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THE MODERATING EFFECT OF SLACK RESOURCES ON THE RELATION BETWEEN QUALITY MANAGEMENT AND ORGANIZATIONAL LEARNING

RUIZ MORENO, ANTONIA

Universidad de Granada
Facultad de Ciencias Económicas y Empresariales
Campus de Cartuja s/n 18071. Granada Spain.
Phone: (34)-958-24-09-16; Fax: (34)-958-24-62-22;
e-mail:*aruizmor@ugr.es*.

MOLINA FERNANDEZ, LUIS MIGUEL

Universidad de Granada
Facultad de Ciencias Económicas y Empresariales
Campus de Cartuja s/n 18071. Granada Spain.
Phone: (34)-958-24-23-49; Fax: (34)-958-24-62-22;
e-mail:*lmolina@ugr.es*

LLORÉNS MONTES, FRANCISCO JAVIER

Universidad de Granada
Facultad de Ciencias Económicas y Empresariales
Campus de Cartuja s/n 18071. Granada Spain.
Phone: (34)-958-24-09-16; Fax: (34)-958-24-62-22;
e-mail:fllorens@ugr.es

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Abstract:

Recent literature in the field of strategic management suggests that firms must learn to combine internal competencies and resources in order to achieve competitive advantages. This paper examines how firms employ slack resources to enhance the relationship between quality management (QM) and organizational learning to obtain sustainable competitive advantages. The findings use empirical data gathered from 202 quality managers to support the hypotheses that: 1) there is a strong connection between organizational learning and QM; and 2) the relation between organizational learning and QM is moderated by slack resources.

Keywords: Quality management; Organizational learning; slack resources, policy strategy, management of resources and human resource management.

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1. Introduction

Although the ability of organizations to adapt to their environments is a basic assumption of strategic theory, the degree to which organizations possess this ability has been questioned. Managers struggle constantly to achieve the proper balance for operating efficiently and to combine competencies and resources in order to achieve competitive advantage.

In recent literature, organizational learning and Quality Management (QM) have emerged as two fundamental resources for responding to the environment and obtaining long term competitive advantage. Authors like Molleman and Broekhuis (2001) and Meso *et al.* (2002) argue that organizational learning has strategic significance for the sustainable competitive position of the firm. Quintas *et al.* (1997) and Llorens *et al.* (2004) show that organizational learning is a vital catalyst for innovation and enables firms to obtain competitive advantages, maintain their competitive position and improve customer focus and employee relations (Cynthia, 2004). Organizational learning is thus viewed as a complex process that includes the acquisition and use of knowledge and represents a true challenge for any firm. QM is also considered to be a way of thinking about organizational management, an alternative for improving the organization's performance and a paradigm for change (Ahmand *et al.,* 2003; Sitkin *et al.*, 1994) that enables improvement of the firm's benefits and assures its competitiveness.

Slack resources give the firm leeway in managing changes in response to a dynamic environment. They act as an inducement, representing "payments to members of the coalition in excess of what is required to maintain the organization" (Cyert and March, 1963:36). Slack can become a resource for conflict resolution and may be employed as a buffer to insulate the technical core of the organization from environmental

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turbulence. Finally, slack can facilitate strategic behaviour, which allows the firm to experiment with new strategies, such as introducing new products and entering new markets (Tan and Peng, 2003).

As business environments increase in dynamism and complexity, firms lose the ability to adapt and maintain existing competitive advantages incrementally. According to this framework, the key to establishing sustainable competitive advantage lies in the firm's abilities to combine competencies and resources in order to build competitive advantage. The main objective of this paper is to show how organizations' combined use of organizational learning, QM (captured via policy strategy, management resources, human resource management and management of processes) and slack is a key element in developing and maintaining sustainable competitive advantage.

We thus seek to answer the following question: How do firms employ slack resources to enhance the relation between QM and organizational learning to obtain sustainable competitive advantages? Or, how do slack resources act as moderators? To this end, we first review existing research on the relationship between organizational learning, QM and slack. Based on prior research, we suggest a series of hypotheses about the influence of QM on organizational learning and how slack resources moderate this relation. We then present the data and methods used to perform an empirical exploration of the hypotheses. Finally, we present the main conclusions and limitations of our research.

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2. Organizational learning, quality and slack resource

Although goals, perspectives and some design characteristics differ for QM and organizational learning (Hodgetts et al., 1994), most researchers emphasize the strong connection between the two fields (Clauson, 1996; Tan et al., 2003). Some researchers even argue that there is no real QM leadership without organizational learning.

The relation between QM and organizational learning has been developed in two lines of research. One analyses whether it is possible to create an organization with quality that is not an organization with the capacity to learn. Practice shows that it would be theoretically possible to begin a quality program without taking into account learning disciplines. However, if we analyse this process in greater depth, we see that these disciplines are necessary (Senge et al., 1994).

The second line of research tries to show that learning is an output of QM implementation (Li and Rajagopalan, 1997; Ittner *et al.*, 2001; Molina *et al.*, 2004). Denton (1998), for example, analyses QM as an initial phase in the development of organizational learning. For Garvin (1993), QM involves some operational definitions for the learning organization that give practical significance to each step of the process; specific guidelines, procedures and tools for the process of effective management; and some well developed metrical measures for these improvement processes.

Other authors, such as Sitkin et al. (1994), propose two complementary forms of QM, which they call Quality Control (QC) and Quality Learning (QL). QC and QL share the underlying precepts fundamental to QM but translate its basic precepts into very different sets of operating principles better attuned to the specific requirements of the different situations they address. For example, QC emphasizes continually enhancing the degree to which an organization is able efficiently and effectively to

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exploit the firm's existing capabilities and resources, where the key is to enhance control. In contrast to QC's emphasis on cybernetic control, QL stresses improvement in learning capability, which includes the effective identification of new skills and resources to pursue, the ability to explore these new arenas, the capacity to learn from that exploration, and the resilience to withstand the inevitable failures associated with such exploration.

Other authors argue that many of the precepts and principles of critical QM as established and developed critically over the past decade can be used to nurture the development of organizational learning. Chiles and Choi (2000, p. 200) argue that "organisational learning is linked to the theoretical underpinnings of QM through customer focus, continuous improvement, teamwork and adaptation in dynamic markets". Thus, a critical QM-based culture can quickly and effectively use flexible workers as sources of new learning. The implementation of a QM-based culture assumes the involvement and responsibility of the employees in improving the organization's knowledge, processes, products and services and establishing a philosophy and way of working that does things well the first time or wants to change and improve what currently exists, viewing errors as an opportunity for improvement and learning. It also means that supplier development and customer focus in increasingly fragmented markets have led to virtual organizations as sources of new knowledge from different geographical locations. In summary, organizations that already have an established critical organismic QM culture can readily adapt their efforts to enhance organizational learning within the firm without fundamental change (Spencer, 1994, Llorens *et al*., 2003).

