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Are quality-oriented companies more innovative?

POLITECNICO
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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1

INTRODUCTION

1.1 Context

In the twenty-first century markets and economic environments characterized by events like globalization and deregulation of markets, increasing customer requirements, and rapid technology transfer have presented challenges to most organizations. In response to these challenges, many companies have developed competitive strategies where innovation and quality play a crucial role. According to (Fernandes & Lourenço, 2011), these dimensions are the guiding elements for what, in today business world, it is known as management excellence.

When talking about quality today it is a common belief that quality orientation is becoming one of the most key strategic factors. Quality management's practices not only provide superior outcomes, but also sustain competitive advantage in national and global markets. Thus, in order to improve business outcomes, companies worldwide have applied the principles of total quality. Essentially, Total Quality Management (TQM) is a general philosophy of management which became popular in the 1980s which represents an organization-wide commitment in satisfying customer expectations, integrating all functions and processes of the organization in order to reach a continuous improvement of the quality of goods and services (Lenka & Suar, 2008). Therefore, a total quality-oriented company is one that apply TQM principles, methods and techniques to all functions and management levels within the organization.

However, referring to business environment characterized by rapid changes, greater uncertainty and complexity, high quality alone could not be sufficient. The basis to gaining competitive advantage in the long-term is shifted from quality to innovation as the most decisive factor for economic competitiveness. According to theorists and

organizational managers, innovation currently plays an essential role for companies which want to develop and maintain a competitive advantage and gain entry in new markets. As organizations seek to distance themselves from competitors, they develop and/or adopt new products, processes, techniques or procedures (Cooper, 1998). Launching new products helps firms protect their revenues while investing in process innovation helps firms lower their costs, both critical aspects to survive in dynamic environments.

To summarize, nowadays in the competitive marketplace both quality and innovation are playing fundamental role in securing a sustainable competitive advantage. However, managers frequently emphasize that they find substantial conflicts between quality and innovation activities (López-Mielgo, Montes-Peón, & Vázquez-Ordás, 2009). The importance of both dimensions in achieving high organizational outcomes has motivated researchers to identify if quality management, specifically TQM, could create a favorable and fertile atmosphere for developing innovation.

It is therefore necessary to establish whether and how quality and innovation are related. If quality limits innovation, it is important for the company to understand the conditions under which this happens and take necessary decisions so that innovative performance is not negatively affected by the implementation of quality practices. On the contrary, if quality plays the role of the antecedent of innovation, it is important for an organization not only understand the conditions under which quality triggers innovation process, but also ensure that these conditions persist over time, in order to gain both quality and innovation benefits (Manders, de Vries, & Blind, 2016).

1.1.1 Problem Statement and Derivation of Research Question

For quality practitioners innovation management's strategic importance is not new. Furthermore, recent developments in global markets competitiveness are turning quality into a necessary but not sufficient factor to achieve business success, being replaced by innovation as the only true differentiator from competitors.

Therefore, it is logical to believe that companies that implement TQM will make an appropriate and considerable effort in innovation of their products and services (Martinez-Costa & Martinez-Lorente, 2008). Thereby, organizations have begun to wonder whether they should continue to implement TQM, especially if they want to achieve high levels of innovative outcomes. Consequently, there is a need to figure out if companies should choose between quality and innovation or whether a synergy could exist between these two dimensions.

There is an apparent tension between TQM and innovation. TQM is about consistency, standardization and control, whereas innovation is about change, difference, and accepting failure (Silva, Gomes, Lages, & Pereira, 2014). In contrast, for many academics and practitioners, there are common elements to TQM and innovation. This supposed relationship had drawn the attention of researchers, leading to empirical studies in order to investigate if TQM fosters innovation or if, on the contrary, it limits the firm's innovation capacity.

However, the relationship is not still clear and there are both positive and negative arguments about the influence of TQM in organization's innovative capability. The arguments for a positive impact of quality on innovation capability could be based on the similarities of TQM core principles and practices and those embedded on the concept on innovation. This claim implies that firms implementing quality systems also improve their innovation performance. For instance, a TQM system: (1) by involving employees in the management of processes it can create a culture that encourages people to explore and take risks; (2) by focusing on customers it can stimulate organizations to be more creative in order to meet market's changing needs; (3) by promoting a continuous improvement it gives companies the commitment required for establishing an internal environment of never-ending innovation.

On the other hand, negative arguments declare that TQM quality management systems could hinder innovation. A customer-focused philosophy can easily cause organizations to focus only on incremental improvements to current products and services (Prajogo & Sohal, 2001); as a result, these companies could show many limits in looking for unserved customers or potential markets. Similarly, continuous improvement requires standardization and routines for establishing process' control and achieving reductions in

variability. This could lead rigidity and narrow innovation by stimulating people into focusing on the details of the current quality process rather than come out with new ideas to change the current work system (Glynn, 1996).

Given the crucial role that quality and innovation have for the survival of organizations in the current market, the study of this relationship has great importance. The aim of this work is, by developing a conceptual model, to clarify "how" quality management can influence firm's innovation capability. Specifically, the model proposes the deployment of company's corporate strategy as a possible means by which a quality orientation promotes innovation capacity.

