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# Quality management practices as a forerunner of absorptive capacity. An empirical study


## Abstract

Absorptive capacity is one of the most important constructs to emerge in strategic and organizational research in recent years. This article analyzes the antecedents that determine a firm's absorptive capacity from the perspective of Quality Management (QM). It studies the effect of seven QM practices (leadership, strategic planning, customer focus, human resource management, supplier management, process management, and information and analysis) on this construct. The model and the hypotheses proposed are tested on a sample of 230 Spanish firms. The results show the impact of the different QM practices on the level of absorptive capacity.


**Keywords:** absorptive capacity, empirical research methods, quality management.
**JEL Classification:** M10.

## Introduction

Currently, the turbulence of environments has focused attention on knowledge management as a valid tool for achieving a competitive advantage. To survive in dynamic environments, firms must identify, assimilate and exploit new knowledge to achieve their commercial objectives, abilities related to the concept of absorptive capacity (Cohen and Levinthal, 1990; Jansen et al., 2005). Cohen and Levinthal (1990) describe absorptive capacity as a fundamental part of the process of new knowledge creation, given the importance the external environment has acquired in generating new innovations. Further, absorptive capacity can be considered a major source for creating and maintaining a competitive advantage (Zahra and George, 2002).

Diverse studies have shown the positive relationship between Quality Management (QM) and knowledge creation (Mukeherjee et al., 1998; Osterloh and Frey, 2000) and learning (Ittner et al., 2001). There is insufficient research, however, on how quality management practices can lead to knowledge creation or learning (Choo et al., 2007). Therefore, this paper focuses specifically on the following goals: a) analyzing the antecedents of absorptive capacity in greater depth, showing the relationship between the antecedents and QM practices, and b) determining the effect of the different QM practices on firm's absorptive capacity. The paper is organized as follows. Based on the review of the literature in the next section, a research model and related hypotheses are presented. Section 2 describes the research methodology, including the construction of the instrument and measures, the survey procedure, the sample, and the tests for reliability and validity. Section 3 presents the results of testing the proposed model. The implications of the results are discussed in Section 4. The paper concludes with further research implications of this study for researchers.

## 1. Theoretical background

**1.1. Quality management.** Quality management (QM) has been defined as a management philosophy that strives to achieve continuous improvement in all of the organization's functions and that can be achieved only if this concept is implemented on all levels of the firm (Kaynak, 2003). This management focus includes a set of principles, practices, and techniques, such that each principle is implemented through a series of practices and techniques, simple activities like gathering information or analyzing processes (Dean and Bowen, 1994). Sousa and Voss (2002) determine that, at the empirical level, QM implementation should be based on analysis of the firm's practices, since "principles are too general for empirical research and techniques are too detailed to obtain reliable results".

Quality management practices have been investigated extensively (Saraph et al., 1989; Flynn et al., 1994; Powell, 1995; Ahire et al., 1996; Kaynak, 2003), and reviews of these studies have been conducted by Nair (2006), Sousa and Voss (2002). One extensive literature review shows the use of seven quality management practices (QMP): leadership, strategic planning, customer focus, human resource management, supplier management, information and analysis, and process management – practices that are also consistent with those proposed by the Malcolm Baldridge National Quality Award (MBNQA) (Curkovic et al., 2000; Sila, 2007). Further, as theoretical reviews by Sousa and Voss (2002) and Kaynak (2003) propose, analysis of QM should include practices that influence the firm's internal environment as well as its relationship with the environment (understood as external environment). These studies therefore include QM practices related to the social and technical parts of the firm. The descriptions of these practices are shown in Table 1.

Table 1. Quality management practices

| QM practices | Description |
|---|---|
| Leadership | This element examines executives' leadership and personal involvement in setting strategic directions and building and maintaining a leadership system will facilitate high organizational performance, individual development, and organizational learning. |
| Customer focus | This element addresses how and how well the organization determines current and emerging customer requirements and expectations, provides effective customer relationship management, and determines customer satisfaction. |
| Strategic planning | This element focuses on the organization's strategic and business planning and deployment of plans, along with the organization's attention to customer and operational performance requirements. |
| Human resource management | This element comprises training, development, communication, safety, multi-skilling and employee flexibility, employee responsibility and measurement of employee satisfaction. |
| Supplier management | This element comprises the selection of a small number of suppliers and establishing a long-term relationship with them, selection of suppliers based on quality considerations and the interdependence and cooperation links for sistematically exchanging information. |
| Information and analysis | This element focuses on the scope, management and use of data and information to maintain a customer focus, to drive quality excellence, and to improve performance. |
| Process management | This element is concerned with how the organization designs and introduces products and services, integrates production and delivery requirements and manages the performance of suppliers. |

**1.2. Absorptive capacity.** Absorptive capacity refers to the firm's ability to identify, assimilate and exploit external knowledge for commercial ends (Cohen and Levinthal, 1990). Zahra and George (2002) propose a new stage in the outline developed by Cohen and Levinthal (1990) concerning transformation. The concepts relating to the different stages are included in Table 2.