We can thus conclude that learning constitutes not only an impulse toward QM in the organization but in many ways a real requirement. At the same time, an organization

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that values learning cannot remain closed to the lessons of QM since, as Stata (1989) indicates, improvements in quality are a vehicle for accelerating learning in the organization. If the development of knowledge has often been described as a process that uses analogies and metaphors to transfer what is known from a more developed area of knowledge to another less known and familiar area, we should not doubt that an analogy between the process of a vision of quality and a process of knowledge gives us the foundation on which to build an intelligent organization.

Organization theory generally treats the firm as an entity analogous to an organism, which seeks survival as the ultimate goal. Therefore, slack resources are necessary to help ensure the firm' long-term survival (Nystrom *et al*., 2002; Tan and Peng, 2003; Bogetoft and Hougaard, 2004). In a turbulent environment, slack is especially important in enabling the firm to "hang in there" (Sharfman *et al.*, 1988). Organization theorists typically argue that, despite its costs, slack buffers a firm's technical core from environmental turbulence and thus enhances its performance. To be sure, these theorists acknowledge that slack resources represent an additional cost to the organization and that an excessive level of slack is untenable (Galbraith, 1973). However, they generally believe that, given the complex trade-offs, the benefits of slack outweigh its costs.

In summary, slack is one of the capital-based firm resources (financial, physical, human and organizational) that the organization uses to implement strategies designed to improve firm efficiency and/or effectiveness (Adams and Lamont 2003). Slack is a mechanism for effective learning, giving potential for further enhancement of alignment skill (Levinthal and March, 1993). Bourgeois (1981) adds that slack is a resource cushion that firms can use in a discretionary manner, both to counter threats and to exploit opportunities. Geppert (1996) argues that slack resources have two functions in

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organizations: they can provide a surplus of time and resources and the possibility of experimenting with these resources.

For many years there has been an ongoing debate among organizational researchers on the role slack plays in organizations. Most research has tried to examine the concept of slack resources (Bourgeois, 1981) and the relation between slack and performance (Tan and Peng, 2003); studies have analysed the relation between slack and organizational innovation (Nohria and Gulati, 1996; 1997).

This paper contributes to the above literature by examining the moderating effect of slack resources in the relation between QM and organizational learning. As indicated, the theory of resources and capacities shows that sustainable competitive advantages are not achieved through the strategic use of any one resource but through the combination and revitalizing of multiple, distinctive firm resources and competencies in order to create valuable outputs capable of becoming sustainable competitive advantages (Black and Boal, 1994; Teece *et al.*, 1997; Galunic and Rodan, 1998; Vastag and Whybark, 2005). This perspective complements the dynamic capabilities framework of Teece *et al*. (1997), who maintain that, as business environments increase in dynamism and complexity, firms lose the ability to adapt incrementally and maintain existing competitive advantages. According to this framework, the key to establishing sustainable competitive advantage lies in the firm's abilities to combine competencies and resources in order to build competitive advantage.

3. Research framework and hypotheses

The literature review shows that organizations committed to quality can obtain synergy benefits in other areas, especially in organizational learning (Gelle and Karhu,

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2003; Tan et al.,2003; Ittner et al., 2001; Chiles and Choi, 2000; Li and Rajagoplan, 1997; Clauson, 1996; Fine, 1996; Hodgetts et al., 1994; Sitkin et al., 1994; Spencer, 1994). However, the literature has paid little attention to the fact that quality management practices can produce much wider benefits than quality in organizational learning.

Therefore, it is necessary first to identify the practices of quality management that can influence organizational learning. In the literature, we see that identifying the elements that constitute QM is one of the issues of greatest interest among academics. Each author has identified from his or her point of view the fundamental elements for effective QM. The study of this subject thus mixes and even confuses basic principles with the different practices, methods, or instruments used to carry out QM implementation. Our study is grounded in the EFQM model of excellence, which considers a combination of active or facilitating criteria, such as leadership, policy and strategy, human resources management, resources management and partnerships, and management processes that influence a combination of criteria called results. Table 1 shows a summary with the relationship between the five enablers in the EFQM model and the QM variables identified in different literature reviews.

"Insert Table 1 about here"

We also see that the new challenges that organizations must confront require firms to seek solutions to navigate the new competitive landscape. There are a number of actions that help firms navigate this new landscape. More specifically, these actions contribute directly or indirectly to implementing QM successfully and obtaining a competitive advantage for the firm. One of these is exercising quality leadership, which has direct

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effects on QM and competitive advantage. As can be seen in Figure 1 of the EFQM model, leadership is the element that promotes the rest of the criteria or facilitating agents. Quality leadership also affects these outcomes indirectly through the other major actions, such as policy and strategy, human resources management, resource management and alliances, and management processes, that is, the processes or facilitating agents that influence the degree of implementation of QM. According to Hitt et al. (1998), firm leaders are most often identified as members of the top management team. Thus, in our research we decided to ask about the function of leadership implicitly—by asking the quality managers—rather than directly. Quality managers have information about the firm's working environment and the employees' needs, since one of the basic QM principles is a focus on the internal client and an effort to satisfy his or her needs (Dean and Bowen, 1994; Dean and Evans, 1994). This means that quality managers try to identify, analyse and implement strategies to improve the employees' working environment and satisfy their needs. We therefore consider quality managers to be the people who take this leadership role, making decisions related to quality in the organization, as they promote and foster the implementation of the rest of the agent's criteria

Other questions should be underlined regarding these factors. First, the factors are interrelated, forming among themselves a system that sustains the implementation and development of QM. Second, in addition to determining the systematic character, it is important to determine the relation of causality that enables the establishment of more precise links and of the most basic direction in which some factors act on others. Among the factors we considered in our research, we can differentiate two kinds that are interrelated, the specific and generic factors. The first are those that traditionally form the most basic and specific substratum of the QM focus. The second are those necessary to preserve the coherence and effectiveness of the application of this focus. The generic factors are implemented and developed by the deliberate and explicit will of the management, while the specific principles not only respond to the will of the

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management but are also the result of the combination of technical and social relations shaped by the implementation and development of the generic principles. Thus, we stress that the general principles should be understood as the necessary, enabling and facilitating condition for obtaining the development and fulfilment of the other specific factors. Likewise, correct establishment of the generic factors requires the deliberate and explicit will of the management, which carries out the specific actions oriented to fulfilling this factors. As can be seen in the figure, the factors policy strategy and management resources are generic factors necessary for preserving the coherence and effectiveness of the application of QM and for implementing the specific factors successfully. In contrast, management of human resources and management of processes are considered specific factors necessary for the implementation of QM that require the deliberate and explicit will of the management and of the combination of relations shaped by the implementation of the previous factors (Moreno-Luzon and Peris, 1998; Spencer (1994), Sitkin et al., 1994 and Dean and Bowen (1994).