After this brief frame on the justification and importance of the subject, the central question of this research may be pointed out: are quality-oriented companies more innovative?

1.2 Methodological Overview

The methodology of this work could be described as a two-step process. First, a literature review was carried out about the fields of quality and innovation and about the nature of their relationship. Second, based on the knowledge acquired, a conceptual model concerning the relationship between quality orientation and the determinants of innovation capability was developed in order to answer to the research question.

1.2.1 Systematic Literature Review

The necessary knowledge-base to carry out this thesis' work has been built by searching for key-words related to the main covered topics (quality and innovation) among scientific papers published over the last three decades. Specifically, several international journals about quality like the TQM Journal, Total Quality Management & Business Excellence Journal and others interdisciplinary journals were consulted.

This has been necessary to develop the core-knowledge background. Focusing on quality management, a literature review was undertaken to capture the essence of a quality-oriented company. Particularly, researches were analyzed in order to better understand the fundamental principles of a total quality system and the most important factors involved in a strategy based on these principles. Subsequently, a broad analysis has been carried out to further investigate the main tendency regarding the impact, both direct and indirect, of quality management on firm's innovation performance.

Finally, regarding innovation, several studies were investigated to comprehend what determines the innovation capacity of an organization. Information collected among literature's sources has been fundamental to find out whether these determinants could be promoted by a quality-oriented strategy.

1.2.2 Conceptual Model Development

The body of the acquired knowledge was used to develop a conceptual model. Due to the presence of models which directly link TQM principles, practices and methods to different innovation typologies, it has been preferred to face the research question from a different perspective.

First, it has been decided to consider the integration of TQM into the organizational culture as the result of the adoption and implementation of the TQM principles. Thus, a total quality-oriented company is one that creates a culture-orientation to TQM principles. Consequently, it has been necessary to re-elaborate TQM critical success factors resulting from the literature, distinguishing TQM principles from core aspects and creating a proprietary set of principles.

Second, the role of corporate strategy has been considered as the mechanism by which a quality-oriented company can create a fertile atmosphere for innovation. Particularly, the model provides a set of quality-based strategy's core aspects that companies should promote, through their strategic choices, in order to create an internal environment where innovative capacity determinants could grow. In line with this reasoning, quality-oriented companies could be more innovative then others.

Consequently, a set of company's innovative capability determinants has been developed as the means by which an organization can facilitate the innovation process and generate innovative outputs.

1.3 Organization of the Work

Concluding these introductory remarks, this work is structured in the following chapters.

Chapter two provides the theorical background to the study. This chapter presents the information acquired in the literature review phase regarding the fields of quality and innovation at the corporate level. In particular, the chapter is mainly divided into three parts. The first part provides an overview of the meaning and purpose of quality management in a company, and how to adopt a quality orientation through the Total Quality Management philosophy. Then, it is provided a summary of the critical factors for a successful implementation of TQM, and their classification into different categories in accordance with the theory that attributes a multidimensional nature to TQM. The second part is devoted to the innovation field. After an introduction on the concept of innovation in all its nuances and typologies, this part focuses on the definition of innovative capacity and it provides a framework of determinant aspects in the creation of a company's innovation capability highlighted by different authors. Finally, at the end of the chapter, a summary of the previous studies on the relationship between quality and innovation is presented, showing the contrasting results obtained so far.

Chapter three presents the conceptual model developed for answering to the research question. In particular, the chapter provides a discussion of all the parts of the proposed model. It presents three principles of the TQM philosophy as pillars promoting an orientation towards quality, eight core aspects of a quality-oriented corporate strategy, and five innovation capability determinants. Lastly, the chapter presents a set of hypotheses that suggest a positive impact of the aspects (or practices) of a quality oriented strategy on the innovation capability of the company.

Finally, the fourth chapter provides some conclusive remarks on the proposed research. Particularly, it aims to suggest at the contribution provided by the study developed both

from a theoretical and a managerial point of view. Finally, the chapter highlights the limits of the proposed study and introduces some directions for testing the conceptual model developed.

CHAPTER 2

REVIEW OF LITERATURE

2.1 Introduction

This chapter discusses the information acquired from the exiting literature on the concept of both quality and innovation. In particular, section 2.2 presents the different definitions of quality at company level provided by some of well-known quality gurus. Section 2.3 discusses the concept of the organizational culture, underlying how companies need to adopt a culture of quality in order to be quality-oriented. In particular, as mentioned in the introduction chapter, the Total Quality Management philosophy has been considered as the means to develop a culture of quality. Therefore, in section 2.4, its evolution, its critical success factors, and the theory of multidimensionality are extensively described. Regarding innovation concept, section 2.5 presents the review of some definitions of innovation and its typologies. This will be followed by the presentation of the concept of innovation capability and its main determinants in section 2.6. Lastly, the main findings concerning the relationship between TQM and innovation are presented in section 2.7.

2.2 What is Quality

As mentioned in the introduction chapter, in order to face global competition, regardless of the industry under consideration, quality has become a key factor to compete and gain a sustainable competitive advantage in the long-term run. Over the years, both managers and academics have stressed the importance of quality in achieving successful business results and many people have tried to formulate a universal definition of quality.

