organisation (Fernández-Santos et al., 2010), although it is not as obvious as the traditional manner through the criteria and the sub-criteria. Thus, the EFQM model is not a set of unconnected criteria. On the contrary, it presents a series of interrelated practices that offer greater continuity and coherence (Martín-Castilla and Rodríguez-Ruiz, 2008). The interpretation of the relationships between the criteria and sub-criteria lies in the so-called transverse axes, or horizontal reading of the model, as opposed to its traditional vertical reading. The existence of these axes implies adopting a systemic approach to management. This is to say, we will not be able to achieve global improvements in the organisation, if we do not simultaneously approach the different aspects of the criteria of the model as interdependent elements (Calvo-Mora, Navarro-García, & Periáñez-Cristobal, 2015).

In this study, the transverse analysis of the EFQM model allows KM to be analysed in organisations that have been subjected to the assessment process, taking into account that KM is not contemplated in any specific criterion of the model. On the contrary, the aspects related to knowledge are considered in different sub-criteria throughout the EFQM model. More specifically, we attempt to analyse two important aspects for the effectiveness of KM: process management methodology (PMM) (Asif et al., 2013) and the management of partners (Ju, Lin, Lin, & Kuo, 2006).

In this regard, the value of products and services for the customers should be optimised, through PMM. Thus, documented information (procedures, technical instructions and records) is generated, which is a way of systematising the what, who, how and when of what is done in the organisation (a formalisation of the organisational report). In addition, this documented information constitutes a means of contributing evidence of the results that are being achieved. This source of information and knowledge must be known by the management to improve the decision-making process and by the workers to undertake their work more efficiently (internal knowledge). Conversely, the management of partners is crucial to obtain a sustainable profit; more specifically, we refer to the need to establish networks to identify opportunities for potential alliances with partners. This type of knowledge is also necessary to compete, which is why it is necessary to favour the transfer of knowledge between organisations.

Finally, the effectiveness of the previous practices and the results that the company achieves can be limited by the size of the organisation. Desouza and Awazu (2006) and Hutchinson and Quintas (2008) identify a series of peculiarities in small and medium-sized enterprises (SMEs) that could influence KM: (1) socialisation activity is predominant within the process of knowledge creation. (2) In the SMEs, their members have broad and deep levels of common knowledge. It is knowledge that is assumed and interiorised by the employees and management. (3) SMEs present limitations when creating knowledge internally. Therefore, the alternative is to capture the knowledge from external sources. (4) The loss of knowledge is not a problem in the SMEs, due to their high flexibility and their common knowledge base. (5) In SMEs, the knowledge is managed from a more person-focussed approach than from a technological aspect.

For this reason, the present research attempts to achieve the following objectives:

1. To verify the reliability and validity of the horizontal reading of the EFQM Model to study key aspects of quality management and KM.
2. To analyse the relationships between three transverse axes of the EFQM model (PMM, partner management (PM) and KM) with key business results (KBRs).
3. To study the moderating effect of organisational size between the relationships that exist between the previous variables.

In order to answer the proposed questions, this paper is organised as follows. Firstly, the literature on QM and KM is analysed. Secondly, the research model and the hypotheses are presented. This is followed by the research method, results and discussions. Finally, the conclusions are presented, and the limitations and future research of the study are described.

2. Theoretical framework

2.1. TQM and KM

TQM is a comprehensive management philosophy oriented towards achieving excellent results in relation to stakeholders (Prajogo & McDermott, 2005). The principles and practices for TQM to produce the desired effects on an organisation’s performance are known as critical factors. Some of the critical factors most frequently studied in the literature include leadership and top management commitment, strategic planning, continuous improvement, customer focus, data-based management, human resources management, process management and control and supplier management. Moreover, the literature presents evidence on the positive effect of this management philosophy on organisational performance (Kaynak, 2003; Prajogo & Sohal, 2006).

Bou-Llusar et al. (2009), Calvo-Mora et al. (2014) and Kim et al. (2010) show how excellence models offer a suitable reference framework that facilitates the implementation and improvement of TQM. In Europe, the EFQM model is the best-known and most
widespread reference when introducing and improving a TQM system. Bou-Llusar et al. (2009) and Gómez Gómez et al. (2015) highlight how the use of the EFQM model guarantees that the TQM practices employed form a coherent system.

KM has been of increasing importance in the field of strategic management. According to the knowledge-based approach, it is the most important strategic resource of companies. This is because knowledge-based resources are generally difficult to imitate and are socially complex (Teece, 2014). This approach suggests that companies exist to create, share and receive benefit from their knowledge (Ipe, 2003). Thus, successful companies are those that can identify, value, create and develop their knowledge assets (Spender & Scherer, 2007). In the same way that knowledge is considered a strategic resource, KM is considered a critical capacity for organisational success (Chen & Huang, 2009).

This fact has entailed taking a qualitative and quantitative step in the management of organisations, which see the need to implement KM systems to increase their competitive capacity. The KM systems are a set of infrastructures and tools that support the activities of KM (Alavi & Leidner, 2001); that is to say, they provide a context that facilitates the creation, storage, transfer and application of knowledge. Meso and Smith (2000) differentiate between technical infrastructure (information technologies) and that of a social and cognitive nature (leadership, organisational structure, human resources and the culture). In addition, there is no single valid model for managing knowledge, as it depends on the theoretical vision adopted and the context in which it is applied.

In agreement with the existing literature, TQM and KM share factors considered key to the success of implementing both management approaches, for example, motivated workers (Davenport, De Long, & Beers, 1998), employee training, involvement and empowerment, teamwork (Moffett, McAdam, & Parkinson, 2003; Ryan & Prybutok, 2001), leadership and senior management support and commitment, friendly and open organisational culture (Moffett et al., 2003; Ryan & Prybutok, 2001), processes and performance measurement (Hung, Huang, Lin, & Tsai, 2005), benchmarking (Hung et al., 2005; Moffett et al., 2003) and information systems structure (Hung et al., 2005).