"Insert Fig. 1 about here"

Thus, for example, QM policy and strategy define how the plan will be implemented and how resources will be committed to its key elements. That is, policy and strategy influence management and help to maintain an environment conducive to full participation, employee involvement, empowerment, teamwork. They influence the systematic process that the company uses to pursue ever-higher quality and company performance. This includes process design, management of process quality for all work units and suppliers, systematic quality improvement and quality assessment.

Likewise, management of resources helps us to evaluate the efficiency of information management and learning as they support policy and strategy and the effective execution of processes. Resource management involves the management of external alliances, economic and financial resources, buildings, teams and materials, technologies and information and knowledge. Managing the means necessary for achieving the objectives defined in any unit or area of the organization is a principle of

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general rationality in the design and management of any organization and acquires particular importance in the case of a QM system. Poor management of resources can destroy the entire QM system, if the commitment of management is called into question and ceases to fulfil the conditions crucial to the involvement and commitment of the different members of the organization and the combination of connected processes that enable it to obtain the product or service.

Policy strategy, management of resources, human resource management and management of processes can be considered critical factors that form QM (Sitkin et al., 1994) and enable the building of a suitable foundation for establishing organizational learning. Human resource management involves greater commitment, autonomy and initiative of all members of the organization as well as the development of personnel capacities and aptitudes. Human resources managers must also promote the teamwork that plays a central role in the development of learning inside firms, bridging organizational and individual learning and enhancing knowledge flows between teams or individuals in a team (Marquardt, 1996). Therefore, achieving a high degree of organizational learning requires management's active attention in managing the conditions of appropriability to encourage coordination and teamwork (Dyerson and Mueller, 1999). From the perspective of knowledge, learning can thus be understood as the processes of creating new knowledge produced in individuals and groups or teams that exist within firms and of enabling stimulation of knowledge within the organization and between organizations (Sanchez and Heene, 1997). From this we can deduce that the flow of knowledge and learning is fostered if the organization promotes teamwork (Marquardt, 1996; Marquardt and Reynolds, 1994).

We should not forget quality management practices related to management processes, which foster the most effective way of obtaining good products and services

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by acting on the processes that enable them to be obtained. Management processes provide a common language throughout the firm for the way processes are performed in the organization, facilitating the transfer of knowledge between different groups concerning objectives and requirements or borrowing from the processes that have been implemented, and thus involving an increase in organizational learning (Hoopes and Postrel, 1999). These management processes involve, first, learning about the realization of processes carried out by the organization and, second, learning about ways to improve work processes and performance (Dean and Evans, 1994) to satisfy clients' needs. In the framework of management processes, it is important to determine the level of formalization of the latter. Formalization, which consists of generally documented specifications for how activities or processes are executed, is a mechanism for coordinating work. The choice of a high level of formalization of processes leaves its bureaucratic stamp on the functioning of firms. This has caused some authors to affirm that two different sub-focuses coexist in QM, one more oriented to control and training and the other, with only slight formalization, oriented to innovation and learning (Sitkin et al., 1994).

The previously hypothesized relationships between QM practices and between organizational learning and QM are to be moderated by slack resources. Organization theory ascribes four major functions to slack. First, slack acts as an inducement, representing "payments to members of the coalition in excess of what is required to maintain the organization". Second, slack can become a resource for conflict resolution. Ultimately, sufficient slack can provide a solution for every problem. Third, slack may be employed as a buffer that insulates the technical core of the organization from environmental turbulence. Finally, slack can facilitate strategic behaviour, allowing the firm to experiment with new strategies such as introducing new products and entering

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new markets. Slack resources are thus resources that have not been optimally deployed but that allow a company to adapt to environmental change by providing the means for achieving flexibility in developing strategy options to pursue opportunities such as the implementation of QM or organizational learning (Levinthal and March, 1993)

The literature review emphasizes that QM enables a firm to build a suitable foundation for establishing organizational learning (Hodgetts et al., 1994; Sitkin et al., 1994; Spencer, 1994; Clauson, 1996; Li and Rajagoplan, 1997; Chiles and Choi, 2000; Ittner et al., 2001; Tan et al., 2003). A firm's learning capacity and QM are also determined and limited by the nature and variety of resources that the organization can combine and apply to the maintenance and development of competitive advantages, and by the availability of slack resources to be applied directly to learning and QM efforts. A diagram of this model is shown in Figure 2.

The literature appears to support the idea that organizations can develop competitive advantages through the combination and synergistic merging of various firm resources (slack resources) and capacities of the organization (QM and organizational learning). Taking the foregoing discussion into account, we propose the following hypotheses:

Hypothesis 1. The relation between QM elements will be moderated by slack resources.

Hypothesis 1a. The positive relation between policy strategy, management of resources and human resource management will be moderated by slack resource.

Hypothesis 1b. The positive relation between policy strategy, management of resources and management of process will be moderated by slack resource.

Hypothesis 2. The positive relation between organizational learning, human resource management and management of process will be moderated by slack resource.

"Insert Fig. 2 about here"

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4. Data collection and research instrument

4.1. Source of empirical data

The sample of firms was randomly selected from the Duns and Bradstreet 2000 database, which includes the largest companies operating in the European Union. Drawing on our knowledge of key dimensions of this investigation, previous contacts with interested managers and scholars, and new interviews with five managers and six academics interested in the topic, we developed a structured questionnaire to investigate how organizations face learning and QM and slack resource issues.

We decided to use quality managers as our key informants since they receive information from a wide range of departments and are therefore a very valuable source for evaluating the different variables of the organization. They also play a major role in forming and moulding these variables by determining the types of behaviour that are expected and supported. We chose the same types of informant, since this means that the level of influence among the organizations is constant, increasing the validity of the variables' measurements. Quality managers as well as CEOs exercise the function of strategic leadership for quality, make decisions related to quality in the organization and thus promote and foster the implementation of the other active criteria: policy and strategy, management of resources, human resource management and management of process.