Revisiting the literature on definitions of quality, it appears obvious that there is no general agreement about which one firms should follow. Over the past decades, Edward

W. Deming, Philip B. Crosby, Joseph M. Juran, Armand V. Feigenbaum, Kaoru Ishikawa, Genichi Taguchi and other influent writers to be referred to as quality gurus have developed certain propositions defining quality in several ways. A short synopsis has been elaborated placing an emphasis on the main ideas proposed by them.

2.2.1 Definitions by Quality Gurus

Edward W. Deming (1988) argued that quality means meeting the customer's expectations in the use of the product. Deming defined quality as "satisfying the customer, not merely to meet his expectations, but to exceed them". Essentially, therefore, he stressed that quality must be defined in terms of customer satisfaction and that it is necessary to prevent customer needs through a constant renewal. Moreover, the author underlined that quality is a multidimensional concept that is impossible to define as a single characteristic of a product or service (Deming, 1986). To conclude, Deming showed an approach in which, in addition to the product, it is necessary to take into account the customer and how he will use it. Quality is therefore defined in terms of the present and future needs of customers.

Crosby (1979) defined quality as conformance to requirements. The requirements of a product need to be defined and specified clearly, so that they are properly understood in order to translate them into measurable product or service characteristics. In this term, quality is not excellence. Furthermore, another essential point is that quality also means "zero defects" and is crucial implementing systems that allow the company to do things in the right way from the beginning. In this term, quality is achieved by setting up a prevention system, not an inspection’s one, emphasizing that doing things well the first time is cheaper.

Juran (1988) highlighted two meanings of quality that are vital to quality management. First of all, quality represents those product characteristics that meet the needs of customers and, consequently, provide customer satisfaction. In these terms, quality is associated with the concept of revenue. In addition, quality means freedom from deficiencies, which means freedom from those errors that require rework or that lead to failures and unsatisfied customer. In this sense, quality is associated with the concept of

cost. Furthermore, the author considered the convenience to have a single definition of quality that encompasses both concepts. In these terms, quality is defined as fitness for use, which implies a relationship between customer satisfaction and conformity of product characteristics (desired by the customer) with design specifications (Juran & Gryna, 1988).

Armand V. Feigenbaum defined product and service quality as the total composite of product and service characteristics of marketing, engineering, manufacturing and maintenance through which the product or service in use will meet or exceed the expectations of the customer (Feigenbaum, 1983). In these terms, quality is a multidimensional concept. Furthermore, the author suggested that quality is a determination of the customer, measured in relation to his needs. According to this approach, quality is a dynamic concept because customers constantly change their needs and expectations. Finally, quality is not necessarily the absolute best, but the best for a certain customer, for a certain price and in a certain circumstance. In these terms, therefore, quality establishes the appropriate balance between the cost of producing a product or service and the value that the customer attributes to it.

Genichi Taguchi demonstrated an engineering approach, defining quality as the "loss imparted to the society from the time a product is shipped". In this context, the loss considered is caused by variability of product's functions, failure to meet the customer's requirements, breakdowns, and harmful side-effects caused by products (Taguchi, 1986). According to this concept, therefore, quality must be conceived in terms of product performance variation and though general loss that these variations generate for society. In other words, quality is highest when the loss to society is minimal. Emphasis is therefore placed on the idea that quality is determined by product engineering design and by product manufacturing process, focusing on achieving target values with minimal variability.

Karou Ishikawa defined quality as the "development, design, production and service of a product that is most economical, most useful, and always satisfactory to the consumer" (Ishikawa, 1985). It appears clear from this definition that quality coincides with the satisfaction of every customer's expectation. Furthermore, according to the author's opinion, since the needs and requirements of customers change, the definition of quality

also changes. Finally, the author stressed the importance of a product/service price as an important part of the evaluation of its quality: it does not matter how good the product or service is, if the price is too high, it will leave the customer unsatisfied.

After this brief review of concepts expressed by quality gurus, it is possible to argue that quality can be defined in different ways, sometimes as a characteristic, sometimes as value creation or even as the level of correspondence between customer expectations and the product/service offered by the firm. Furthermore, depending on the perspective in which one looks at quality, it takes on different meanings. For organizations, quality represents conformance with technical specifications or the set of characteristics that meet the needs of the customer, leading to customer satisfaction. In conclusion, quality consists of an objective nature, in terms of the technical aspects that must meet the specifications, but also presents a subjective essence in terms of the functionalities that meet customer's present and future needs.

Due to the final goal of this work, it is not crucial to adopt one of the definitions provided over the years. For the purpose of this research, quality is considered from a broader perspective and the following basic definition is provided: *"Quality is a system of values and practices that involves and influences every aspect of the business"*. For these reasons, the next section deals with quality culture.