Linderman et al. (2004) go further, by considering that TQM and KM seek the same objective: to create and use tacit and explicit knowledge more efficiently, at the individual and collective level, to continuously improve and to obtain better results. Molina et al. (2007) emphasise the importance of technical and social aspects of quality and KM so that the knowledge transfer process is efficient. Asif et al. (2013) show how a series of TQM practices (continuous improvement, statistical control of quality, management of client satisfaction, process improvement techniques, individual learning and the methods of new product development) favours the process of knowledge creation.

In short, KM processes do not make sense if they are not developed systematically. To be competitive, organisations need to continuously generate and assimilate knowledge and new capabilities. Therefore, TQM as a management philosophy based on continuous improvement, innovation and learning can serve as a context and support for the start-up and later development of a KM process.

2.2. Vertical and horizontal interpretation of the EFQM model

The aim of the EFQM model is to support organisations to achieve business excellence through continuous improvement, learning and innovation. The model presents a non-prescriptive working framework that analyses the relationships between what an organisation does and the results that it is able to attain, assuming that there are different approaches to attaining excellence (EFQM, 2013).

The EFQM model sets out the management of excellence from a conceptual structure, based on a series of Fundamental Principles of Excellence upon which all the later development of the elements of the model is based. Nevertheless, when describing the implications of excellent management, the model considers two levels of detail:

- **Criteria (Enablers and Results):** These represent essential constructs that can describe the actions and consequences that must derive from an authentic excellent management in a comprehensible manner and adjusted to the reality of the organisations. These criteria are leadership, policy and strategy, partnerships and resources, people and process, and the four remaining criteria reflect the results that the organisation attains, with respect to their customers, employees, society and other KBRs.

- **Sub-criteria:** In each criterion, the model sets out a series of sub-criteria that detail the elements that shape the construct on which they depend. Their purpose is to provide a more specific and practical guide that translates what each criterion defines at more operational levels. If we understand that a criterion represents an important construct in management terms, the sub-criteria can be understood as components of the said construct, which allow a greater applicability of the proposals of the model.

Two immediate conclusions can be drawn from the description of the general structure of the model: Firstly, the criteria, on which the development of the model is based, cannot be considered in a compartmentalised manner, and it should certainly not be understood that a description of the full complexity involved in the management of an organisation could be made solely with those criteria. Only those best suited to serve as a conceptual framework for the description of excellence are considered. It could be said that these nine criteria represent a ‘vertical’ perspective from which to approach excellence in management. Secondly, the consideration of other possible constructs important for management calls for a horizontal reading of the Model, based on the meaning of each of its 32 sub-criteria. Each of these horizontal readings (‘transverse axes’) allows the consideration of new factors that allow management excellence to be approached from other perspectives (Fernández-Santos et al., 2010). In comparative terms, the vertical structure of the model would be the equivalent of that used to describe an organisation on the basis of its organisational units or departments. On the contrary, the analysis of other possible management components, through axes, would be equivalent to the processes executed daily in an organisation and which connect the activities or functions of departments.

Thus, it is easy to simplify seeing the model as the sum of nine criteria without any apparent connection between them. Nevertheless, it is impossible to approach the whole complexity of management without analysing other constructs or axes (Martín-Castilla and Rodriguez-Ruiz, 2008). These axes involve a more refined reading of the different sub-criteria, seeking in each those ideas that could be extracted for a better knowledge of the components of the construct that is attempted to be approached. Fig. 1 shows three of these axes: KM, PMM and PM.

If we assumed that the consideration of each and every one of the possible elements involved in excellent management would be unapproachable, we must conclude that the analysis of the model on the basis of transverse axes can help answer the following questions: (a) In each case, which sub-criteria of the model relate to the new construct to be studied (axis), and what knowledge is contributed with respect to that question? (b) For a more correct understanding of the new construct under study, how is each of these sub-criteria interconnected with the others?
Table 1
EFQM Model and knowledge management issues.

<table>
<thead>
<tr>
<th>Fundamental concepts of excellence</th>
<th>KM issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development and involvement of people</td>
<td>Excellent organisations recognise the increasing importance of the intellectual capital of those who comprise them and use their knowledge to the benefit of the whole organisation</td>
</tr>
<tr>
<td>Continuous process of learning, innovation and improvement</td>
<td>Excellent organisations, through benchmarking activities, must continuously learn, and gather and share the knowledge of the people who comprise them, to maximise the learning in the whole organisation</td>
</tr>
<tr>
<td>Development of alliances</td>
<td>Partners must work together to reach common objectives, each helping the others with their experience, resources and knowledge</td>
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**EFQM Criteria**

<table>
<thead>
<tr>
<th>KM issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leadership</td>
</tr>
<tr>
<td>Policy and strategy</td>
</tr>
<tr>
<td>People</td>
</tr>
<tr>
<td>Partnerships and Resources</td>
</tr>
</tbody>
</table>

Source: Own production.
2.3. Using transverse axes of the EFQM model for KM

Benavides and Quintana (2005), Calvo-Mora et al. (2015), Martín-Castilla and Rodríguez-Ruiz (2008), and Westerveld (2003) maintain that the EFQM model constitutes an element of stimulus and fundamental support to KM, and that there are important relationships between the fundamental activities of KM and the fundamental concepts of excellence and criteria and sub-criteria of the EFQM Model (Table 1).

Nevertheless, none of the criteria approaches KM through the vertical reading of the model, although a transverse axis can be identified for KM. In addition, other axes can be found, such as communication, social responsibility, creativity and innovation, human resources, PMM or PM (EFQM, 2003). Indeed, these last two axes (PMM and PM) are practices characteristic of excellent management, which can favour and strengthen the effect of KM on the results (Calvo-Mora et al., 2015). PMM is a critical factor of KM, because the knowledge of the organisation becomes formalised and more explicit through processes, which favours its creation, transfer and diffusion (Molina et al., 2007). In PM, apart from the information derived from the internal processes, the management of the information and knowledge that comes from them is increasingly important (Ju et al., 2006).