Surveys were mailed to the quality managers of the 1500 selected firms along with a cover letter. To reduce possible desirability bias, we promised that we would keep all

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individual responses completely confidential and confirmed that our analyses would be restricted to an aggregate level that would prevent the identification of any organization.

We mailed each quality manager who had not yet responded three reminders. 207 quality managers finally answered the questionnaire, but because of missing values only 202 questionnaires were included in the research. The response rate was 13.8 percent (Table 1). We did not find significant differences between the respondents and the sample in type of business or number of employees or between early and late respondents.

4.2. QM Measures

Our research includes those facilitating agents of the EFQM model that, through the exercise of strategic leadership for quality, can influence the organization's competitive advantage: policy and strategy, management of resources, human resource management and management of process. To measure these factors, we adopted items from different studies of quality performed by Black and Porter (1996), Rao et al. (1999), Wilson and Collier (2000), Zhang (2000) and from the methodology of the EFQM model for self-evaluation, which consists of a global, systematic and regular examination of the activities and results of an organization compared to a model of entrepreneurial excellence. This self-evaluation enables organizations to discern clearly their strong points and the areas for improvement. It culminates in planned actions for improvement and monitoring of the progress made (EFQM, 1998). It thus enables organizations to determine the degree of QM implementation.

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Based on previous studies, we first developed a scale of 5 items that measures policy and strategy. These items were to evaluate how the organization implements its mission and vision via a clear stakeholder-focused strategy, supported by relevant policies, plans, objectives, targets and management of process. When we validated our scales, results showed that the final scales was unidimensional and had high reliability (α = .8788).

Second, we selected five items to measure human resource management related to how the organization manages develops and releases the knowledge and full potential of its human resource management at an individual, team-based and organization-wide level; and how it plans these activities to support its policy and strategy and the effective operation of its processes. Results showed that the final scale was unidimensional and had high reliability (α = .8596).

To measure management of resources, we used a scale of five items related to how the organization plans and manages its external partnerships and internal resources to support its policy and strategy and the effective operation of its process. The scale was unidimensional with high convergent validity and high reliability (α = .8796).

Next, we measured management of process with four items related to how the organization designs, manages and improves its management of process to support its policy and strategy, to satisfy fully, and to generate increasing value for its customers and other stakeholders. Results showed that the final scale was unidimensional and had high reliability (α = .8563). A Likert-type 5-point scale (1 indicates "*very low*" and 5 "*very high*") was used for quality managers to indicate the degree of implementation of the previous critical factors of QM.

4.3. Organizational learning Measures

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Various research works (e.g. Edmondson, 1999; Hurley and Hult, 1998) have measured learning within organizations. We used items from the scale developed by Kale *et al.* (2000), due to the fact that there is a closer link with our research, that they reflect the different prior trends well and that the scale's validity was verified in detail. The items were duly adapted to the present study and were formulated following the theoretical overview. A Likert-type 7-point scale (1 "*totally disagree*", 7 "*totally agree*") made up of four items was used for quality managers to express their level of agreement or disagreement. After analysis of unidimensionality and reliability, we had to eliminate Item 4 from the scale on organizational learning to guarantee the unidimensionality of the measurement scale. Subsequently, the results showed that the final scale composed of three items was unidimensional and had high reliability (α = .8730).

4.4. Slack resource measure

To investigate the moderating effects of slack resources, it is recommended that the sample be divided into a high and a low group along the variable. Slack resource was assessed by a two-item scale adapted from Nohria and Gulati (1996, 1997). We asked the quality managers to evaluate these situations using a scale from 1 to 7, where 1 signifies that the output is not affected and 7 that the output could drop 20% or more. Organizations whose output was not affected by a 10% increase in responsibility or a 10% decline in budget were considered to have high levels of slack resources, whereas organizations whose members anticipate a decline in output of 20% or more (disproportionate to the change suggested) were considered to have low levels of slack. Drawing on research by Nohria and Gulati (1996; 1997) we added the two responses, constructing a composite measure of slack, since we had verified that these measures

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were highly correlated. Appendix A shows the items used to measure each variable in the model, and in table 2 we see the distribution matrix of the slack variables. Based on these results, the data was split into two nearly equal groups: firms with high slack resources and firms with low slack resources (Pagell et al., 2007). One hundred and two firms had scores below the mean (actual scores less than 3.14), and 100 had scores above the mean (actual scores greater than 3.14). We divided the sample along these lines because the two sub-groups were nearly equal in size.

"Insert table 2 about here"

5. Data analysis

First, we performed a descriptive analysis of the sample and calculated the correlation matrix. Table 3 shows the descriptive analysis and the correlation matrix as well as the reliability of the different scales. As the table demonstrates, the values of the correlation coefficients among variables confirm appropriate aggregation of the different variables.

"Insert table 3 about here"

Next, we tested the theoretical model postulated in Figure 2 and the corresponding hypothesis, using LISREL's VIII maximum likelihood program (Joreskog and Sorbom, 1996). We used a recursive non-saturated model, taking policy and strategy (ξ_1) and resource management (ξ_2) as the exogenous latent variables, human resource management (η_1) and process management (η_2) as endogenous latent variables and slack resources as the moderated variable. Through its flexible interplay between theory and data, this structural equation model approach bridges theoretical and empirical knowledge for a better understanding of the real world. Such analysis allows for modelling based on both latent (unobservable) variables and manifest (observable)

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variables and is therefore well suited for a hypothesized model in which most of the represented constructs are abstractions of unobservable phenomena (Simonin, 1999). Furthermore, structural equation modelling takes into account measurement errors, variables with multiple indicators, and multiple-group comparisons (Anderson and Vastag, 2004).

The literature suggests a number of methods for testing mediation effects. Recently Mackinnon et al., (2002) evaluated 14 methods for Type I error and statistical power. Based on this review, these authors recommend testing for mediation using the test of the indirect effect of the causal variable through the hypothesized mediator reported by the LISREL program. In the present study, we thus used the procedure proposed by Simonin (1999) and that proposed by these authors and used by Wei et al. (2004) with some modifications. First, we tested the full structural model and confirmed the model's fit with the data. Second, we modified the model, introducing the moderating effect first in the QM model, as done by Simon (1999) but not by the other authors. To verify this moderating effect, we divided the sample into high and low resources and verified the fit of the data. Subsequently, we calculated a chi-square difference test used to compare the initial model with the modified model. This suggested no difference in the fit for the two models, indicating that the modification introduced made no significant contribution to the model. If the opposite had been true, the modification introduced would have made a significant contribution to the model. The second step is thus to introduce in the model how the moderating variable affects the relationships of learning.