2.3 Organization's Culture and the Culture of Quality

Many scholars consider organization's culture as the key factor on which the company's success is based. Defining the concept of organizational culture, however, is not an easy task. In general, the concept of organization's culture as a set of unwritten values, beliefs and rules that shape people's attitudes within an organization. After the examination of several definitions of organizational culture, (Gallear & Ghobadian, 2004) did not find an accepted consensus on a specific definition, sustaining that some scholar view the organization's culture as a system of shared values, while a second group refer to company's culture as a way of working. Finally, a third group considers it as a combination of both point of views. In other words, the corporate culture is an abstract

concept and represents the essence of an organization, which is manifested through the behavior of people.

Edgar H. Schein (1984) defined the organization's culture as "the pattern of basic assumptions that a given group has invented, discovered, or developed in learning to cope with its problems of external adaptation and internal integration, that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think and feel in relation to those problems" (Schein, 1984). In addition, the author proposed a model in which organizational culture is analyzed on several different levels according to the degree of observability of the cultural phenomenon. The first level, defined as the level of *visible artefacts*, is composed of those visible elements in which the organizational culture is manifested such as the corporate structure, the way of dressing, public documents, etc.. However, how a group builds its environment depends on how people behave. To analyze how members of an organization behave, the author defined a second level as the level of *values*. It refers to a system of values that are not directly observable and that guide people's behavior towards a certain way of acting. However, this level does not allow to define what is the basis of the corporate culture because it only represents those exposed values from which people say they are guided in their behavior. For this reason, the author proposed a third level defined as *underlying assumptions*. This level represents the unconscious assumptions that determine how members of a group perceive, think and feel (Schein, 1984).

A deep study of the theme of corporate culture is not the purpose of this work, but is interesting to underline the common agreement on the statement that the implementation of quality programs would be unsuccessful unless a deep quality focus is adopted as the core of the organization's culture. The existence of a strong culture of quality should help an organization in sustaining competitive advantage by delivering higher quality service and producing higher quality products. Consequently, it can be concluded that those organizations that want to exceed their competitors by focusing on the quality of products and services offered must first develop a culture of quality which allows them to effectively implement and manage quality programs.

Why talking about the culture of quality? As highlighted in the literature, the foundation of the company's quality orientation lies in an organizational culture that encourages a

quality-conscious work environment. Cameron (2001) argued that the organizations need to adopt a culture of quality, not just a quality system or a set of techniques. Particularly, adopting a culture of quality means that quality is reflected in the basic values, into the general orientation toward work and into the ideology of the organization (Mahmood & Mohammed, 2008) Furthermore, a culture of quality has been described as one that inspires commitment in quality programs at every level of the organization (Saha & Hardie, 2005). This type of culture can't be ordered by management, but it should be built and sustained in everyday activities. Finally, the culture of quality is defined as the shared values and beliefs, and quality-related attitudes which are essential to achieve the quality goals of the company (Gryna, Chua, & DeFeo, 2007).

Considering the claims above presented, the primary aim in the development of this work was to investigate and understand the channels and systems through which a culture of quality can be created within an organization. In this perspective, the Total Quality Management appears to be the means though which developing a culture of quality (Gallear & Ghobadian, 2004). In fact, if having a culture of quality means that the concept of quality is deeply included in every aspect of the organizational life of the company, the TQM likewise represents an organization-wide commitment to quality, a philosophy that makes quality as a way of life for the organization. For these reasons, in this work it is argued that the TQM represents the basis to the development of a culture focused on quality.

As will be highlighted in the next section, there is no single consensus whether the TQM is a tool, a managerial system, or a management philosophy. By following Lundquist (1995) suggestion in underlying that the philosophy is the foundation of the concept while the culture is the desired state which will be realized (Hellesten & Klefsjo, 2000), in the present work it was decided to consider the TQM as a management philosophy based on several principles that promote and support a culture of quality, consequently a quality orientation, within the organization.

2.4 The Total Quality Management

In the following sections a review of theorical foundation of the management philosophy known as Total Quality Management is presented. Beginning with an overview of TQM concept and definitions provided by the literature, the focus go next into the review of TQM critical success factors.

2.4.1 Total Quality Management Development

Systems for improving and managing quality have rapidly evolved through the years. As outlined by Dahlgaard, Kristensen, & Kanji (1998), the evolution of quality towards TQM has taken place in four stages. They illustrated the evolutionary process arguing that companies, from the beginning of last century, started to employ teams of inspectors to compare or test the product with the project standard in order to separate poor quality products from the acceptable quality ones. During the Second World War, manufacturing systems became more complex and quality required to be verified by using statistical quality control systems instead of using workers. According to the authors, the third stage consists in the development of activities such as comprehensive quality manuals, use of cost quality and auditing of quality systems in order to progress from quality control to quality assurance. Finally, the present and fourth era demands that the principles of quality management must be involved and implemented in every aspects of business activities.

Dale (2003) argued that TQM is final step in the evolution of quality management. Simple inspection activities were integrated in quality control systems, later replaced by the concept of quality assurance. This has been perfected and today the most advanced companies are working towards TQM. Thus, according to the author, four fairly discrete stages of quality management can be identified:

1) Quality Inspection stage;
2) Quality Control stage;
3) Quality Assurance stage;
4) Total Quality Management stage.