The description of the main antecedents of absorptive capacity and its justification in the literature appear in Table 3.

Table 2. Stages of absorptive capacity

| Stages of absorptive capacity | Concept | Authors |
|---|---|---|
| Identification | The recognition of the value of knowledge proceeding from external sources. | Cohen and Levinthal (1990) |
| Assimilation | Includes existing routines and processes for analyzing, processing, interpreting and understanding external information. | Szulanski (1996) |
| Transformation | The firm's capacity to develop and redefine routines that facilitate combining existing knowledge with that acquired and assimilated. | Zahra and George (2002) |
| Exploitation | Includes all of the routines that enable the firm to incorporate knowledge acquired for the development of its operations in order to increase profit and profitability of the firm. | Lane and Lubatkin (1998) |

Table 3. Antecedents of absorptive capacity

| Antecedents | Citations |
|---|---|
| Relevant prior knowledge:<br>Common language<br><br>Types of knowledge (tacitness)<br><br>Knowledge complementarity<br><br>Experience | <br>Cohen and Levinthal (1990); Van den Bosch et al. (1999); Gupta and Govindarajan (2000); Matusik and Heeley (2001); Van den Bosch and Volberda (2001)<br>Lane and Lubatkin (1998); Van den Bosch et al. (1999); Sparkes and Miyake (2000); Zahra and George (2002); Lane et al. (2006)<br>Lane and Lubatkin (1998); Kim (1998); Matusik and Heeley (2001); Meeus et al. (2001); Zahra and George (2002)<br>Cohen and Levinthal (1990); Szulanski (1996); Lane and Lubatkin (1998); Simonin (1999); Gupta and Govindarajan (2000); Zahra and George (2002) |
| Organizational structure (cross-functional teams, level of centralization, organizational flexibility) | Cohen and Levinthal (1990); Lane and Lubatkin (1998); Van den Bosch et al. (1999); Gupta and Govindarajan (2000); Lane et al. (2001); Meeus et al. (2001); Lane et al. (2006) |
| Training | Lyles and Salk (1996); Kim (1998); Lane and Lubatkin (1998); Lane et al. (2001); Lane et al. (2006) |
| Social integration mechanisms (task forces) | Gupta and Govindarajan (2000); Meeus et al. (2001); Zhara and George (2002); Jansen et al. (2005); Todorova and Durisin (2007) |
| Environment (turbulence, spillovers) | Cohen and Levinthal (1990); Van den Bosch et al. (1999); Lane et al. (2006) |
| Another antecedents | Activation triggers (Kim, 1998; Zahra and George, 2002); Participation in decision making (Jansen et al., 2005); Job rotation (Jansen et al., 2005); Teamwork (Meeus et al., 2001; Jansen et al., 2005); Trust (Lane et al., 2001); Top Management Support (Lenox and King, 2004); Intensity of efforts to learn (Kim, 1998; Zahra and George, 2002); R+D spending (Cohen and Levinthal, 1990; Tsai, 2001); Strategic scope (Lane et al., 2006); Regimes of appropriability (Cohen and Levinthal, 1990; Zahra and George, 2002). |

**1.3. The relationship between QM and absorptive capacity.** Leadership is an important factor in QM implementation because it improves performance by influencing other QM practices (Kaynak, 2003). Senge (1999) argues that leadership is vital to construct shared vision in a learning organization, since it should promote the necessity of learning. Further, managers establish links and relationships with other firms and within their own organizational units, so the information they provide will be associated with better adoption of new knowledge (Lenox and King, 2004). Therefore, leadership is related positively to the stages of identification, assimilation and exploitation of absorptive capacity. The literature discussed above leads to the following hypothesis:

*H1: Leadership is positively related to absorptive capacity.*

QM advocates that relations to suppliers are characterized by a high level of trust, fluid communication, high levels of shared information, and long-term development of the relationship (Langfield-Kim and Greenwood, 1998; González-Benito and Dale, 2001). These characteristics should encourage the development of common or related knowledge and its superimposition on the firm's knowledge base (Hansen, 2002). Absorption capacity is determined by the degree of overlap between external knowledge and the firm's knowledge base (Lane and Lubatkin, 1998; Matusik and Heeley, 2001).