If we consider the quality of the measurement model for the full sample, the constructs display satisfactory levels of reliability, as indicated by composite reliabilities ranging from 0.93 to 0.95 and shared variance coefficients ranging from

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0.75 to 0.83. Convergent validity, the extent to which maximally different attempts to measure the same concept agree, can be judged by looking at both the significance of the factor loadings and the shared variance. The amount of variance shared or captured by a construct should be greater than the amount of measurement error (shared variance >0.50). All of the multi-item constructs meet this criterion with each loading (λ), for they are significantly related to its underlying factor (t-values greater than 23.48) in support of convergent validity. Likewise, a series of chi-square difference tests on the factor correlations showed that discriminant validity, the degree to which a construct differs from others, is achieved among all constructs.

If we turn to the structural model itself, Table 4 reports the parameter estimates and goodness-of-fit indicators of the structural equation system (Appendix B shows the different covariance matrices used as input in LISREL). Although the overall chi-square is significant (χ^2=688.38; 452 d.f.; p<0.01), as might be expected with this statistic's sensitivity to sample size (Bagozzi and Yi, 1988), the other fit indices (NNFI=1.02; NFI=1.00; CFI=1.00) and the low standardized root mean square residual (RMR=0.048) are all within acceptable ranges and show that a substantial amount of variance is accounted for by the model (Bagozzi and Yi, 1988). Hence the model is a reasonable representation of the data.

As to the parameter estimates, a first result is the significant positive effect of human resource management and management of process in organizational learning, which partially supports Hypothesis 2 (β_{31}=0.39, t =2.15; β_{32}=0.51, t =2.76). That is, fundamentally, a strong connection exists between organizational learning and QM. As we predicted, policy strategy and management of resources also influence human resource management (γ_1 = 0.40, t =2.59; γ_{12}=0.52, t =3.48) and the management of

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process (γ_{21}=0.46, t =2.88; γ_{22}=0.49, t =3.10), partially supporting Hypothesis 1. That is, a strong connection exists between critical factors of QM.

"Insert table 4 about here"

To further understand the role of QM and organizational learning, this research seeks to analyse the possible moderating effects of slack resources. To do this, we divided the sample into two groups of firms, following the recommendations of studies like Jaccard et al., (1990), Simonin (1999), George (2003) and Llorens et al. (2005). These authors situate in the high level observations whose point values of the moderating variable are above the mean. The low level of this variable would, in contrast, be composed of cases whose point values are lower than the average in a standard deviation. Thus, the first group is composed of firms that have excess resources (slack higher than the mean =3.14) and the second of firms that do not have sufficient resources (slack lower than the mean =3.14). Once the full structural model full is calculated (table 4) and the model's fit with the data verified, we examine the moderating effect of slack on the relation between the QM elements in table 4. To do this, we modify the model, introducing the moderating effect of slack, first on the relationship between the QM elements, as done in Simon (1999), keeping the relations between the QM elements and organizational learning constant, since the goal is to verify first whether the modification introduced—the different relations between the QM elements—makes significant contribution to the model. As can be seen in Table 6, the chi-square difference test indicates significant differences between the model with two-group comparison of slack and the full sample model ($\Delta\chi^2$=14.75, Δd.f.=4, p<0.01). Thus slack moderates the relation between the QM elements, such that for the "high" slack group the policy strategy and management of resources influences positively both human resource management (γ_{11} =0.57, t =3.54; γ_{12} =0.$\tilde{4}$, t =2.34) and management of process (γ_{21} =0.49, t =3.07; γ_{22} =0.49, t =2.96). Again, the result differs for the low slack group, where only management of resources influences human resource management (γ_{12} =0.78, t =3.97) and management of process (γ_{22} =0.65, t =3.13) positively.

"Insert table 5 about here"

"Insert table 6 about here"

Finally, Table 7 analyses the influence of slack on both the relation of learning to the QM elements and the relation between the different QM elements. The difference in the

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chi-square between the model with two-group comparison of slack and the full sample model is significant ($\Delta\chi^2$=26.43, Δd.f.= 6, p<0.01), as can be seen in Table 6. This means that slack exercises a moderating effect both on the relation of learning to the QM elements and on the relation between the different QM elements. The results show that for the "low" slack group the process has a positive influence on organizational learning (β_{32}=0.79, t =2.47) and that management of resources affects processes (γ_{22}=0.67, t =3.51) and human resource management (γ_{12}=0.82, t =3.92) positively. Again, if we look at the high slack group, the results differ substantially: processes do not influence organizational learning (β_{32}=0.38, t =1.57), but human resource management does affect it positively (β_{31}=0.55, t =2.34). Likewise, both policy strategy and management of resources influence human resource management (γ_{11}=0.55, t =3.19; γ_{12}=0.4̃, t =2.24) and processes (γ_{21}=0.48, t =2.44; γ_{22}=0.50, t =2.45) positively.

"Insert table 7 about here"

6. Discussion

Past research has suggested links between QM and organizational learning. The present study seeks to extend this research by exploring whether slack resources serve as a mediator in the link between QM and organizational learning. Thus, this study seeks to advance our understanding of how firms combine resources and competencies in different ways to develop new advantages or to extend existing competitive advantages.

Our results support the hypotheses that slack mediated the relation between the different QM elements and partially mediated the relation between QM and organizational learning. Managers use slack to enable the clear formulation of the

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global strategy that is necessary in the long term for the QM focus. This strategy proposes the objectives that full allow the firm to satisfy the needs of different interest groups related to the firm and leave sufficient flexibility to adjust goals, capacities and resources. Firms also plan and manage their external associations and internal resources to support the strategy and efficient operation of their processes. Both influence human resource management, implying greater commitment, autonomy and initiative of all members of the organization as well as the development of their personnel's capacities and aptitudes. Next, management of human resources provides the means necessary for promoting learning on all levels. Organizations with a pool of resources in excess of the minimum required to produce a given level of organizational output encourage learning through human resource management that depends on policy strategy and management of resources.

Managers must also realize that managing all of the organization's added value activities—the processes—should be supported by the strategy of the organization that reflects its QM focus and the planning and management of internal resources and external associations, even if these are not significant for the generation of learning. Therefore, slack does not mediate the relation between management of processes and organizational learning. This has led some authors to argue that two different sub-focuses exist in QM, one more oriented to control and training and the other to with only slight formalization, oriented to innovation and learning (Sitkin et al., 1994).