Based on Dale's work, the next sections provide a brief synopsis on the evolution of the concept of quality within an organization. The four stages suggested by the author are completed with the addition of a further, between Quality Assurance and Total Quality Management stages, named Quality Management, which represents the turning point in the modern era in facing the quality concept within the company.

2.4.1.1 Quality Inspection Stage

As highlighted above, quality management started with inspection-based systems. Under these systems, one or more characteristics of a product were examined, measured or tested and compared with specified requirements to assess its conformity (Kanji & Asher, 1993). The inspection activity was carried out by dedicated staff employed specifically for the purpose, or by self-inspection of those responsible for a process. Goods manufactured which did not conform to specification might be scrapped, reworked, modified or passed on concession. Simple inspection-based systems were usually wholly in-house and did not directly involve suppliers or customers in any integrated way (Dale, 2003).

2.4.1.2 Quality Control Stage

In the quality control stage, product testing has become the way to ensure greater process control and to reduce non-conformities resulting at the end of the production process. With quality control there were some developments from the basic inspection activity in terms of tools and techniques employed, performance data collection, feedback at different stages of the process, and self-inspection by approved workers. While the main mechanism to avoid non-conforming products and services from being delivered to customers was screening inspection, quality control measures led to greater process control and a lower incidence of non-conformances (Dale, 2003).

2.4.1.3 Quality Assurance Stage

Finding and solving the problem of non-conformance is no longer sufficient and quality improvement can only be achieved by preventing problems and defections at source. This

thought has contributed to the transition from quality control to quality assurance. This consists in the creation of a quality system oriented to increase product uniformity and conformity through the use of technical quality control tools, statistical process control, failure mode and effects analysis (FMEA), and use of quality costs. In short, with quality assurance concept, more emphasis was placed on advanced quality planning, with the aim of preventing and not inspecting non-conformities when already realized.

2.4.1.4 Quality Management Stage

The quality management stage represented a shift into the contemporary era of quality at company level. In the 1960s, the concept of quality as a well-functioning product was overtaken by a broader concept in which quality was considered a strategic issue. The shift from ensuring the monitoring of responsible processes of the creation of products that comply with requirements (Quality Assurance), to a management of quality that includes both its planning in terms of policies and goals, and the implementation and control of those activities necessary to achieve these goals. In the 1970s, many organizations began to publish quality management standards, which subsequently led to the creation of the International Organization for Standardization (ISO). Finally, quality management has attributed, over the years, an increasingly managerial nature to the concept of quality, outlining the way to the last stage of its evolution: the Total Quality Management.

2.4.1.5 Total Quality Management Stage

According to Dale (2003), TQM is the latest stage in the evolution of quality management in the company. Particularly, the author sustained that Total Quality Management requires that the principles of quality management should be applied in every area of the organization, with an emphasis on integration into business practices and a balance between technical, managerial, and people issues. With the TQM philosophy, quality is definitively interpreted not only as a product requirement, but as a total orientation of the company to a culture of quality in every area of business, from people management to processes, from partnerships with suppliers to relations with the end customers.

Consequently, after this short review, it can be concluded that TQM is therefore the step in the modern era of quality, in which quality evolves from a mainly technical fact to a managerial one. The goal that today's companies must achieve is a total quality orientation which includes both technical and relational aspects, which should be integrated in order to satisfy, in the most efficient and cost effective way, the needs and expectations of customers and whole community.

The next section will provide various TQM conceptualizations pointed out in literature.

2.4.2 The Concept of Total Quality Management

As mentioned in the previous section, Total Quality Management represents a way of governing an organization focused on quality, based on a system of shared principles able to create a quality-conscious work environment in all functions and management levels within the organization. Using a three-words definition, Wilkinson & Witcher (1993) summarized TQM as three major requirements, as outlined in the following:

- **Total** (Participation of Everyone): TQM requires continuing improvement and getting things right first time. Since most quality solutions are outside the control of any one individual or function, there is the need of team work and maintenance of good relationship.

- **Quality** (Meeting Customer Requirements): TQM requires customer-agreed specifications which allow the supplier to measure performance and customer satisfaction. Individuals and teams need to use quality tools and systems to facilitate measurement and problem solving.

- **Management** (Enabling Conditions for Total Quality): TQM requires leadership and total commitment from senior management. They must ensure that an appropriate infrastructure exists to support a holistic and not a compartmentalized approach to organizational management.

However, providing an unambiguous conceptualization of TQM is not an easy task. A generally accepted conceptualization from the literature has not emerged and numerous definitions have been given by practitioners and academicians. Within the analyzed papers, Total Quality Management is variously described in different ways, from something like a philosophy to something more like a process or a managerial tool. In order to comprehend the existence of different interpretations, various definitions from scholars will be presented.

Steingard & Fitzgibbons (1993) defined TQM as a set of techniques and procedures used to reduce or eliminate variation from a production process or service-delivery system, in order to improve efficiency, reliability, and quality. According to Horwitz (1990), TQM is a total process which recognizes that every member in the organization contributes in some form or another to the end product or service provided to the customer. Ho & Fung (1994) defined Total Quality Management as a way of managing to improve the effectiveness, flexibility, and competitiveness of a business as a whole. It is also a method of removing waste, by involving everyone in improving the way things are done. Vuppulapati, Ahire, & Gupta (1995) sustained that TQM is an integrative philosophy of management for continuously improving the quality of products and processes to achieve customer satisfaction.