These conclusions are consistent with the antecedents proposed in Table 3 regarding the level of prior knowledge and their complementarity. Supplier management also promotes a climate of trust (Langfield-Kim and Greenwood, 1998; Humphreys et al., 2004) that encourages the willingness to share and exchange information (Lane et al., 2001). Finally, supplier management will achieve the formation of related knowledge that is fruit of the experience with these external agents (Hansen, 2002), thus influencing absorption capacity:

*H2: Supplier management is positively related to absorptive capacity.*

The firm's relationships with its customers affect new knowledge absorption (Danneels, 2003; Hill and Rothaermel, 2003; Slater and Narver, 1998). In QM, the customer is a source of information. Customer focus involves having direct and continuous contact with customers, gathering information on their tastes and needs, and using the information acquired to improve the products and services offered (Dean and Bowen, 1994). It will therefore be a source of information (Mills et al., 1983), improve the complementarity of the customer's knowledge base with that of the firm (Hansen, 2002), and provide experience (Nonaka and Takeuchi, 1995). We can thus affirm:

*H3: Customer focus is positively related to absorptive capacity.*

Sparkes and Miyake (2000) conclude that the implementation of human resource management practices allows the tacit component of knowledge to be managed indirectly. The smaller this component is, the easier its acquisition and assimilation will be (Zahra and George, 2002).

On the other hand, human resource management includes (among other techniques) teamwork, which is a determinant of absorptive capacity (Meeus et al., 2001). Jansen et al. (2005) establish that the existence of multi-functional teams affects positively the acquisition and assimilation of external knowledge, since teams facilitate transfer of this knowledge. Therefore, teamwork favors the integration of the different components of knowledge and their integration into the existing knowledge base (Cohen and Levinthal, 1990; Jansen et al., 2005). Osterloh and Frey (2000) determine that quality management and continuous improvement produce both explicit and tacit knowledge. For example, the constitution of teamwork enables the organization's members to internalize knowledge and "create" tacit knowledge.

Human resource management also advocates the training of employees (Ahire et al., 1996), another antecedent of absorptive capacity (Kim, 1998; Lane et al., 2001). We can thus propose:

*H4: Human resource management is positively related to absorptive capacity.*

On the other hand, management of processes and their statistical control generate and store information on the functioning of organizational processes so that they can then be improved (Rungtusanathan et al., 1997). This will enable the creation of a knowledge base that builds on prior knowledge, as well as subsequent complementing of the new knowledge acquired. Experience is also the fruit of benchmarking (Garvin, 1993; Stata, 1989). In process management, benchmarking is a source of information, as it seeks to analyze the best processes and products of the leading competition in order then to use this knowledge to improve the firm's own processes and products (Ahire, Golhar and Waller, 1996). We can thus affirm that:

*H5: Process management is positively related to absorptive capacity.*

The practice of "information and analysis" refers to the reach, management and use of information and

other data concerning the firm to maintain customer focus, lead the organization toward excellence in quality, and improve performance (Samson and Terziovski, 1999). Because this practice will be a source of knowledge and enable the identification of possible points for improvement, it is consistent with the determinants of absorption capacity related to experience and management of prior knowledge (Cohen and Levinthal, 1990; Zahra and George, 2002). We therefore propose:

*H6: Information and analysis is positively related to absorptive capacity.*

Finally, strategic planning of quality refers to the development and implementation of strategies and plans that focus on quality and on the analysis of performance data oriented to directing organizational improvements (Black and Porter, 1996). Such planning will affect the stages of transformation and exploitation of external knowledge (Zahra and George, 2002). We thus propose:

*H7: Strategic planning is positively related to absorptive capacity.*

Finally, when resources are valuable, rare, difficult to imitate and non-substitutable, they can provide the firm with a sustainable competitive advantage (Matusik and Heeley, 2005). Absorptive capacity and the process that it involves can influence the creation of competitive advantage through innovation in products and processes, as well as in the creation and control of knowledge. Thus, absorptive capacity is both dependent on the past and influenced by experience (Zahra and George, 2002), allowing firms to adapt and renew their stock of knowledge continually through observation of trends in their environment and then internalize this knowledge. Therefore, absorptive capacity can be a source of sustainable competitive advantage (Figure 1).