Interestingly, firms that do not have excess resources also promote learning through the management of process, which in turn depends on the management of resources. Management of resources also influences human resource management, which does not promote organizational learning. However, in these firms the influence of the organization's policy and strategy on human resource management and management of

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process is not significant. Strategy's proposal of goals that enable the firm to satisfy the needs of the clients related to the firm also grows from interpretation of the environment and from the vision the firm has of itself, establishing the paths and concrete forms of action with sufficient flexibility. A constantly changing environment with increasingly intense competition requires some systematic way of establishing where and how the organization will compete in the future and a way of sharing this direction and aligning all efforts. Thus, even though QM promotes learning by means of processes in organizations that do not have slack resources, the correct interrelation is still not present between the different QM elements. This may mean that the learning promoted takes the right direction, since the starting point, the organization's policy and strategy, is not significant.

For agency theorists, managers inherently have a set of goals (e.g., the pursuit of power prestige, money and job security) that are not always aligned with those of the principal. Managers may use slack to engage in excessive diversification, empire-building, and on-the-job shirking. As a result, slack may become a source of agency problems, which breeds inefficiency. Still, our results support organization theory, which specifies the nature of slack when discussing its impact on the relation between organizational learning and QM. For organization theorists, the benefits of slack outweigh its costs, and a zero-slack organization is not realistic. Thus, this paper maintains that the relation between organizational learning and QM is determined and limited by the nature and variety of resources that the organization can combine and apply to the maintenance and development of competitive advantages, according to the availability of slack resources to be applied directly to QM and slack resources. The results of the research show that, in order to improve profits and obtain competitive

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advantages, managers should be aware of the need to use resources not as separate entities but in combined form.

Further, the results of the research reveal that a strong direct connection exists between the different elements of QM and between organizational learning and QM. Policy strategy, management of resource, human resource management and management of process can be considered critical factors that form QL (Sitkin et al., 1994) and enable the building of a suitable foundation for establishing organizational learning. Thus QM by means of human resource management enables improvement of coordination both at the functional level and with interfunctional teams for the coordination of workflow, since intermediate directors have trouble with this coordination when they lack the specialized knowledge necessary for each task. For its part, human resource management implies the implementation of systems of participation that attempt to take advantage of their workers' knowledge, allowing workers themselves to make the decision since they are the ones who know better. In sum, human resource management encourages knowledge on all levels, for high-level management does not have at its disposal all of the knowledge necessary to formulate the strategy and design organizational processes. Further, the information obtained from management of process carried out inside the organization decreases the perceived risk for those who have to learn, as it makes the firm's problems more visible, accentuates differences in efficiency between the different ways of managing process that the firm carries out, and facilitates the search for the most efficient management of process. On the other hand, the evaluation of how well policy and strategy are fulfilled enables the firm to obtain information concerning the measures of performance that we discuss in this research, learning and creativity. Finally, management of resources helps us to

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evaluate the efficiency of information management and learning as they support policy and strategy and the effective execution of processes.

The conclusions of this study are subject to several limitations that may suggest further possibilities for empirical research. First, survey data based on self-reports may be subject to social desirability bias. However, an assurance of anonymity can reduce such bias even when responses are related to sensitive topics. The low risk of social desirability bias in this study was indicated by several managers who commented at the end of their questionnaires that it made no sense at all for their companies to go beyond regulatory compliance. Still, the responses are subject to interpretation by individual managers. Secondly, the cross-sectional nature of the research into a series of dynamic concepts (e.g. organizational learning) allows us to analyse a specific situation in time of the organizations studied but not their overall conduct throughout time. This problem is attenuated in our investigation, since the items reflect dynamic characteristics. Future research should place greater emphasis on longitudinal studies. One way of approaching QM constructs with greater precision and studying their influence on organizational learning systematically is by designing longitudinal studies. Further, contact with reality will enable the researcher to combine his or her experiences and intelligence and to draw more trustworthy conclusions about these activities.

Finally, other questions related to the subject treated here could become the object of additional research and discussion. Our research has analysed policy and strategy, partnerships and resources, human resource management and management of process and their influence on organizational learning moderated by slack resources. However, other critical QM factors (leadership, teamwork; cooperation with suppliers and clients) should be taken into account to analyse how they affect organizational learning. It

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would also be interesting to use a multidimensional perspective to analyse the moderating effect that types of slack have on the relation between QM and organizational learning. Likewise, it would be interesting to study similar characteristics with information provided by different levels of management and employees of the organization, confirming the consistency of the results.

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APPENDIX A: "ITEMS USED TO MEASURE VARIABLE"

Indicate the degree of implementation of previous QM practices by circling a number from 1 to 5 (1"Very low", 5"Very high")

POLICY AND STRATEGY

1. Policy and Strategy are based on the present and future needs and expectations of stakeholders.
2. Policy and strategy are based on information from performance measurement, research, learning and creativity-related activities.
3. Policy and strategy are developed, reviewed and updated.
4. Policy and strategy are deployed through a framework of key processes.
5. Policy and strategy are communicated and implemented.

HRM

1. People resources are planned, managed and improved.
2. People's knowledge and competencies are identified, developed and sustained.
3. People are involved and empowered.
4. People and organizations have dialogue.
5. People are rewarded, recognised and cared for in order to support its quality policy and strategy and the effective operation on their processes.

RESOURCES MANAGEMENT

1. External partnerships are managed in order to support quality policy and strategy and the effective operation of its processes.
2. Finances are managed in order to support quality policy and strategy and the effective operation of its processes.
3. Buildings, equipment and materials are managed in order to support quality policy and strategy and the effective operation of its processes.
4. Technology is managed in order to support quality policy and strategy and the effective operation of its processes.
5. Information and knowledge are managed in order to support quality policy and strategy and the effective operation of its processes.

MANAGEMENT PROCESSES

1. Processes are systematically designed and managed.
2. Processes are improved, as needed, using innovation in order to fully satisfy and generate increasing value for customers and other stakeholders.
3. Products and services are designed and developed based on customer needs and expectations.
4. Customer relationships are managed and enhanced.

Indicate the degree of your disagreement or agreement with each statement by circling a number from 1 to 7 (1"Totally disagree", 7"Totally agree")

ORGANIZATIONAL LEARNING

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1. The organization has learned or acquired much new and relevant knowledge over the last three years.
2. Organizational members have acquired critical capacities and skills over the last three years.
3. The organization's performance has been influenced by new learning it has acquired over the last three years.
4. The organization is a learning organization.

