RELATIONSHIP BETWEEN DIFFERENT DIMENSIONS OF QUALITY MANAGEMENT AND INNOVATION

Lillian do Nascimento Gambi (UFV)
lillian.gambi@gmail.com

Alex Ribeiro Rosa Junior (UFV)
alex_ribeirojr@hotmail.com

In order to be competitive in a changing marketplace, firms must improve both quality and innovativeness. However, literature shows conflicting results concerning the relationship between quality management and innovation. The main purpose of this study is to investigate if: (1) QM dimensions (hard and soft) have positive/negative effect on innovation practices and performance, and (2) In which extension those dimensions affect innovation practices and performance. The research models and questions devised are tested using data collected from 132 Brazilian manufacturing companies. This study contributes to the quality-innovation literature by showing that both dimensions of QM have positive effect on innovation practices and performance and these effects vary across the QM dimensions. This finding has an important implication for managers who need to be actively aware of the practices used in their companies and emphasize those that most contribute to innovation.
Palavras-chave: Quality management; Innovation practices; Innovation Performance
1. Introduction

In order to be competitive in a changing marketplace, firms must improve both quality and innovativeness (FENG et al., 2006; HUNG, 2007). Nevertheless, there is an interest among academic and practitioners on the relationship between quality management and innovation.

Over the last decades the relationship between Quality Management (QM) and innovation has been extensively studied (e.g. Singh and Smith, 2004; Feng et al. 2006, Abrunhosa et al. 2008). It is recognized that QM practices and innovation can provide improvements to all functions within an organization. However, literature shows conflicting results concerning the relationship between quality management and innovation (PRAJOGO and SOHAL, 2001).

In this context, the literature has discussed if QM fosters or hinders innovation? However, literature fails to provide a clear answer to this question since there are conflicting arguments. While studies such as Prajogo and Sohal (2001); Singh and Smith (2004); Molina et al. (2007); Abrunhosa and Sá (2008) state that firms that implement the soft elements tend to be more innovative; other authors argue that hard elements inhibit innovation (BENNER and TUSHMAN, 2002; PRAJOGO and SOHAL, 2004). Therefore, this study aims to investigate the relationship between different dimensions of Quality Management and Innovation in Brazilian manufacturing companies.

2. Literature review

Quality Management (QM) has been widely used by organizations. It is recognized as an important management approach to provide competitive advantage. QM consists of a large number of elements principles, practices and techniques that several authors have classified into two large groups: soft and hard quality management (ABRUNHOSA and SÁ, 2008).

Several recent studies have considered QM under a multidimensional view, formed hard elements related to the technical aspects of quality management (such as control of processes...
and products, quality standards, tools of quality and satisfy manufacturing specifications), whereas soft elements relates to the social/behavioral attributes of quality (such as training, learning, and internal cooperation or teamwork).

In turn, innovation has received important attention having a crucial role for competitive advantage nowadays. The idea that innovation is a competitive instrument essential for firms’ long-term success and survival is widely recognized (ANDERSSON et al., 2008). It has a significant role in helping business to attain a sustainable competitive advantage. According to Ooi et al. (2012) especially in developing countries where industrial growth is fundamental to economic development and also due to a competitive global environment, companies in developing companies are increasingly seeking for innovation.

Several studies have tried to synthesize the relationship between QM practices and innovation and identify the influence of QM practices dimensions. Feng et al. (2006) for instance show that soft practices (e.g., leadership and people management) are related to innovation. Furthermore, Hoang et al. (2006) state that there is positive relationship between QM and innovation, they also found that leadership, process and strategic management, and open organization have a positive impact on innovation. Additionally, Abrunhosa et al. (2008), found positive relationship between three QM practices (e.g communication, teamwork, and supportive people management practices) and technological innovation. In sum, there is an agreement that the set of QM practices is associated with innovation performance.