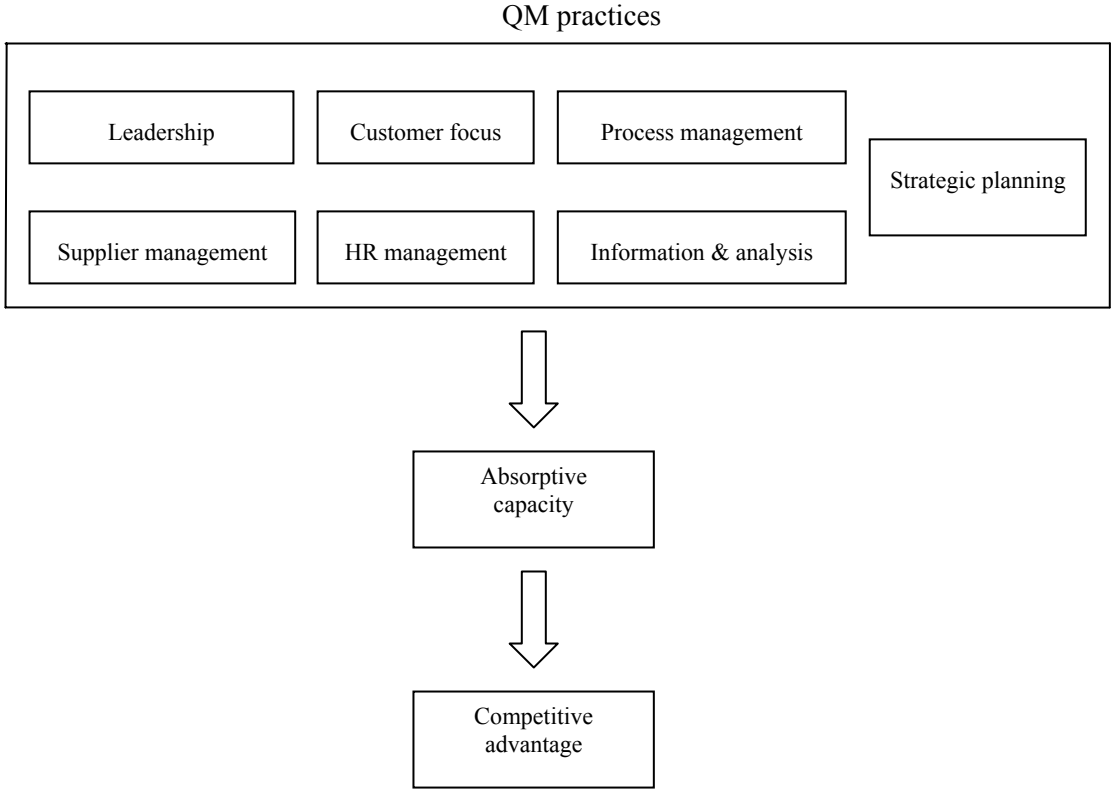


**Fig. 1. The relationship between QM practices and absorptive capacity**

## 2. Methodology

The measurement instruments (Likert-type seven-point scales) were developed through an extensive literature review. QM practices were adapted from scales from previous studies of QM: Flynn et al. (1995), Ahire et al. (1996), Samson and Terziovski (1999), Kaynak (2003) and Prajogo and Sohal (2006). To measure absorptive capacity, we used the scale developed by Szulanski (1996) and Matusik and Heeley (2005).

The survey was sent to 2133 manufacturing firms and services selected at random from the SABI database of the largest Spanish firms. It was to be answered by a key informant (vice president, general manager, quality manager, director or supervisor). After eliminating the questionnaires with missing data, we obtained 230 valid questionnaires. Table 4 shows the technical data of the survey.

Table 4. Technical data of the research

| | |
|---|---|
| Ambit of research | Spanish |
| Methodology | Survey |
| Sample unit | Managers |
| Total population | 11283 |
| Sample size | 2133 |
| Response size | 230 |
| Response rate | 10,78% |
| Sample error | 6,4% |
| Confidence level | 95%; p-q=0,50; Z=1,96 |
| Date of information collection | October and November (2008) |

As Table 5 (Appendix) shows, the unidimensionality and reliability of the scales were analyzed [50]. EQS 6.1 for Windows was used for the following analyses. The unidimensionality of the QMP measures and the absorptive capacity measure was analyzed using CFA. In the SEM literature, a comparative fit index (CFI) cutoff value of 0.90, e.g., [51], [52] or "close to" 0.95 (Hu and Bentler, 1999), and a standardized root mean square residual (SRMR) value of less than 0.08 (Hu and Bentler, 1999) have been recommended for adequate model fit. On the other hand, all the items had statistically significant factor loadings.

The reliability of the constructs was assessed using Cronbach's alpha (Cronbach, 1951). Alpha values equal to or greater than 0.70 indicate high construct reliability (O'Leaary-Kelly and Vokurta, 1998). However, Fornell and Larcker (1981) state that the composite reliability is a more appropriate indicator, since it is calculated taking the scale into account in the context of the measurement model. The minimum recommended value is 0.7. This analysis was completed by calculating the average variance extracted, whose minimum recommended value is 0.5. As Table 5 shows, in all cases the scales are within the accepted limits, indicating that the measurement model is good.