These two axes contemplate different aspects, although complementary to the Process and Partnerships and Resources criteria. Thus, the Process criterion makes two essential statements for the description of excellent management: (1) independently of the departmental structure of an organisation, the identification and management of their processes become key elements for excellence; (2) within the whole spectrum of processes that unfold daily in an organisation, those directly involved with the products and services provided to the customers must have special attention, as they are considered to be key processes. However, there is no exhaustive description of the complete development of all the activities for an excellent process management in the Process criterion itself, but it is extended to others.

For example, when referring to the establishment of owners (leaders) as an essential phase of process management, this activity appears among the sub-criteria of the Leadership criterion. In short, for a complete analysis of process management, an axes-based analysis becomes necessary; that is to say, apart from considering some sub-criteria of the Process criterion (those of a more general character), it is also necessary to consider others included in different criteria of the model, such as in the case mentioned for ‘Leadership’.

Criterion 4 (Partnerships and Resources), however, shows that when using the term ‘Resources’ with excellence criteria, we must extend our field of vision to understand that not only must the tangible elements linked to the activity of the organisation have space within the construct, but also those of an immaterial character, fundamentally those associated with information and the bonds, contacts, influences or formal alliances with third parties. Both elements need excellent management in consonance with the strategy and policies of the organisation. Although most of the questions related to the excellent management of the material resources of an organisation are included in the sub-criteria of criterion 4, many questions concern immaterial elements and, especially the theme of alliances, are dispersed through the remaining criteria of the model.

3. Research model and hypotheses

The research model is based on the extent to which the organisation can improve its KBR through KM, for which it will have to apply PMM, in addition to the participation and involvement of its strategic suppliers and partners (PM) in the process. The KBRs are analysed as a dependent variable. This variable attempts to determine the benefits to the organisation in relation to the planned economic–financial, market and process results and the efficiency of the management of tangible and intangible resources. Moreover, the relationship between these variables may be affected by organisational size.

3.1. PMM and KM

PMM supposes a way to act that focuses the attention of people on the same realities that the client perceives, together with using criteria similar to those of the client, to assess the quality of the work done. It involves the organisation being oriented towards the activities that generate value for the client, which calls for the creation, sharing and application of the information and knowledge that comes from the market.

The PMM includes the following activities: assignment of proprietors or those responsible for the processes; implementation of standardised systems for its management; establishment of objectives and monitoring and measurement systems; and systems of analysis and improvement of these processes. These activities need to document the processes, in order to describe what the organisation does and, consequently, to make its knowledge and capacities explicit (Tang & Tong, 2007). Therefore, PMM facilitates the creation of knowledge (Asif et al., 2013), as the processes include concepts, methods and techniques to support the design, implementation and analysis of the activities that generate value. Accordingly, the information derived from the activities that form the processes are transformed into knowledge. The PMM also favours the transfer and storage of knowledge (Molina et al., 2007) when cooperating to transform it from tacit to explicit. Therefore, there are two prerequisites for facilitating knowledge transfer: the intention to share it and the capacity to do so. In addition, the implementation of PMM changes the structure of the company, making it more open and flexible. In this climate, the transfer and diffusion of knowledge are strengthened (Linderman et al., 2004). Therefore, we propose the following hypothesis:

H1. PMM is positively related to KM.

3.2. PM and KM

In the EFQM Model context, partners are considered to be any external ally of a strategic nature with which the organisation chooses to work, to reach common objectives and to obtain a sustained mutual benefit (EFQM., 2013).

Companies that maintain excellent relationships with their suppliers and partners can take advantage of synergies and can access and exchange new or complementary knowledge, which allow the generation of value for both parties. This exchange of knowledge can even be obtained without having to produce explicit knowledge, as it can be made through the exchange of people or groups with common objectives and cultures that will be able to work together effectively (Davenport & Prusak, 1998).

As noted previously, confidence between the partners is an important factor that influences the effectiveness of knowledge transfer. Confidence is associated with the belief that organisations act coherently and according to expectations (Spekman, Spear, & Kamauff, 2002). Confidence is closely related to the risk and protection of knowledge. A reduction in confidence between organisations will be translated into a greater risk of losing critical knowledge. On the contrary, confidence will encourage the actors to actively share their knowledge, ensuring that this will not be used against their objectives (Linderman et al., 2004). Therefore, it
is hoped that an organisation with greater levels of confidence in its collaborative relationships with its suppliers and partners manages knowledge in a better manner (Loke, Downe, Sambasivan, & Khalid, 2012). Accordingly, we propose the following hypothesis:

**H2.** PM is positively related to KM.

### 3.3. KM and KBRs

The KBR in the EFQM model attempts to measure what the organisation obtains in relation to its strategic results and planned goals. More specifically, the strategic key results of the economic-financial type (sales volume, share or dividend prices, gross margins, share profits, profits before interests and taxes or operating margin), as well as those of a non-economic nature, are analysed (market share, time of launching new products, success indices and process performance), which indicate the success of implementing the strategy. The positive relationship between KM and financial results has been confirmed in the study by Huang and Shih (2009). More specifically, Tarif and García Fernández (2013) reach the conclusion that the processes of creation, storage, transfer and application of knowledge influence economic results through greater product diversification, greater client loyalty and increased automatic control over the work.