SLACK RESOURCES (Nohria and Gulati, 1996, p. 1253)

1. Assume that due to some sudden development, 10% of the time of all people working in your department has to be spent on work totally unconnected with the tasks and responsibilities of your department. How seriously will your output be affected over the next year?
2. Assume that due to a similar development, your department's annual operating budget is reduced by 10%. How significantly will your work be affected over the next year?

APPENDIX B: "COVARIANCE MATRIX USED FOR LISREL"

Covariance Matrix model full sample

	GRH	Management process	Organizational learning	Policy strategy	Management resources
Human resource management	0.90				
Management process	0.82	0.95			
Organizational learning	0.77	0.80	1.08		
Policy strategy	0.86	0.89	0.79	1.00	
Management resources	0.87	0.89	0.79	0.88	1.00

Covariance Matrix model QM : high slack resource

	GRH	Management process	Organizational learning	Policy strategy	Management resources
Human resource management	0.99				
Management process	0.89	1.01			
Organizational learning	0.81	0.82	1.04		
Policy strategy	0.93	0.92	0.79	1.00	
Management resources	0.91	0.92	0.78	0.89	1.00

Covariance Matrix model QM: low slack resource

	GRH	Management process	Organizational learning	Policy strategy	Management resources
Human resource management	0.90				
Management process	0.82	0.96			
Organizational learning	0.74	0.76	0.99		
Policy strategy	0.82	0.87	0.72	1.00	
Management resources	0.89	0.91	0.77	0.89	1.00

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Covariance Matrix model QM and learning relationship: high slack resource

	GRH	Management process	Organizational learning	Policy strategy	Management resources
Human resource management	0.94				
Management process	0.88	1.02			
Organizational learning	0.85	0.87	1.17		
Policy strategy	0.91	0.93	0.85	1.00	
Management resources	0.89	0.93	0.84	0.89	1.00

Covariance Matrix model QM and learning relationship: low slack resource

	GRH	Management process	Organizational learning	Policy strategy	Management resources
Human resource management	0.88				
Management process	0.83	0.98			
Organizational learning	0.71	0.83	1.07		
Policy strategy	0.81	0.88	0.75	1.00	
Management resources	0.89	0.92	0.79	0.89	1.00

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Table 1
Relation between the five enablers in the EFQM model and the QM variables identified by different studies

	Saraph *et al*. (1989)	**Flynn *et al*. (1994)**	**Juran (1995)**	**Zhang (2000)**
Human resource management	Training	Management of workforce		Education and training
	Relations with employees			Participation
Leadship	Management and policy leadership	Top management support		Leadership
Strategy and policy			Quality planning	Planning and vision
Management of process	Design of product or service	Processes of product design		Improvement of quality systems
	Management of processes	Management of process flows		Improvement and control of processes
	Role of the quality department	Statistical control and *feedback*		
Management of resources	Management of providers	Relations with providers		Quality management providers
		Relationships with clients		Orientation to client

Source: produced by the authors

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Table 2. Distribution of the slack variables

	SLACK 2							TOTAL
SLACK 1	1.00	2.00	3.00	4.00	5.00	6.00	7.00	
1.00	6	13	8	1	0	0	0	28
2.00	2	27	9	0	0	0	0	38
3.00	1	12	16	0	0	1	0	30
4.00	2	0	0	0	2	4	1	9
5.00	0	2	0	0	6	1	2	11
6.00	0	2	1	1	4	7	22	37
7.00	0	1	1	0	14	9	24	50
TOTAL	11	57	35	2	26	22	49	202

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Table 3 Mean, Standard deviation, reliability and correlations[a]

Variable	Mean	S.d	1	2	3	4	5	6	
Policy strategy	3.61	0.76	1	0.878 [b]					
Management resources	3.61	0.72	0.617**	1	0.879 [b]				
Human management resources	3.50	0.68	0.611**	0.653**	1	0.859 [b]			
Process of management	3.9	0.67	0.628**	0.638**	0.627**	1	0.856 [b]		
Organizational learning	5.18	1.07	0.385**	0.330**	0.380**	0.414**	1	0.873 [b]	
Slack resource	3.14	1.28	-0.183*	-0.153*	-0.137	-0.023	-0.039	1	0.864 [b]

[b] Cronbach's alpha
* p< .05
** p< .01

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Table 4
Structural parameter estimates and goodness-of-fit indices (full sample)

Paths		Estimate	t-Value
Human resource management → Organizational learning	β_{31}	0.39	2.15*
Management of process → Organizational learning	β_{32}	0.51	2.76**
Policy Strategy → Human resource management	γ_{11}	0.40	2.59**
Management of resources → Human resource management	γ_{12}	0.52	3.48**
Policy Strategy → Management of process	γ_{21}	0.46	2.88**
Management of resources → Management of process	γ_{22}	0.49	3.10**

NFI= 1.00

NNFI= 1.02

CFI= 1.00

Standardized RMR= 0.048

χ^2 (452 d.f.)= 688.38

p-value <0.001 *n*=202

**Significant at the p<0.01 level
*Significant at the p<0.05 level

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Table 5
Structural parameter estimates and goodness-of-fit indices for two-group comparison on slack resource Differences in the QM model relationships

Paths		Slack resource High (n=100)		Slack resource Low (n=102)	
		Estimate	t-Value	Estimate	t-Value
Human resource management → Organizational learning	β_{31}	0.42	2.33*	0.42	2.33*
Management of process → Organizational learning	β_{32}	0.43	2.36*	0.43	2.36*
Policy Strategy → Human resource management	γ_{11}	0.57	3.54**	0.13	0.60
Management of resources → Human resource management	γ_{12}	0.40	2.34*	0.78	3.97**
Policy Strategy → Management of process	γ_{21}	0.49	3.07**	0.30	1.40
Management of resources → Management of process	γ_{22}	0.49	2.96**	0.65	3.13**
NFI=1.00					
NNFI=1.02					
CFI=1.00					
Standardized RMR=0.040					
χ^2 (448 δ.ϕ.)= 673.43					
p-value <0.001					

**Significant at the p<0.01 level
*Significant at the p<0.05 level

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Table 6
Testing Sequence and Difference Tests

Comparison	$\Delta\chi^2$	Δdf	Probability
Total – quality	14.75	4	P< 0.01
Total- learning quality	26.43	6	P<0.01

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Table 7

Structural parameter estimates and goodness-of-fit indices for two-group comparison on slack resource (Differences in the QM model and Learning relationships)