## 3. Analysis

To determine the effect of different QM practices on absorptive capacity, we use a multiple regression analysis. In this case, the independent variables are the different quality practices, while the dependent variable is absorptive capacity. Table 5 shows the results of the analysis. The regression model is statistically significant, with an F-Snedecor coefficient of 45,732 significant at the level $p<0.01$.

To control the problem of multicollinearity we examined variance inflation factors (VIF). The largest of the resulting VIF scores in the model was 2,581, well below the maximum level of 10, indicating that multicollinearity should not be a problem with regard to our data.

The results in Table 5 show that leadership, information and analysis, human resources management, process management and supplier management are positively related to absorptive capacity. This evidence lends support to Hypotheses 1, 2, 4, 5 and 6. Contrary to our hypotheses, both customer focus and strategic planning do not significantly interact with absorptive capacity. The results reject Hypotheses 3 and 7.

Table 5. Results of multiple regression analysis

| Dependent variable: Absorptive capacity (ACAP) | | | | |
|---|---|---|---|---|
| Independent variables | β | T | Sig. | FIV |
| Leadership | 0,285 | 4,539 | 0,000** | 1,780 |
| Strategic planning | 0,042 | 0,432 | 0,666 | 2,581 |
| Customer focus | -0,052 | -0,833 | 0,378 | 1,564 |
| Information and analysis | 0,139 | 2,226 | 0,027* | 1,755 |
| Human resources management | 0,230 | 3,482 | 0,001** | 1,981 |
| Process management | 0,120 | 2,090 | 0,038* | 1,496 |
| Supplier management | 0,128 | 2,158 | 0,032* | 1,587 |
| Model F | 45,732 | Sig. | 0,000** | |
| R | 0,711 | $R^2$ | 0,505 | |

Note: Coefficient significant at **p < 0,01; *p < 0,05.

## 4. Discussion

This paper has studied the relationship between QM practices and absorptive capacity. The results indicate that several practices have a great impact on the firm's ability to identify, assimilate, and exploit the new information.

First, we see that leadership has a positive effect on absorptive capacity, since stable relations with one's own agents and with those outside the firm encourage learning, reduce the cost of seeking information, and increase the speed of its implementation (Lenox and King, 2004). In the same

way, the positive relationship between supplier management and absorptive capacity shows that this management practice enables high levels of fluid communication, shared information, trust, and complementarity of knowledge bases. Suppliers constitute a source of information, fulfilling the characteristics of antecedents consistent with those proposed in the literature (Lane and Lubatkin, 1998).

Human resource management involves, among other practices, teamwork, whose positive relationship to absorptive capacity has been demonstrated in the literature (Meeus et al., 2001; Jansen et al., 2005).

Another source of information is management of processes and their statistical analysis, like information and analysis. Further, benchmarking will enable the firm to acquire important experience (Garvin, 1993), a key antecedent of absorption capacity (Zahra and George, 2002).

Finally, the results show that there is no significant relationship between customer focus and absorptive capacity. In that respect, Hill and Rothaermel (2003) concluded that obligations to current customers and other stakeholders can hinder the proper evaluation and exploitation of new knowledge. On the other hand, the lack of significance of strategic planning in absorptive capacity is an unexpected result. Deeper study of this relation taking into account strategic planning and its relation to absorptive capacity is a line of research that would improve understanding of this relationship.

## Conclusions, limitations and further research

This study represents one of the first empirical studies to explore the link between QM practices and absorptive capacity, and the results provide a theoretical support for the relationship between the two variables.

The results indicate that this set of practices has a great impact on the firm's ability to identify, assimilate, and exploit the new information. Szulanski (1996) determines that lack of absorptive capacity is a determinant of the success or failure of the best practices implementation in the firm.

Our findings indicate that QM practices (leadership, supplier management, human resources management, information and analysis and process management) enhance a unit's absorptive capacity. Given that QM practices have a positive influence on absorptive capacity, we can conclude that this result affects the resources and capabilities of the firm, as well as its competitive advantage.

Finally, our model presents a complement to current theoretical elaborations of the absorptive capacity. Our study provides insights on specific antecedents of absorptive capacity. Van den Bosch et al. (1999) noted that future research may incorporate additional antecedents of absorptive capacity. The suggestions of Todorova and Durisin (2007) direct the attention of researchers to the antecedents of absorptive capacity, both their relative importance and the exploration of new antecedents.

As for future studies in this line of research, we believe that the analysis of the influence of implementing QM practices in other knowledge management processes is important because empirical studies in this field are very few. We believe that determining the effect of the proposed antecedents on the different dimensions of absorptive capacity is important. Although the literature provides various organizational antece-dents (Zahra and George, 2002), few empirical studies analyze the impact of each of these on the dimensions proposed in the concept of absorptive capacity (Jansen et al., 2005).