The key economic-financial indicators (treasury, depreciation, maintenance costs and credit qualification) and non-economic indicators (performance of processes, partners and suppliers, external resources and alliances, buildings, equipment and materials, technology, information and knowledge) are used by the organisation to measure its operational efficiency. Hence, studies like those of Davenport and Prusak (1998) and Tarif and García Fernández (2013) indicate how KM helps improve the operational results through the development of a global vision of the company, empowerment, improvement in decision-making, reduction of errors, teamwork or the training and qualification of the workers. Therefore, the following hypothesis is proposed:

**H3.** KM is positively related to KBRs.

### 3.4. The moderating role of organisational size

Durst and Edvardsson (2012) and Gray and Mabe (2005) indicate that the size must be considered an important factor when understanding how knowledge is managed, and that the size influences decision-making processes and the strategic choices that the company may adopt. Thus, the simpler organisational structure in the SMEs entails greater centralisation in the decision-making (Jones & George, 2010). They are structures with few hierarchical levels, in which the strategic and operational decisions are usually centralised jointly in the general management (Mintzberg, 1979). With respect to the strategic choices, the small size does not allow access to economies of scale and scope, which is why low unit costs cannot be achieved. This involves the difficulty of implementing strategies based on cost leadership (Jones & George, 2010). Another important factor that limits the competitiveness of the SMEs is their difficulty in accessing resources, especially those of the financial and intangible type. The SMEs have very limited access to avant-garde technological knowledge or to highly qualified labour due to the high cost. They also have limited access to credit and capital markets (McAdam & Reid, 2001). This means that they face difficulty in introducing more expensive, radical and technologically advanced innovations and KM. The KM in SMEs tends to be more informal and ad hoc, which may lead to a short-term viewpoint (Laforet, 2013). Furthermore, innovation and KM in SMEs is usually linked to development orientation, through the continuous improvement of process management, whereas that of large companies is usually linked to research (Desouza & Awazu, 2006). Moreover, the small size and the lower specialisation of the workforce indicate a greater probability of collaboration and cooperation between the employees (Daft, 2010), which largely favours the process management and KM in SMEs. According to the arguments, we propose the following hypothesis:

**H4.** PMM has a stronger positive effect on KM for SMEs than for large companies.

However, when the relationships with clients, suppliers, distributors and other partners and stakeholders are included, the SMEs find greater difficulties in managing such relationships and in generating knowledge due to their lower negotiating power and relational capabilities than large organisations (Jones & George, 2010). This implies that in large organisations, given the greater size and complexity of their networks of partners, the development of systematised processes to manage this network influences knowledge generation to a greater extent than in the SMEs (Aragon-Sánchez and Rubio-Bañón, 2005). For this reason, we propose the following hypothesis:

**H5.** PM has a stronger positive effect on KM for large companies than for SMEs.

Finally, with respect to the relationship between KM and key results, McAdam and Reid (2001) concluded that SMEs and large organisations have much to gain by developing effective KM systems. These benefits are related to a reduction of costs and an improvement in quality and efficiency. Nevertheless, in SMEs, there is a predominance of socialisation activity within the process of knowledge creation. Most of the knowledge is held in the mind of the proprietor and some key employees. In addition, management and employees maintain more direct and constant contact with each other, which facilitates knowledge transfer and application. In SMEs, the members have broad and deep levels of common knowledge. Knowledge is assumed and interiorised by the employees and management. It helps mark the behaviour in the workplace and provides a common reference framework that ensures communication, transfer and application of the knowledge. Finally, in environments of high competitiveness and mobility of employees, the loss of knowledge can be a serious problem. However, in SMEs, this is not considered a real problem, due to their high flexibility, their common knowledge base or to their capacity to retain employees, due to the close social bonds between them (Desouza & Awazu, 2006; Hutchison and Quintas, 2008). From the above, we can extract the following hypothesis:

**H6.** KM has a stronger positive effect on KBRs for SMEs than for large companies.

### 4. Methodology

#### 4.1. Sample

The sample consisted of 225 Spanish companies subjected to self-assessment and external assessment on the basis of the EFQM Model. According to data contributed by the Centres of Excellence (an association that unites the efforts of excellence-promoting centres throughout Spain), the total number of organisations subjected to complete assessments during the period 2003–2014 was 531. Therefore, there was a 42% response rate. Considering size as a categorical variable, the sample was split into two groups (SMEs = 146; large companies = 79). To this end, the
Recommendation of the European Commission 96/280/EC was followed. Therefore, SMEs will be considered to be companies that employ <250 people, whose annual business volume does not exceed 50 million euros or whose annual general balance sheet figures do not exceed 43 million euros. Moreover, 83.5% (188) of the companies are privately owned, and 16.5% (37) are public organisations. Finally, 71.5% (161) of the companies of the sample pertain to the services sector, 19.55% (44) to the industrial sector and 8.95% (20) to the agricultural sector.

4.2. Measures

The variables and their respective measurement indicators were obtained from the transverse axes of the EFQM model (EFQM, 2003). As previously indicated, the elements that form the axes are the sub-criteria of the EFQM model, although sub-criteria pertaining to various criteria can be combined in each axis. In this work, and according to the objectives considered, three transverse axes were selected (KM, PMM and PM), as well as the KBR (see Fig. 1).

Most studies that analyse the internal structure of the EFQM model do not use the original measurement scales or the scores obtained through the RADAR logic matrices. The literature confirms the theoretical reliability of the data obtained through the validation performed by independent external experts (Pannirselvam & Ferguson, 2001). The reliability and validity of the original measures of the EFQM model have also been confirmed by Bou-Llusar et al. (2009) and Calvo-Mora et al. (2014).

The data were collected from the assessment processes according to the RADAR (Results—Approach—Deployment—Assessment and Review) logic, which the EFQM model uses to score the level of excellence of organisations. The RADAR logic is a dynamic assessment framework and a powerful management tool that provides a structured approach to questioning the performance of an organisation.

The elements of Approach, Deployment, Assessment and Review are applied to Enablers; these elements analyse the evidence of what the organisation is doing. The Results element is used to assess the criteria related to the results. This analyses what the organisation achieves, as a consequence of the efforts made. More specifically, it establishes what an organisation needs to do to (EFQM, 2013): (1) Determine the Results that it wants to obtain as part of the process of producing its policy and strategy; (2) plan and develop a series of solidly based and integrated Approaches, which it takes to obtain the required results, now and in the future; (3) Deploy the approaches systematically to assure complete implementation; and (4) Assess and Review the approaches used, based on the monitoring and analysis of the results achieved and on the continuous learning activities. Finally, it will have to identify, establish priorities for, plan and implement the improvements that are necessary.