Paths		Slack resource High (n=100)		Slack resource Low (n=102)	
		Estimate	t-Value	Estimate	t-Value
Human resource management → Organizational learning	β_{31}	0.55	2.34*	0.069	0.20
Management of process → Organizational learning	β_{32}	0.38	1.57	0.79	2.47*
Policy Strategy → Human resource management	γ_{11}	0.55	3.19**	0.081	0.36
Management of resources → Human resource management	γ_{12}	0.40	2.24*	0.82	3.92**
Policy Strategy → Management of process	γ_{21}	0.48	2.44*	0.28	1.44
Management of resources → Management of process	γ_{22}	0.50	2.45*	0.67	3.51**
NFI=1.00					
NNFI=1.02					
CFI=1.00					
Standardized RMR=0.039					
χ^2 (446 d.f.)= 661.95					
p-value <0.001					

**Significant at the p<0.01 level
*Significant at the p<0.05 level

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Fig. 1. EFQM Model

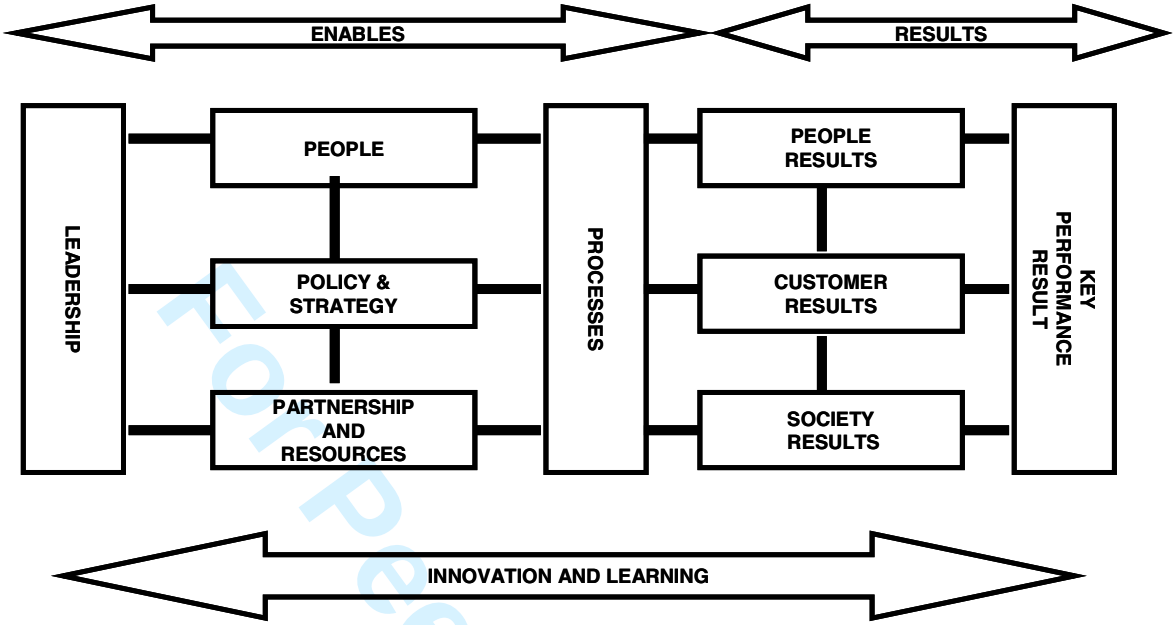

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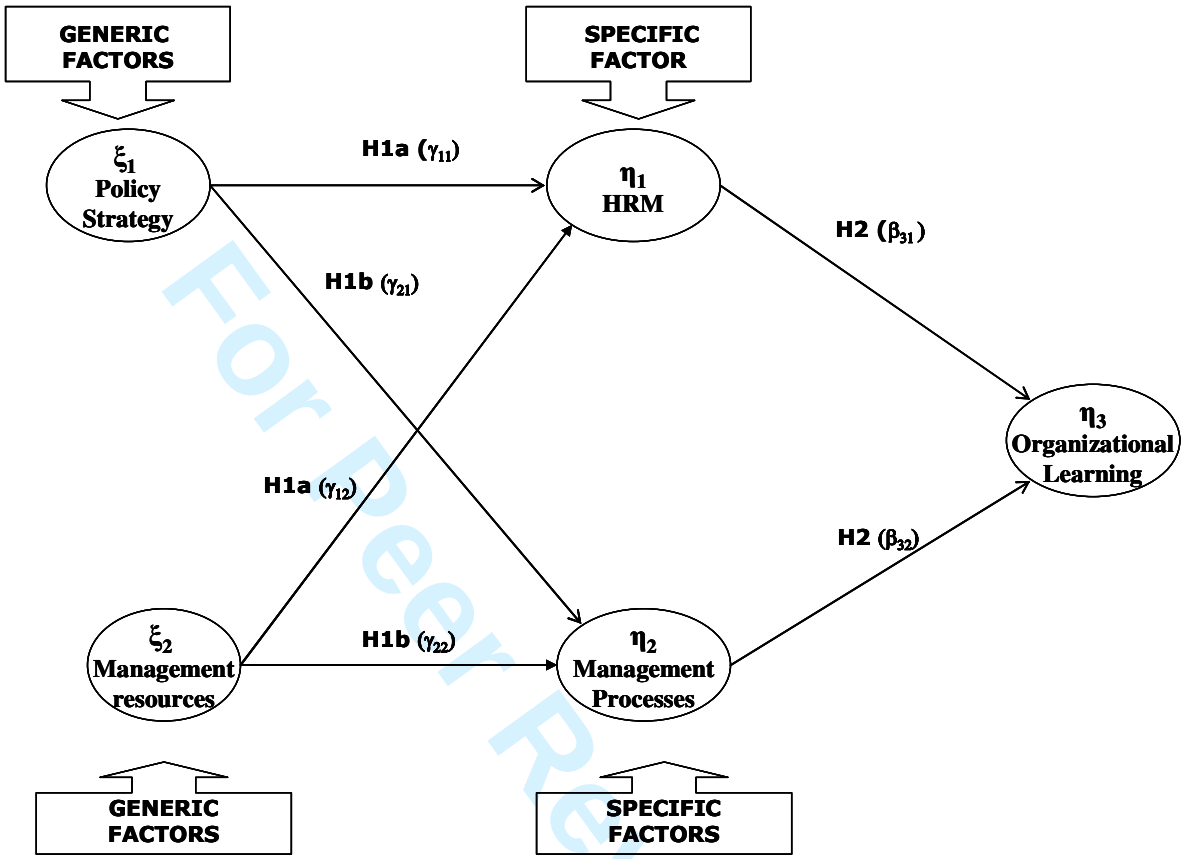
Fig. 2. Research framework



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