**Acknowledgment.** This work was supported in part by the Spanish Department of Education and Science under Grant SEJ2007-60772.

## References

1. Ahire, S.L., Golhar, D.Y., Waller, M.A. (1996). "Development and validation of TQM implementation Costructs", *Decision Science*, Vol. 27, No. 1, pp. 23-56.
2. Barney, J. (1991). "Firm Resources and Sustained Competitive Advantage", *Journal of Management*, Vol. 17, No. 1, pp. 99-120.
3. Black, S., Porter, L. (1996). "Identification of the critical factors of TQM", *Decision Sciences*, Vol. 27, No. 1, pp. 1-21.
4. Cohen, W., Levinthal, D. (1990). "Absorptive capacity: a new perspective on learning and innovation", *Administrative Science Quarterly*, Vol. 35, No. 1, pp. 128-152.
5. Cronbach, L. (1951). "Coefficient alpha and the internal structure of test", *Psychometrica*, Vol. 16, No. 3, pp. 297-334.
6. Curkovic, S., Melynk, S., Calantone, R., Handfield, R. (2000). "Validating the Malcolm Baldrige National Quality Award framework through structural equation modeling", *International Journal of Production Research*, Vol. 38, No. 4, pp. 765-791.
7. Choo, A.S., Linderman, K.W., Schroeder, R.G. (2007). "Method and context perspectives on learning and knowledge creation in quality management", *Journal of Operations Management*, Vol. 25, No. 4, pp. 918-931.
8. Dean, J.W., Bowen, D.E. (1994). "Management theory and total quality management: improving research and practice through theory development", *Academy of Management Review*, Vol. 19, No. 3, pp. 392-418.
9. Fornell, C., Larcker, D.F. (1981). "Evaluating structural equation models with unobservable variables and measurement error", *Journal of Marketing Research*, Vol. 18, No. 1, pp. 39-50.