The scoring scale of the RADAR matrices for the Enablers is divided into five intervals, ranging from values 0 (without evidence or anecdotes) to 100 (total evidence). For the Results, the scale also varies between 0 and 100, but the significance of the extreme values changes, according to the type of result that is being analysed (trend of the results, fulfilment of objectives, comparisons with other companies, causes of the results or sphere of application). Finally, we controlled for sector (1. Agriculture; 2. Industry; and 3. Services) and ownership of the company (public vs. private).

4.3. Data analysis

Two stages were developed in the data analysis using a variance-based, structural equation modelling (partial least squares (PLS); SmartPLS 3.1.9. software was used (Ringle, Wende, & Becker, 2015)). (1) For the whole sample, the research models depicted in Fig. 2 were tested allowing the assessment of the measurement model and the testing of the linkages proposed between constructs (Koldan & Sanchez-Franco, 2012). This first stage included a permutation algorithm and the measurement invariance of composite models (MICOM). (2) The moderating effects of Size were analysed through a multi-group comparison approach (MGA), as the Size type of variable was categorical (Henseler & Fassott, 2010). Multi-group analysis (MGA) has several advantages: a) It allows researchers to determine whether parameters of a measurement model and/or the structural model are equivalent (i.e., invariant) across two or more groups (Chin et al., 2012). b) It provides a particularly strong test of the validity of the measurement model and replicability of the structural model across settings. c) It is also used to make comparisons within a study, whether this is to assess theoretical differences between subgroups of the same population.
or across populations in the case of multicultural research, or to determine if samples taken from different sources can be combined into a single data set (Fawcett, Wallin, Allred, Fawcett, & Magnan, 2011). For MGA, responses were divided into two groups, depending on Size (group 1 = SMEs; group 2 = Large companies). Then, with the use of PLS, the path coefficients were estimated for each group or subsample (Sarstedt, Henseler, & Ringle, 2011). Finally, the differences between the coefficients’ paths were analysed. If they are significant, they can be interpreted as having moderating effects. To determine the significance of differences between the estimated parameters for each of the groups, the permutation test was mainly used. In addition, in a complementary manner, two approaches were followed. On the one hand, the parametric approach was used considering both equal variances and different variances (Chin, 2000). On the other hand, a non-parametric confidence approach was used (Sarstedt et al., 2011).

### 5. Results

The measurement model has been designed as a composite factor model following a reflective approach (Henseler, 2014). The composite factor model relaxes the strong assumption that all of the covariation between a block of indicators is explained by a common factor. This implies that the composite factor model does not impose any restrictions on the covariances between indicators of the same construct, and composites are formed as linear combinations of their respective indicators (Henseler et al., 2014). In addition, our model is oriented to prediction. Its assessment has to be based on reliability and validity (Roldán & Sánchez-Franco, 2012). A subsequent PLS path model analysis reveals that all measures meet the commonly suggested criteria for measurement model assessment as described, for example, by Henseler, Ringle, and Sinkovics (2009) and Hair, Sarstedt, Ringle, and Mena (2012). In this vein, the loadings of both indicators and dimensions exceed the 0.70 threshold. Consequently, indicators and dimensions are reliable. Constructs and dimensions present high internal consistency, as its composite reliability indices exceed 0.7. In addition, the convergent validity is achieved for all latent variables because the average variance extracted (AVE) ratios exceed the 0.5 benchmark (Table 2).

Conversely, Table 3 shows the discriminant validity. According to the Fornell–Larcker criterion, the square root of the AVE of each latent construct is greater than its correlations with any other latent variable (Fornell & Larcker, 1981). Moreover, we used the heterotrait–monotrait (HTMT) ratio of correlations (Henseler, Ringle, & Sarstedt, 2015). In this respect, all values are under 0.85. Thus, the discriminant validity is reached, and it can be concluded that the main constructs measure different aspects.

In summary, according to the PLS analyses, the measurement model is completely satisfactory for our model, both with the whole sample and with each subsample (SMEs and large companies). The following step was to ensure the metric invariance of the construct measures; that is, the proposed measurement model does not vary when the size of the company is considered.

For this purpose, a permutation algorithm was used to confirm that the indicators associated with each construct are invariant between SMEs and large companies (Chin et al., 2012). As can be seen in Table 4, the differences between the factorial loads of both groups are all non-significant (permuation p-value > 0.05). These results were also corroborated with parametric and Welch–Satterthwaite tests (Table 4).

Furthermore, the permutation algorithm was used to implement the MICOM, described by Henseler, Ringle, and Sarstedt (2016). MICOM is used to determine whether significant inter-group differences are due to inter-group differences in constructs, when assessing composite models. As the indicators in the outer model determine the meaning of the constructs in the structural (inner) model, the lack of measurement invariance implies that even though the constructs for, say, the ‘SME’ and ‘Large companies’ groups carry the same labels, the labels are deceptive because the constructs measure different things. MGA tests are suited only in cases of measurement invariance, meaning only if the inner model constructs measure the same things. MICOM is therefore a logically necessary step, prior to conducting MGA. The values of Table 5 corroborate the configurational, compositional and scalar invariance assuring ‘full measurement invariance’.