To better understand the existing wide range of conceptualizations, other definitions from various literature sources are further presented in a tabulated form in Table 1 (a,b):

Table 1 (a,b) - Total Quality Management definitions - Adaptation from Singh & Dubey (2013)

Table 1.a

Study	Definition
Tobin (1990)	TQM is a totally integrated effort for gaining competitive advantage by continuously improving every facet of the organizational culture.
Pike & Barnes (1996)	TQM is a process of individual and organizational development, the purpose of which is to increase the level of satisfaction of all those concerned with the organization: customers, suppliers, stakeholders and employees.

Table 1.b

Study	Definition
Tapiero (1996)	TQM is viewed as a total (social, organizational and operational) commitment to manage a firm's resources to achieve the highest levels of performance in everything in which the firm is involved.
Kanji, Malek, & Tambi (1999)	TQM is a process of continuously satisfying customer requirements at the lowest possible cost by harnessing the capabilities of everyone.
Kaynak (2003)	TQM is an holistic management philosophy that strives for continuous improvement in all functions of an organization.
Kristianto, Ajmal, & Sandhu (2012)	TQM is a strategy to effectively achieve customer satisfaction that ultimately leads to greater market share and profit maximization.

In conclusion, the TQM can be defined in many ways and different authors provided different definitions, all accepted by the community. It can therefore be concluded that the absence of a uniquely accepted definition is considered not essential for research purposes. Not following a specific definition, the TQM is considered the initiative through which a company shows a total attention to quality, which allows to improve its internal efficiency and competitiveness in the market. The next step is to understand how companies can fully show a quality orientation, investigating and identifying those critical factors ensuring a successful TQM implementation.

2.4.3 The Critical Success Factors (CSFs) of Total Quality Management

Providing a univocal definition of TQM critical success factors and their number is not easy due to the different opinions of different authors. This section is dedicated to an evaluation of values and key elements in Total Quality Management empirically identified over the years by different researchers. By reviewing the existent literature, it has been noted that the terminology of TQM constructs used across various studies may

be different: in some studies TQM constructs are referred to as ‘practices’, while in other studies, these are either mentioned as ‘critical success factors’ or even ‘elements’, but their meanings remain the same.

Most quality practitioners consider TQM as a set of elements. Saraph, Benson, & Schroeder (1989) proposed a set of eight critical factors that must be managed to achieve effective quality management in a company. They are represented by the roles of management leadership and quality policies, role of quality department, training, product/service design, supplier quality management, process management, quality data and reporting and, employee relations.

Anderson, Rungtusanatham, & Schroeder (1994) proposed and articulated a theory by underlying the Deming management method, providing seven abstract concepts on which quality management theory is based. These concepts consist of visionary leadership, internal and external cooperation, learning, process management, continuous improvement, employee fulfillment and customer satisfaction. Summarizing, leadership should create a system that promotes cooperation and learning, facilitating a process management that leads to continuous improvement of products and processes and employee fulfillment, both crucial factors in achieving end customer satisfaction.

Flynn, Schoeder, & Sakakibaba (1994) identified and substantiated the key dimensions of quality management. The seven proposed dimensions identified were top management support, quality information, process management, product design, work force management, supplier involvement and customer involvement. In their opinion, top management behavior should create a work environment in which some quality management activities are recognized as essential. These activities refer to the dimensions mentioned and must be used together to support the continuous improvement of manufacturing capability, which leads to improvements in quality performance and, consequently, to competitive advantage.

Powell, (1995) after an exhaustive review and integration of the TQM literature, suggested that complete TQM programs tend to share twelve principal factors. The author not only highlighted aspects already mentioned such as management commitment, effective communications, employee involvement and the relation with customers and suppliers, but also explained the importance of training and introduces the concepts of

flexible manufacturing and zero-defect mentality. The author concluded that some of these factors most associated with TQM do not produce competitive advantage, while other tacit and imperfectly imitable aspects such as an open culture can produce an advantage for the organization.

Hackman & Wageman (1995) highlighted four principles that should guide any organizational interventions intended to improve quality. The first is to focus on work processes because the quality of products and services depends most of all on the processes by which they are designed and produced. The second principle is analysis of variability, because uncontrolled variance in processes or outcomes is the primary cause of quality problems. The third principle is management by fact, which means the use of systematically collected data at every point in a problem-solving cycle. The fourth principle is continuous improvement because the survival of a company depends on treating quality improvement as a never-ending quest.

Bayazit (2003) analyzed TQM practices in the Turkish manufacturing industry. By using a survey conducted among 100 large companies, the authors highlighted that important factors for a successful TQM implementation are upper management support, employee involvement and commitment, customer focus, quality education and training, teamwork, and the use of statistical techniques. Similarly Rad (2005), by investigating Iranian health service organizations who implemented TQM, defined several necessary elements including not only common aspects as top management stability, teamwork and quality culture development, management by facts to solve problem, customer, suppliers and partners focus and, continuous improvement, but also introducing factors like strategic quality planning and employees' commitment and understanding of the vision, values and quality goals of the organization.