10. Flynn, B.B., Schroeder, R.G., Sakakibara, S. (1995). "The impact of quality management practices on performance and competitive advantage", *Decision Science*, Vol. 23, No. 5, pp. 659-691.
11. Garvin, D.A. (1993). "Building a learning organization", *Harvard Business Review*, Vol. 17, No. 4, pp. 78-91.
12. González-Benito, J., Dale, B (2001), "Quality and Reliability Assurance Practices in the Spanish Auto Components Industry: A Study of Implementation Patterns", *European Journal of Purchasing and Supply Management*, Vol. 7, No. 3, pp. 187-196.
13. Gupta, A., Govindarajan, V. (2000). "Knowledge flows within multinational corporations", *Strategic Management Journal*, Vol. 21, No. 4, pp. 473-496.
14. Hansen, M.T. (2002). "Knowledge networks: explaining effective knowledge sharing in multiunit companies", *Organization Science*, Vol. 13, No. 3, pp. 232-248.
15. Hu, L., Bentler, P.M. (1999). "Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives", *Structure Equation Modeling*, Vol. 6, No. 2, pp. 1-55.
16. Humphreys, P.K., Li, W.L., Chan, L.Y. (2004). "The impact of supplier development on buyer-supplier performance", *Omega: The International Journal of Management Science*, Vol. 32, No. 4, pp. 131-143.
17. Hill, C.W.L., Rothaermel, F.T. (2003). "The performance of incumbent firms in the face of radical technological innovation", *Academy of Management Review*, Vol. 28, No. 2, pp. 257-274.
18. Ittner, C.D., Nagar, V., Rajan, M. (2001). "An empirical examination of dynamic quality based learning models", *Management Science*, Vol. 47, No. 4, pp. 563-578.
19. Jansen, J., Van den Bosch, F., Volberda, H. (2005). "Managing potential and absorptive capacity: how do organizational antecedents matter?", *Academy of Management Journal*, Vol. 48, No. 6, pp. 999-1015.
20. Kaynak, H. (2003). "The relationship between total quality management practices and their effects on firm performance", *Journal of Operations Management*, Vol. 21, No. 2, pp. 1-31.
21. Kim, L. (1998). "Crisis construction and organizational learning: Capability building in catching-up at Hyundai Motor", *Organization Science*, Vol. 9, No. 3, pp. 506-521.
22. Lane, P.J., Lubatkin, M. (1998). "Relative absorptive capacity and interorganizational learning", *Strategic Management Journal*, Vol. 19, No. 4, pp. 461-477.
23. Lane, P.J., Salk, J., Lyles, M. (2001). "Absorptive capacity, learning and performance in International Joint Ventures", *Strategic Management Journal*, Vol. 22, No. 12, pp. 1139-1161.
24. Lane, P.J., Koka, B., Pathak, S. (2006). "The reification of absorptive capacity: a critical review and rejuvenation of the construct", *Academy of Management Review*, Vol. 31, No. 4, pp. 883-863.
25. Langfield-Smith, K., Greenwood, M.R. (1998). "Developing co-operative buyer-supplier relationships: a case study of Toyota", *Journal of Management Studies*, Vol. 35, No. 3, pp. 331-353.
26. Lenox, M., King, A. (2004). "Prospects for developing absorptive capacity through internal information provision", *Strategic Management Journal*, Vol. 25, No. 4, pp. 331-348.
27. Lyles, M.A., Salk, J. (1996). "Knowledge acquisition from foreign parents in international joint ventures: An empirical examination in the Hungarian context", *Journal of International Business Studies*, Vol. 27, pp. 877-903.
28. Matusik, S.F., Heeley, M. (2001). "Absorptive Capacity and firm knowledge: Separating the multiple components of the absorptive construct", *Annual meeting of the Academy of Management*, Wahington, DC.
29. Matusik, S.F., Heeley, M. (2005). "Absorptive capacity in the software industry: identifying dimensions that affect knowledge and knowledge creation activities", *Journal of Management*, Vol. 31, No. 4, pp. 549-572.
30. Meeus, M.T.H., Oerlemans, L.A.G., Hage, J. (2001). "Patterns of interactive learning in a high-tech region", *Organization Studies*, Vol. 22, No. 1, pp. 145-172.
31. Mills, P.K., Chase, R.B., Marguelies, N. (1983). "Motivating the client/employee system as a service production strategy", *Academy of Management Review*, Vol. 8, No. 2, pp. 301-310.
32. Nair, A. (2006). "Meta-analysis of the relationship between quality management practices and firm performance: Implications for quality management theory development", *Journal of Operations Management*, Vol. 24, No. 5, pp. 948-975.
33. Nonaka, I., Takeuchi, H. (1995). *The Knowledge-creating Company: How Japanese Companies Create the Dynamics of Innovation*. Oxford University Press, New York.
34. O'Leary-Kelly, S.W., Vokurka, R.J. (1998). "The empirical assessment of construct validity", *Journal of Operations Management*, Vol. 16, No. 4, pp. 387-405.
35. Osterloh, M., Frey, B.S. (2000). "Motivation, knowledge transfer, and organizational forms", *Organization Science*, Vol. 11, No. 5, pp. 538-550.
36. Powell, T.C. (1995). "Total quality management as competitive advantage: a review and empirical study", *Strategic Management Journal*, Vol. 16, No. 1, pp. 15-27.
37. Prajogo, D.I., Sohal, A.S. (2003). "The multidimensionality of TQM practices in determining quality and innovation performance, an empirical examination", *Technovation*, Vol. 24, No. 6, pp. 443-515.
38. Rungtusanatham, M., Anderson, J.C., Dooley, K.L. (1997). "Conceptualizing organizational implementation and practice of statistical process control", *Journal of Quality Management*, Vol. 2, No. 1, pp. 113-137.
39. Samson, D., Terziovski, M. (1999). "The relations between total quality management practices and operational performance", *Journal of Operations Management*, Vol. 17, pp. 393-409.
40. Saraph, J.V., Benson, G.P., Schroeder, R.G. (1989). "An instrument for measuring the critical factors of Quality Management", *Decision Science*, Vol. 20, No. 4, pp. 810-829.

41. Senge, P. (1999). "It's the learning: the real lesson of the quality movement", *Journal for Quality and Participation*, Vol. 22, No. 6, pp. 34-40.
42. Simonin, B.L. (1999). "Ambiguity and the process of knowledge transfer in strategic alliances", *Strategic Management Journal*, Vol. 29, pp. 595-623.
43. Slater, S.F., Narver, J.C. (1998). "Customer-led and market-oriented: Let's not confuse the two", *Strategic Management Journal*, Vol. 19, No. 5, pp. 1001-1006.
44. Sousa, R., Voss, C.A. (2002). "Quality management re-visited: a reflective review and agenda for future research", *Journal of Operations Management*, Vol. 20, No. 1, pp. 91-109.
45. Sparkes, J.R., Miyake, M. (2000). "Knowledge transfer and human resource development practices: Japanese firms in Brazil and Mexico", *International Business Review*, Vol. 9, pp. 91-109.
46. Stata, R. (1989). "Organizational learning: the key to management innovation", *Sloan Management Review*, Vol. 30, No. 3, pp. 63-74.
47. Szulanski, G. (1996). "Exploring internal stickiness: Impediments to the transfer of best practice within the firm", *Strategic Management Journal*, Vol. 17 (Winter), pp. 27-43.
48. Todorova, G., Durisin, B. (2007). "Absorptive capacity: valuing a reconceptualization", *Academy of Management Review*, Vol. 32, No. 3, pp. 774-786.
49. Tsai, W.P. (2001). "Knowledge transfer in intraorganizational networks: Effects of network position and absorptive capacity on business unit innovation and performance, *Academy of Management Journal*, Vol. 44, No. 4, pp. 996-1004.
50. Sila, I. (2007). "Examining the effects of contextual factors on TQM and performance through the lens of organizational theories: An empirical study", *Journal of Operations Management*, Vol. 25, No. 1, pp. 83-109.
51. Van den Bosch, F., Volberda, H., De Boer, M. (1999). "Coevolution of firm absorptive capacity and knowledge environment: organizational forms and combinative capabilities", *Organizational Science*, Vol. 10, No. 5, pp. 551-568.
52. Zahra, S.A., George, G. (2002). "Absorptive capacity: A review, reconceptualization, and extension", *Academy of Management Review*, Vol. 22, No. 2, pp. 185-203.

