



## ARTICLE

# Exploring the relationship between information technology competence and quality management



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**Abstract** The introduction of information technology (IT) has become a necessity to compete in most industries, so simple implementation of an IT strategy is not enough to achieve a better firm performance. Literature review shows IT as a useful tool only when it is combined with other firm resources and practices. The purpose of this paper is to analyze the complementarity between IT and one of the most prevalent and well-established set of organizational practices, Quality management practices (QMP). Structural equation modeling with data collected from managers in 230 Spanish firms shows a positive and significant relationship between IT and QMP. The findings provide us with in-depth understanding of both disciplines and several conclusions for its success.

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## Introduction

The ability to obtain information on markets and customers can improve firms' predisposition to adapt to changes in the environment and thus to improve their competitive position with respect to competitors who are poorly informed and therefore slower to adapt (Barney, 2001). Many firms have thus begun to develop strategies that understand information technology (IT) as a resource that facilitates the acquisition and use of information (Mata et al., 1995; Tippins and Sohi, 2003). In spite of the growing academic and

practical interest in understanding how IT can sustain competitive advantage (Pavlou and El Sawy, 2006), there is no clear understanding of the processes by which IT impacts firm strategy or performance improves (Devaraj and Kohli, 2003; Lee et al., 2008).

Research has conceptualized IT as a useful tool only when it is combined with other resources or practices in the firm (Powell and Dent-Micallef, 1997; Jarvenpaa and Leidner, 1998). In other words, the utility of IT is tied to its complementarity with other organizational resources or practices, developing IT-related resources (Nevo and Wade, 2010). For example, the literature review shows that IT facilitates other business processes, such as new product development (Pavlou and El Sawy, 2006), customer service quality (Ray et al., 2005) and entrepreneurial culture (Benitez-Amado et al., 2010). Despite these advances,

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however, the processes by which IT resources interact with other human and organizational resources, as well as the nature of these resources, have hardly been studied (Ravichandran and Lertwongsatien, 2005; Wade and Hulland, 2004; Nevo and Wade, 2010). Previous research also shows that studies that are undertaken to study IT do not consider the role of IT capabilities, key variables for the proper implementation of IT assets (Kohli and Grover, 2008). It is therefore necessary to develop and study the impact of IT competence (Tippins and Sohi, 2003) or Information Systems strategy (Chen et al., 2010) on the different organizational resources.

When analyzing the complementarity of IT competence with other organizational resources and practices, it is necessary to define a well-structured set of the competences present in the business area. In that sense, quality management (QM) offers one of the sets of organizational practices related to Operations Management that is most frequently and well-established in firms (Sousa and Voss, 2002; Nair, 2006). The literature review shows that QM plays an important role in improving the firm's competitive position (Reed et al., 2000) and that the proper application of IT can influence this relationship (Murray, 1991; Aiken et al., 1996; Cortada, 1995; Forza, 1995; Ahmed and Ravichandran, 1999; Perez-Arostegui et al., 2012). Thus, the development of an IT competence will improve the efficacy of QM practices, enabling firms to achieve a better competitive position (Pearson et al., 1995).

Various studies have examined the relation between IT and QM. Matta et al. (1998) describe a theoretical framework that analyzes the impact of a set of IT tools present in the firm on success in the implementation of QM practices. The main limitation of this study is that it defines IT as a mere possession of these tools. The results of one of the main empirical studies to analyze the relationship between IT and QM, by Forza (1995), show that there is no significant statistical evidence between these variables. This study also provides merely a technical conception of IT. The study by McAdam and Henderson (2004) concludes that the empirical study of the relationship between QM and its antecedents (including IT) should be considered in future research.

Among the more recent studies, we would distinguish those of Sanchez-Rodriguez and Martinez-Lorente (2011), whose results show a positive and significant relationship between IT and QM. Here too, however, the definition of IT limits the degree of implementation of software, hardware, and communications infrastructure in the firm. Finally, the study by Perez-Arostegui et al. (2012) tackles the definition of IT as a competence composed of IT infrastructure, IT technical and managerial knowledge, and the integration of IT with the firm strategy. This study concludes that IT competence has a positive and significant impact on quality performance but does not analyze its impact on QM practices.

The goal of this study was thus to develop a deeper knowledge of the complementarities of IT competence with other organizational resources or practices that have a strong presence in firms, such as QM practices. We will analyze the impact of an IT competence on the implementation of QM, defining this implementation as the development of a set of QM practices. We give this goal concrete form in the following research proposals: (a) to determine the concept

of IT competence based on an exhaustive literature review, and (b) to analyze the impact of an IT competence on the implementation of QM, as measured using seven practices (leadership, strategic planning, customer focus, information and analysis, human resources management, process management, and supplier management).

One of the main contributions of this paper is to develop an empirical study of the complementarity of IT competence with other organizational resources. The integrated study model provides a basis for calculating the level of influence of IT strategy on QM practices. Further, our study provides empirical evidence for the development of a second-order factor to evaluate the different dimensions of IT competence, providing new perspectives for researchers who wish to examine the multidimensionality of this variable.

The study also provides a guide for managerial practice by improving existing knowledge of the efficacy of a QM system. The positive impact of IT competence on different QM practices guarantees greater efficacy of the QM program. We also express the need for managers not to limit themselves to mere investment in an IT infrastructure, but to develop a set of IT-related capabilities that facilitate the development of other organizational practices.

To achieve these goals, the following section presents a theoretical review of the study variables, as well as justification of the different hypotheses that give our goal concrete form. Methodology section explains the research methodology, the origin of the scales chosen, their psychometric properties, and the characteristics of the study performed. After analysis and discussion of the theoretical model proposed in analysis and discussion section, the last section synthesizes the main conclusions, as well as the limitations and implications (academic and practical) of the study.

## Literature review and hypotheses

### Information technology competence

The literature on IT capability or competence analyzes the existence of various resources related to IT, whose combination composes an IT competence or capability that is valuable, non-imitable, and non-substitutable (Mata et al., 1995; Powell and Dent-Micallef, 1997). From this perspective, Bharadwaj (2000, p. 171) defines IT capability as the ability to mobilize and use IT-based resources through the combination or coexistence of other resources and capabilities in the firm. For Tippins and Sohi (2003, p. 748), IT competence represents the degree to which a firm possesses IT knowledge and employs it effectively to manage the information generated in the firm. In other words, the different dimensions of the construct "IT competence", composed of IT knowledge management, IT infrastructure (IT objects), and IT operations, represent co-specialized resources that reflect the organization's ability to understand and use IT tools and processes necessary to manage the information derived from customers and from the market.

Along these lines, Bharadwaj et al. (2002, p. 4) redefine IT capability as the firm's ability to acquire, develop, and direct its IT resources to determine and support its business strategies and value chain activities.

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