Conca, Llopis, & Tarí (2004) carried out a deep review of existing studies in order to identify measures for changes toward a quality culture. Taking previous researches as a basis, although the TQM elements vary from one author to another, they highlighted a common core of them formed by customer-based approach, management commitment and leadership, quality planning, management based on facts, continuous improvement, human resources management, learning, process management, and cooperation with suppliers. Similarly, Karuppusami & Gandhinathan (2006) analyzed 37 TQM empirical

studies among 5 online journal database and proposed 56 CSF's. After implementing a Pareto analysis of critical success factors, those with more than 20 occurrences in the studies analyzed are the role of management leadership and quality policy, supplier management, process management, customer focus, training and employee relations.

Chowdhury, Paul, & Das (2007) identified, tested and validated a list of ten critical factors using data from 45 Thai garment manufacturing companies. Results showed that firms with high top management commitment demonstrate a greater orientation to quality and application of TQM's key aspects, resulting in better quality performance. Abdullah, Uli, & Tarí (2008) conducted a study in which they examined the "soft" TQM elements that influence quality improvement and organizational performance in 255 firms in Malaysia. The study showed that organizational performance was significantly influenced by factors such as management commitment, customer focus and employee involvement, while quality improvement depends also to factors such as training and education and, reward and recognition's system.

More recently Salaheldin (2009), by evaluating the impact of TQM programs within 297 SMEs in the Qatari industrial sector, proposed a classification of successful factors of TQM implementation. Particularly, the author divided them into strategic factors (e.g. top management support, continuous improvement and benchmarking), tactical factors (e.g. employee empowerment, involvement and training, team building and problem solving, use of information technology and supplier relationship) and operational factors such as product and service design, customer and market knowledge, inspection and checking work.

Table 2 (a,b,c) provide a summary of the most TQM's critical success factors highlighted among studies analyzed.

Table 2 (a,b,c) - A summary of TQM CSF's

Table 2.a

Study	TQM Critical Success Factors
Saraph, Benson, & Schroeder (1989)	(1) Roles of management leadership and quality policies; (2) role of quality department; (3) training; (4) product/service design; (5) supplier quality management; (6) process management; (7) quality data and reporting; (8) employee relations.
Anderson, Rungtusanatham, & Schroeder (1994)	(1) Visionary leadership; (2) internal and external cooperation; (3) learning; (4) process management; (5) continuous improvement; (6) employee fulfillment; (7) customer satisfaction.
Flynn, Schoeder, & Sakakibaba (1994)	(1) Top management support; (2) quality information; (3) process management; (4) product design; (5) work force management; (6) supplier involvement; (7) customer involvement.
Powell (1995)	(1) Committed leadership; (2) adoption and communication of TQM; (3) closer customer relationship; (4) closer supplier relationship; (5) benchmarking; (6) increased training; (7) open organization; (8) employee empowerment; (9) zero-defects mentality; (10) flexible manufacturing; (11) process improvement; (12) measurement.
Hackman & Wageman (1995)	Four principles that should guide any organizational interventions intended to improve quality: (1) focus on work processes; (2) analysis of variability; (3) management by fact; (4) continuous improvement.
Ahire, Golhar, & Waller (1996)	(1) Top management commitment; (2) supplier quality management; (3) supplier performance; (4) customer focus; (5) SPC (Statistical Process Control) usage; (6) benchmarking; (7) internal quality information usage; (8) employee involvement; (9) employee training; (10) design quality management; (11) employee empowerment; (12) product quality.

Table 2.b

Study	TQM Critical Success Factors
Black & Porter (1996)	(1) Corporate quality culture; (2) strategic quality management; (3) quality improvement measurement systems; (3) people and customer management; (4) operational quality planning; (5) external interface management; (6) supplier partnership; (7) teamwork structures; (8) customer satisfaction orientation; (9) communication of improvement information.
Dow, Samson, & Ford (1999)	(1) Workforce commitment; (2) shared vision; (3) customer focus; (4) use of teams; (4) personnel training; (5) co-operative supplier relations; (6) use of benchmarking; (7) use of advanced manufacturing systems; (7) use of JIT principles.
Lai, (2003)	(1) People and customer management; (2) supplier partnership; (3) communication of improvement information; (4) customer satisfaction orientation; (5) external interface management; (6) strategic quality management; (7) teamwork structures for improvement; (8) operational quality planning; (9) quality improvement measurement systems; (10) corporate quality culture.
Bayazit (2003)	(1) Upper management support; (2) employee involvement and commitment; (3) customer focus; (4) quality education and training; (5) teamwork; (6) use of statistical techniques.
Conca, Llopis, & Tarí (2004)	(1) Leadership; (2) quality planning; (3) employee management; (4) supplier management; (5) customer focus; (6) process management; (7) continuous improvement; (8) learning.
Rad (2005)	(1) Top management commitment to quality and involvement; (2) top management stability; (3) strategic quality planning for quality; (4) employee involvement; (5) teamwork and quality culture; (6) focus on internal and external customers; (7) open communications; (8) management by fact to solve problems; (9) continuous improvement; (10) aligning process to improve customer satisfaction; (11) focus on supplier and partners; (12) monitoring and evaluation of quality.