Table 6 shows the results of the structural model assessment. Consistent with Hair, Hult, Ringle, and Sarstedt (2013), bootstrapping (5000 resamples; one-tailed Student’s t distribution with 1 Running MICOM in SmartPLS usually automatically establishes configurational invariance. The statistical output does not apply to this step and is not shown.
<table>
<thead>
<tr>
<th>Discriminant validity.</th>
<th>Total sample; ( n = 225 ) SMEs;</th>
<th>Large companies; ( n = 146 )</th>
<th>SMEs; ( n = 79 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total sample; ( n = 225 ) SMEs;</td>
<td>0.868</td>
<td>0.821</td>
<td>0.868</td>
</tr>
<tr>
<td>Large companies; ( n = 146 )</td>
<td>0.846</td>
<td>0.870</td>
<td>0.868</td>
</tr>
<tr>
<td>SMEs; ( n = 79 )</td>
<td>0.870</td>
<td>0.857</td>
<td>0.856</td>
</tr>
<tr>
<td>Sector Ownership</td>
<td>PMM</td>
<td>PM</td>
<td>KM</td>
</tr>
<tr>
<td>Ownership</td>
<td>0.870</td>
<td>0.857</td>
<td>0.856</td>
</tr>
<tr>
<td>PM</td>
<td>0.846</td>
<td>0.870</td>
<td>0.868</td>
</tr>
<tr>
<td>KM</td>
<td>0.821</td>
<td>0.847</td>
<td>0.849</td>
</tr>
<tr>
<td>KBR</td>
<td>0.819</td>
<td>0.847</td>
<td>0.849</td>
</tr>
<tr>
<td>Sector Ownership</td>
<td>PMM</td>
<td>PM</td>
<td>KM</td>
</tr>
<tr>
<td>Ownership</td>
<td>0.868</td>
<td>0.821</td>
<td>0.824</td>
</tr>
<tr>
<td>PM</td>
<td>0.846</td>
<td>0.870</td>
<td>0.868</td>
</tr>
<tr>
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<td>0.849</td>
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<tr>
<td>KBR</td>
<td>0.819</td>
<td>0.847</td>
<td>0.849</td>
</tr>
<tr>
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<td>PMM</td>
<td>PM</td>
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</tr>
<tr>
<td>KBR</td>
<td>0.819</td>
<td>0.847</td>
<td>0.849</td>
</tr>
</tbody>
</table>

Note: Monotrait Ratio (HTMT) was mainly used (5000 permutation runs; two-tailed 0.05 significance level). This condition is fulfilled for H4 and H5, but not confirmed for H6. Similar results were obtained when Henseler’s PLM multi-group analysis (Table 7) was applied. This non-parametric significance test showed a significant difference if the p-value is < 0.05, or >0.95, as occurs in H5 (p-value = 0.997), for the difference of group-specific path coefficients (Henseler et al., 2009). For H6, the differences were not significant (p-value = 0.110). The same result is derived from the application of the non-parametric approaches (the bias –correct 95% confidence intervals). In this case, if the parameter estimate for a path relationship of one group (Table 6) does not fall within the corresponding confidence interval of another group (Table 7) and vice versa, no overlap exists and it can be assumed that the group-specific path coefficients are significantly different with regard to a significance level a (Sarstedt et al., 2011). This condition is fulfilled for H4 and H5, but not confirmed for H6. Similar results were obtained when Henseler’s PLM multi-group analysis (Table 7) was applied. This non-parametric significance test showed a significant difference if the p-value is < 0.05, or >0.95, as occurs in H5 (p-value = 0.997), for the difference of group-specific path coefficients (Henseler et al., 2009). For H6, the differences were not significant (p-value = 0.110). Finally, the overall model was measured through a standardised root mean square residual (SRMR) composite factor model.
Table 4
Metric invariance assessment permutation algorithm and multi-group analysis.

<table>
<thead>
<tr>
<th>Construct/Indicator</th>
<th>Diff (SME-L)</th>
<th>Permutation test</th>
<th>Parametric test Welch–</th>
<th>t-value Satterthwaite test (t-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>95% confidence interval</td>
<td>p-value</td>
<td></td>
</tr>
<tr>
<td>PMM</td>
<td>0.010</td>
<td>[−0.088; 0.074]</td>
<td>0.301</td>
<td>0.273**</td>
</tr>
<tr>
<td>2d.</td>
<td>0.044</td>
<td>[−0.072; 0.065]</td>
<td>0.093</td>
<td>1.415**</td>
</tr>
<tr>
<td>5a.</td>
<td>0.064</td>
<td>[−0.129; 0.107]</td>
<td>0.378</td>
<td>0.825**</td>
</tr>
<tr>
<td>5b.</td>
<td>0.043</td>
<td>[−0.080; 0.071]</td>
<td>0.076</td>
<td>0.916**</td>
</tr>
<tr>
<td>PM</td>
<td>1c.</td>
<td>[−0.074; 0.068]</td>
<td>0.243</td>
<td>0.900**</td>
</tr>
<tr>
<td>2a.</td>
<td>0.018</td>
<td>[−0.053; 0.049]</td>
<td>0.455</td>
<td>0.742**</td>
</tr>
<tr>
<td>2c.</td>
<td>0.018</td>
<td>[−0.075; 0.068]</td>
<td>0.083</td>
<td>0.548**</td>
</tr>
<tr>
<td>4a.</td>
<td>0.031</td>
<td>[−0.105; 0.096]</td>
<td>0.117</td>
<td>0.568**</td>
</tr>
<tr>
<td>KM</td>
<td>2b.</td>
<td>[−0.048; 0.046]</td>
<td>0.307</td>
<td>0.544**</td>
</tr>
<tr>
<td>3b.</td>
<td>0.059</td>
<td>[−0.122; 0.103]</td>
<td>0.116</td>
<td>1.096**</td>
</tr>
<tr>
<td>4e.</td>
<td>0.093</td>
<td>[−0.110; 0.091]</td>
<td>0.164</td>
<td>1.296**</td>
</tr>
<tr>
<td>KBB</td>
<td>9a.</td>
<td>[−0.028; 0.025]</td>
<td>0.240</td>
<td>0.955**</td>
</tr>
<tr>
<td>9b.</td>
<td>0.011</td>
<td>[−0.022; 0.161]</td>
<td>0.161</td>
<td>1.010**</td>
</tr>
</tbody>
</table>

ns = not significant.

Table 5
Measurement invariance (MICOM) tests.