Based on the literature review, there are many contradictions concerning the influence of hard and soft QM in innovation. Nevertheless only hard QM or Soft QM may not be sufficient to provide innovation and improve the market competitiveness. The implementation of QM would result in changes in the organizational structure, making it flexible (FORZA, 1996), which can be afford a beneficial effect on innovation. Besides QM practices promote employee empowerment, involvement and teamwork, which improve the development of innovation (HUMBLE and JONES, 1989).

Several empirical studies have shown that hard QM can have a positive impact on innovation. Kim et al. (2012) argue that by implementing QM tools, a firm can identify potential
innovation areas, develop innovation practices, and produce innovative products and processes. Effective management of processes encourages firms to develop routines that are formed by a set of best practices, which can be used to establish a learning base and support innovative activities (PERDOMO-ORTIZ et al., 2006).

Besides the above arguments that propose a positive relationship between QM and innovation, there are opposite studies, represented by Tidd et al. (1997), Slater and Narver (1998), Kim and Marbouigne (1999). Those authors suggest that QM practices can hinder innovation. Prajogo and Sohal (2001) summarize some arguments of the studies which support the negative relationship between QM and performance for instance: QM principles based on risk avoidance and adaptive approach could lead firms to be imitators than innovators, QM could hinder creativity since it defends following standards.

3. Method

The main purpose of this paper is to clarify previous conflicting results of the effect of quality management, under a multidimensional perspective, on the innovation practices and performance.

Thus, two research questions arise in this context:

RQ1 – Does the QM dimensions (hard and soft) have positive/negative effect on the innovation practices and performance?

RQ2 – If so, in which extension those dimensions affect innovation practices and performance?

To investigate the research questions proposed in this study, it was devised the research model presented in Figure 1 which shows the two QM dimensions, innovation practices and performance.

Figure 1 - Structural model of the relationship between QM, Innovation Practices and Performance
With two dimensions of QM, two models were tested. Based on data collected from 132 manufacturing companies in Brazil, structural equation modelling in IBM SPSS Amos v.20 was used to test the models.

Hard QM and soft QM were operationalized in 4 items each and measured on a five-point Likert scale ranging from 1= “Strongly Disagree” to 5= “Strongly Agree.” The items are based on previous studies (e.g. Flynn et al., 1994; Prajogo and McDermott, 2011).

Literature shows different methods to measure innovation. In order to measure innovation practices and performance, were used scales based on criteria such as, total research and development of new products, the number of new products introduced to the market, based on the studies of Prajogo and McDermott (2011). Then, innovation practices were measured using four items ranging from 1= “Strongly Disagree” to 5= “Strongly Agree.”, while to measure performance innovation, two items were used. As it is difficult to collect objective performance data, a five-point Likert scale was used with 1= “Very Low” to 5= “Superior” to describe the end points of the scales. Additionally, an item “Not Sure” was included to avoid forced answers if the respondents do not know how their firms are performing.

4. Results
Reliability was performed as a preliminary statistical test to check internal consistency of the scales. Reliability is broadly defined as the degree to which scales are free from error and therefore consistent (NUNNALLY et al. 1967). The reliability of survey scales was assessed using Cronbach’s alpha performed in PASW Statistics 17. With all values above 0.70 (Table 1), the scales showed acceptable reliability (HAIR et al. 2009).

Table 1 - Reliability of the constructs
The structural model is represented in Figure 1. Research questions are tested using IBM® SPSS® Amos 20. Many indicators are used to indicate the fit of the data to the model (RMSEA, \( \chi^2/df \), CFI). As a guideline, RMSEA < 0.05 good model fit, \( \chi^2 (\chi^2/df) \) smaller than 2.0 is considered very well (Hair et al., 2009) and CFI close to 1.0 represent a perfect fit (Hair et al., 2009). The overall fit statistics for both models tested are \( \chi^2/df = 1.449 \), CFI = 0.974 and RMSEA = 0.059, (Model 1 – Soft QM), and \( \chi^2/df < 1.260 \), CFI = 0.984 and RMSEA< 0.045 (Model 2 – Hard QM), which suggest satisfactory model fit.

Both models tested showed that QM hard elements, and QM soft elements have significant effect on innovation practices, and on innovation performance. More specifically, all these effects were positive and vary across the QM dimensions as presented in Table 2.