## Appendix

Table 6. Summary of goodness-of-fit statistics for CFA of model constructs

| Constructs/items | Factor loading | R-square | CFI | SRMR | Composite reliability | Average variance extractred | Cronbach's alpha |
|---|---|---|---|---|---|---|---|
| Leadership | | | 0,935 | 0,025 | 0,93 | 0,69 | 0,925 |
| L1 | 0,803 | 0,645 | | | | | |
| L2 | 0,871 | 0,759 | | | | | |
| L3 | 0,890 | 0,792 | | | | | |
| L4 | 0,839 | 0,704 | | | | | |
| L5 | 0,825 | 0,680 | | | | | |
| L6 | 0,760 | 0,577 | | | | | |
| Strategic planning | | | 0,917 | 0,039 | 0,907 | 0,71 | 0,937 |
| SP1 | 0,789 | 0,773 | | | | | |
| SP2 | 0,937 | 0,879 | | | | | |
| SP3 | 0,826 | 0,682 | | | | | |
| SP4 | 0,721 | 0,519 | | | | | |
| Customer focus | | | 0,949 | 0,04 | 0,95 | 0,86 | 0,931 |
| OC1 | 0,877 | 0,769 | | | | | |
| OC2 | 0,924 | 0,853 | | | | | |
| OC3 | 0,918 | 0,844 | | | | | |
| Information and analysis | | | 0,994 | 0,009 | 0,93 | 0,76 | 0,923 |
| IA1 | 0,747 | 0,559 | | | | | |
| IA2 | 0,936 | 0,876 | | | | | |
| IA3 | 0,922 | 0,849 | | | | | |
| IA4 | 0,877 | 0,770 | | | | | |
| Human resource management | | | 0,914 | 0,098 | 0,87 | 0,58 | 0,873 |
| HRM1 | 0,723 | 0,522 | | | | | |
| HRM2 | 0,715 | 0,512 | | | | | |
| HRM3 | 0,761 | 0,579 | | | | | |
| HRM4 | 0,770 | 0,593 | | | | | |
| HRM5 | 0,849 | 0,721 | | | | | |
| Process management | | | 0,933 | 0,046 | 0,847 | 0,63 | 0,828 |
| PM1 | 0,728 | 0,530 | | | | | |
| PM2 | 0,992 | 0,850 | | | | | |
| PM3 | 0,732 | 0,536 | | | | | |

Table 6 (cont.). Summary of goodness-of-fit statistics for CFA of model constructs

| Constructs/items | Factor loading | R-square | CFI | SRMR | Composite reliability | Average variance extractred | Cronbach's alpha |
|---|---|---|---|---|---|---|---|
| Supplier management | | | 0,95 | 0,028 | 0,88 | 0,604 | 0,883 |
| SM1 | 0,774 | 0,599 | | | | | |
| SM2 | 0,726 | 0,527 | | | | | |
| SM3 | 0,821 | 0,654 | | | | | |
| SM4 | 0,802 | 0,644 | | | | | |
| SM5 | 0,703 | 0,597 | | | | | |
| Absorptive capacity | | | 0,934 | 0,026 | 0,93 | 0,75 | 0,947 |
| ACAP1 | 0,878 | 0,771 | | | | | |
| ACAP2 | 0,922 | 0,849 | | | | | |
| ACAP3 | 0,895 | 0,800 | | | | | |
| ACAP4 | 0,838 | 0,702 | | | | | |
| ACAP5 | 0,840 | 0,706 | | | | | |

Note: All factor loads are significant at $p < 0,01$.