<table>
<thead>
<tr>
<th>Construct</th>
<th>Correlation c value (−1)</th>
<th>95% confidence interval</th>
<th>Permutation p-value</th>
<th>Compositional invariance?</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMM</td>
<td>0.999</td>
<td>[0.997; 1.000]</td>
<td>0.200</td>
<td>Yes</td>
</tr>
<tr>
<td>PM</td>
<td>0.999</td>
<td>[0.999; 1.000]</td>
<td>0.178</td>
<td>Yes</td>
</tr>
<tr>
<td>KM</td>
<td>0.999</td>
<td>[0.998; 1.000]</td>
<td>0.134</td>
<td>Yes</td>
</tr>
<tr>
<td>KBR</td>
<td>1.000</td>
<td>[0.999; 1.000]</td>
<td>0.776</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Table 6
Direct and indirect effects. Bias-corrected 95% confidence intervals and indirect effect of multi-group comparison results.

<table>
<thead>
<tr>
<th>Effects on endogenous variables</th>
<th>Total sample; n = 225</th>
<th>SMEs; n = 146</th>
<th>Large companies; n = 79</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Direct effect</td>
<td>t-value (bootstrap)</td>
<td>Explained variance</td>
</tr>
<tr>
<td>Knowledge management</td>
<td>(R² = 0.798/Q² = 0.580)</td>
<td>20.40%</td>
<td>28.28%</td>
</tr>
<tr>
<td>H1: Process management</td>
<td>0.252**</td>
<td>4.919</td>
<td></td>
</tr>
<tr>
<td>methodology</td>
<td>0.161</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H2: Partners management</td>
<td>0.675***</td>
<td>13.672</td>
<td>54.13%</td>
</tr>
<tr>
<td>Key business results</td>
<td>(R² = 0.462/Q² = 0.423)</td>
<td>45.83%</td>
<td></td>
</tr>
<tr>
<td>H3: Knowledge management</td>
<td>0.677***</td>
<td>17.473</td>
<td></td>
</tr>
<tr>
<td>Control variables</td>
<td>0.078ns</td>
<td>1.335</td>
<td>1.39%</td>
</tr>
<tr>
<td>Ownership → KBR</td>
<td>0.001ns</td>
<td>0.340</td>
<td>0.65%</td>
</tr>
<tr>
<td>Indirect effect</td>
<td>Total sample</td>
<td>0.248</td>
<td></td>
</tr>
<tr>
<td>PMM → KM → KBB</td>
<td>[0.114; 0.228]</td>
<td>0.314; 0.513</td>
<td></td>
</tr>
</tbody>
</table>

*** p < 0.001, (based on t(4999), one-tailed test); t(0.05, 4999) = 1.645, t(0.01, 4999) = 2.327, t(0.001, 4999) = 3.092; Bootstrapping based on n = 5000 subsamples; ns – not significant. Sig. denotes a significant difference – indirect effect – at 0.05; Nsig. denotes a non-significant difference – indirect effect – at 0.05.
(Henseler et al., 2014). Thus, the values obtained for the complete model (0.075), the large company model (0.073), and the SME model (0.079) recommend a limit value of 0.08 (Hu & Bentler, 1999).

6. Discussion and conclusions

The results support the reliability and validity of the measurement model (Tables 2 and 3), both for the model that represents the whole sample of companies and for the subsamples that represent the SMEs and the large companies. In addition, the property of metric invariance is confirmed; that is to say, the measurement model does not change when dividing the original sample into two subsamples (Tables 4 and 5). This result supports the universality of the excellence models that can be used as reference for evaluation and improvement by both large organisations and SMEs (EFQM, 2013). Moreover, the results confirm the high predictive power ($R^2$) and high predictive validity ($Q^2$) of the EFQM model as a framework for the implementation and integration of TQM and KM practices. As can be seen in Table 6, the KM and KBR variables display substantial $R^2$ values ($R^2 > 0.67$) according to Chin (2010), both for the whole sample and for the two subsamples representing the SMEs and large companies. Moreover, the endogenous variables present $Q^2$ coefficient values above 0; in particular, they display values of $Q^2 > 0.34$.

With respect to the direct effects represented by the H1, H2 and H3 hypotheses, firstly it is highlighted (Table 6) that PMM plays a central role in the complete model, and in that representing the SMEs, where a significant direct effect on KM is seen (H1). In addition, PMM is used more extensively in the SMEs (0.344) than in large organisations (0.113). In this sense, in the model that represents large companies, the relationship between PMM and KM, although positive, is not statistically significant. In addition, this leads to the indirect effect between PMM, KM and KBR of a lack of statistical significance. This may be due to PMM being focussed mainly on the key processes, those that are directly involved with the products and services supplied to the customers. Thus, the SMEs have greater proximity, contact and knowledge with customers, which explains why their effect on KM is stronger and more direct than in large companies (Desouza & Awazu, 2006). Moreover, this result may be due to greater collaboration and cooperation between employees in the SMEs when putting key processes into practice (Durst and Runar Edwardsson, 2012), and because the SMEs are more focussed on continuous improvement in their activities and processes. In this regard, large companies can dedicate more resources to product innovation, services, processes or technology than the SMEs (McAdam & Reid, 2001). Continuous improvement is based on the human factor; further, it supposes small but constant changes that do not require heavy investments or monetary expenditure. On the contrary, innovation involves drastic changes in the processes and activities of the organisation, which requires time and a substantial amount of resources, which is more feasible for large organisations. The importance of this factor is also reflected in the high percentages of variance ($R^2$) of the KM variable in both the complete model (20.4%) and that representing the SMEs (28.28%).

Secondly, the management of the main partners of the organisations is also a critical variable for KM within the framework of the EFQM model. Thus, the direct effect between PM and KM (H2) is statistically significant both in the model that represents all the companies and in the models segmented according to size (Table 6). In addition, management in large companies emphasises the importance of PM for KM (0.826). This value is far beyond that obtained for the same relationship in the SMEs (0.581). Thus, the indirect effect between these variables and KBR is statistically significant (Table 6). This crucial role in the model is also observed when analysing the percentage of variance, which is accounted for by the endogenous KM variable in the complete sample (54.13%), as well as in those of SMEs (46.71%) and large companies (67.65%).