### Table 2 - The relationship between QM, Innovation practices and Performance

<table>
<thead>
<tr>
<th>Model 1 - Soft QM, Innovation Practices and Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Effects</strong></td>
</tr>
<tr>
<td>Soft QM --&gt; Innovation Practices</td>
</tr>
<tr>
<td>Innovation Practices --&gt; Innovation Performance</td>
</tr>
<tr>
<td>Soft QM--&gt; Innovation Practices --&gt; Innovation Performance</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model 2 - Hard QM, Innovation Practices and Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Effects</strong></td>
</tr>
<tr>
<td>Hard QM --&gt; Innovation Practices</td>
</tr>
</tbody>
</table>
The analysis of the empirical data demonstrates that the relationship between QM, innovation practices and innovation performance is influenced by the dimensions of QM. In spite of all the effects be positive, the highest increase in innovation performance was found for Soft QM: 0.597 against 0.367 – for Hard QM.

Results show that soft QM foster innovation practices and innovation practices can affect substantially innovation performance. This finding can be supported by several arguments in the literature, including a set of practices established through the implementation of soft QM can support innovation practices because soft QM practices can instantly disseminate knowledge across functions and inspire creative ideas, which could be expected to directly yield improved innovation performance (PRAJOGO and SOHAL, 2004; SANTOS-VIJANDE et al., 2007).

Another interesting result is that hard QM has also a positive effect on innovation practices, and they, in turn, can affect positively innovation performance. These findings are consistent with the studies of Perdomo-Ortiz et. al. (2006) which show a positive link between hard QM and innovation, that is, the importance of technical issues to foster innovation.

Besides, this study provides support for the notion that innovation practices has a mediating effect on the relationship between soft QM and innovation performance. Therefore, some quality management practices contribute to appearance of innovation in companies. These arguments are supported by our findings and by Zeng et. al. (2012) who found that QM practices are originally intended to enhance quality performance but it can improve innovation performance. Besides, our findings confirm the multidimensionality of QM since some practices seem to be more effective than others in foster innovation performance.
Moreover, the results suggest that QM can affect innovation. This finding has an important implication for managers who need to be actively aware of the practices used in their companies and emphasize those that most contribute to innovation. For instance, to improve innovation performance, managers should foster innovation through QM by emphasizing communication between employers, leadership, empowerment, training, and teamwork.

Summarizing, this paper provides empirical results showing that quality (even related only to hard dimension) and innovation are not conflicting concepts. The results confirm that implement a set of QM practices increase firms’ innovation, but this effect vary across the dimension of QM: the highest increase in innovation performance was found in the model considering Soft QM, but Hard QM can also contributes to innovation performance in a lower degree.

5. Conclusion

Based on a multi-dimensional view of QM, this study provides empirical evidence to contribute to some of the controversies that appear in the literature concerning the relationship between QM and innovation. This study examines the relationship between QM practices and innovation, and shows that different dimensions of QM, mainly the soft dimension, are associated with innovation.

In particular, the results indicate that hard QM also foster innovation practices and innovation practices, in turn, affect positively innovation performance. This study further contributes to the understanding of the different roles played by different QM dimensions in determining innovation. Finally, our study has interesting implications for practitioners. If manufacturing industries implement soft or hard QM practices could be a support to innovation capabilities in the companies.

The study also has certain limitations. First, the data used to conduct analysis was collected via an e-mail survey questionnaire, which the usual limitations associated with this research approach apply, including a lack of control over who actually completes the survey. Future research should use different methodologies, including interviews, field studies or
longitudinal case studies to develop a deeper understanding of the mechanisms behind the statistical relationships reported in this paper. Despite these limitations, this study contributes to the quality-innovation literature by showing that both dimensions of QM have positive effect on innovation practices and performance and these effects vary across the QM dimensions.

6. Acknowledgments

The authors thank the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) and Fundação de Amparo à Pesquisa do Estado de Minas Gerais (FAPEMIG) for the financial support.

REFERENCES