Thirdly, it is necessary to emphasise how the specific efforts that companies make to manage their knowledge have a direct and significant effect on the KBR (H3). This effect is confirmed both for the whole sample and for the subsamples that represent the SMEs and large companies (Table 6). In addition, no important differences were noted in the values of the indirect effects in this case (PMM → KM → KBR and PM → KM → KBR), although the relationship between KM and KBR is stronger in the SMEs (0.722) than in large companies (0.611), explaining up to 52.13% of the variance of the KBR variable.

Finally, on analysing the results of the moderating effect of the size variable on the direct relationships between the variables of the model, significant differences (Table 7) are noted in the relationships between PMM and KM (H4) and between PM and KM (H5). These differences corroborate the differences indicated in the literature on the distinctive features presented by the management of SMEs with respect to large companies. More specifically, PMM has a greater effect on KM in the SMEs, confirming H4. This may be due to the smaller size and the lower level of specialisation of the workforce, leading to a greater probability of collaboration and cooperation between the employees, which largely favours the processes of creation, transfer and application of knowledge. In addition, as noted previously, the SMEs are more focussed on continuous improvement through processes and not as much towards technological innovation (McAdam & Reid, 2001). On the contrary, the relationship between PM and KM is stronger in large companies, confirming H5. Large companies have greater negotiating power over their main partners (Gray & Mabey, 2005) and have greater financial means to know the movements and actions of competitors and other stakeholders. Finally, KM is found to be effective and to improve the KBR independently of the size of the organisation, when there are no significant differences between both samples. This implies that the H6 hypothesis cannot be confirmed.
statistically, although the relationship or direct influence between KM and KBR is stronger in the SMEs than in large organisations.

7. Implications, limitations and future research directions

7.1. Theoretical implications

Despite the great interest and several studies published on TQM philosophy and the EFQM model, empirical research attempting to integrate the EFQM model and KM practices, whether in SMEs or in large organisations, is still scarce. The present research attempts to contribute to a model or reference framework that integrates both management approaches based on a horizontal reading of the EFQM model, and not on its traditional or vertical reading. The model examines the relationship between the transverse axes PMM, PM and KM and their effect on KBR. It is confirmed that the model is valid and can be used both in large organisations and in SMEs.

In addition, the present study is one of the few to contribute empirical evidence on the factors critical to the success of the KM and TQM initiatives for companies of different sizes. The results show that differences exist, which indicates the importance of orienting the business management based on the size, although KM is effective in both large and small companies. Finally, the model can also be used by future researchers, who can test its reliability and validity in other contexts using segmentation variables other than the size.

7.2. Managerial and practical implications

Organisations can use the vertical reading of the EFQM model to identify areas of improvement in each of the nine established criteria. Nevertheless, this is not the excellence management philosophy of the EFQM model. On the contrary, we can identify an obvious first horizontal reading among the agents’ criteria and the results criteria. For example, when analysing the People criterion, we must simultaneously analyse the Results in the people criterion. Nevertheless, several other horizontal readings are not as obvious and establish relationships between the sub-criteria of the Model (transverse axes).

From the point of view of management, the use of the axes can be considered a powerful management and improvement tool, as it allows us to analyse important concepts for excellent management using different sub-criteria of the criteria that compose the EFQM model.

Thus, if an organisation wants to analyse its knowledge management, in the context of an excellent management, it must study three axes: PMM, PM and KM. In addition, the horizontal reading of the Model allows an analysis from the perspectives of leadership, policy and strategy, people, alliances and resources and processes (Fig. 1). Specifically, we will be able to identify the areas of improvement of KM, with respect to concrete aspects (sub-criteria) of policy and strategy (2b), people (3b) and the alliances and resources of the organisation (4e). With respect to PMM, we must analyse the areas of improvement in leadership (1b), policy and strategy (2b) and processes (5a and 5b). In order to identify the areas of improvement in PM, we must focus our attention on leadership (1c), policy and strategy (2a and 2c) and the alliances and resources (4a). Finally, the proposed model adds the relationships and synergies between these three key elements of excellent management and results; that is, we can also analyse the effectiveness of the actions undertaken.

In addition, the multi-group analysis allows us to orient the KM, based on whether the organisation is small, medium or large in size. Thus, in both types of organisations (SMEs and large companies), the development of alliances and cooperation with partners is important for KM, although this aspect is more determinant in large companies. Nevertheless, in the SMEs, the management of internal knowledge (PMM) is more important than in large companies. Finally, suitable KM will have a positive and significant effect on the operational and strategic results of the organisation, independently of the size of the organisation.

7.3. Limitations and future research directions

The interpretation of the results and conclusions of this study are subject to a series of limitations, principally of a methodological character. The first limitation is related to the technique used for the proposed model: structural equation modelling, which assumes the linearity of relationships between the latent variables. The second is related to the notion of causality. Our study considered a soft modelling approach oriented more towards prediction than causality. Thirdly, due to the eclectic nature of knowledge, its management is affected by a multitude of factors, and not all of them could have been considered in the research. Fourthly, when interpreting the results, it is necessary to take into account that the sample corresponds to Spanish companies, to a specific culture of excellence and KM; therefore, it cannot be generalised. Finally, the research design is cross-sectional instead of longitudinal. In this case, a longitudinal study can analyse the effects of excellence practices and KM on the results in more detail.

Some of these limitations allow us to open future streams of research: (1) to introduce new relationships between the excellence practices in the conceptual model, as well as between those and the results; (2) to analyse the influence of other possible transverse axes of the EFQM Model, such as communication, creativity and innovation, human resources or corporate governance on KM; (3) to study the possible relationship of excellence practices and KM in other types of results, for example, related to people, customers or the company; and (4) to analyse, according to company size, the influence of KM on the different types of results (operational and strategic), which form the KBR construct.

References


Fornell, C., & Larcker, D. F. (1981). Structural equation models with unobservable variables and measurement error: Algebra and statistics. Journal of Marketing Research, 382–388.