Table 2.c

Study	TQM Critical Success Factors
Abdullah, Uli, & Tarí (2008)	(1) Management commitment; (2) customer focus; (3) employee involvement; (4) training and education; (5) reward and recognition.
Salaheldin (2009)	**Strategic factors** (e.g. top management support, continuous improvement and benchmarking). **Tactical factors** (e.g. employee empowerment, involvement and training, team building and problem solving, use of information technology and supplier relationship). **Operational factors** (e.g. product and service design, customer and market knowledge, inspection and checking work).

It can be concluded that each author defined his own set of key elements and TQM critical success factors. According to Boaden (1997) most authors cause confusion by listing a mixture of principles and practices, regardless that principles are concepts of philosophical nature that can only be implemented through practices, which instead have a more technical nature. Following this suggestion, it has been decided to re-elaborate critical success factors reported in this section, distinguishing between TQM principles and core aspects and creating a proprietary set of them (see Chapter three).

2.4.4 The Multidimensionality of Total Quality Management

The literature review revealed the various authors have classified total quality management elements into two main groups. They expressed this division using different terms, including:

- Soft vs hard elements
- Infrastructure vs core elements
- Intangible vs tangible elements
- Organic vs mechanistic elements.

Wilkinson (1992) argued that TQM presents both “hard” and “soft” sides. Hard aspects reflect the process orientation of TQM, considering techniques including statistical process control, Quality Function Deployment (QFD) and design processes, while soft aspects concern the creation of customer awareness and emphasize the human resource management. Rahman & Bullock (2005) asserted that soft TQM elements such as leadership, human resource management, and employee empowerment are related to the behavioral aspect of management, while hard elements, including process management tools and methods, and benchmarking and JIT practices refer more to a technical aspect of management.

Many studies have considered this distinction and analyzed whether both categories of elements were essential to the success of the TQM and whether they led, in equal measure, to a competitive advantage. Powell (1995) have found that TQM performance in

generating competitive advantage lies not in TQM tools and techniques like benchmarking and process improvement, but its success depends on intangible factors like leadership, culture and organizational skill. Similarly, Dow, Samson, & Ford (1999) empirically demonstrated that not all of the nine key quality TQM dimensions considered contribute to superior quality results. Particularly, they argued that soft practices such as employee commitment, shared vision, and customer focus have a positive correlation with quality outcomes, while other hard quality practices including cellular work teams, advanced manufacturing technologies, and close supplier relations do not led to superior quality outcomes.

Rahman & Bullock (2005) investigated the direct impact of soft TQM on the adoption and diffusion of hard TQM elements, assessing a direct positive impact of hard aspects on performance and an indirect influence on organizational performance of soft aspects through their effect on hard TQM. Results have shown that elements of hard TQM such as the use of JIT principles, technology utilization, and continuous improvement enablers have a significant relationship with soft TQM, supporting the hypothesis that soft elements create conditions that allow diffusion and utilization of hard elements. Furthermore, they found a positive relationship between those hard TQM elements reported above and measures of organizational performance such as productivity, defects as a percentage of production volume, cost of quality as a percentage of total sales, etc. Finally, regarding the indirect effect of soft TQM elements on organizational performance, the study revealed that soft elements such as workforce commitment, shared vision, customer focus, and cooperative supplier relations affect the use of JIT principles, which in turn affects performance as productivity, employee morale, and cost of quality.

Naor, Goldstein, Linderman, & Schroeder (2008) distinguished infrastructure from core quality management practices and manufacturing performance such as flexibility, quality delivery and cost. Inspired by a classification suggested by Flynn, Schroeder, & Sakakibara (1995) the authors classified quality practices into two clusters: infrastructure (top management support, workforce management, supplier involvement, and customer involvement) and core (quality information on processes, process management, and product design). The results indicate that infrastructure quality practices have a significant positive effect on manufacturing performance, while core quality practices are not significantly associated with manufacturing performance.

More recently, several studies investigated the relationship between different TQM dimensions of TQM. Prajogo & Sohal (2004) proposed a research framework that relate TQM mechanistic (customer focus, process management, information & analysis, product quality, and product innovation) and organic (leadership, strategic planning, and people management) elements to quality and innovation performance, finding evidence that organic elements support innovation in Australian firms in terms of number of innovation, speed of innovation, level of innovativeness, and being the "first" in the market. While Feng, Prajogo, Tan, & Sohal (2006), by conducting a study in Singapore confirmed these conclusions, López-Mielgo, Montes-Peón, & Vázquez-Ordás (2009) supposed, on the contrary, that firms more active in innovation are able to obtain benefits from hard components of TQM, thus innovation increases the likelihood of investing in them.

Summarizing, it can be concluded that hard (mechanistic, tangible or core) elements are related to process and product control techniques, conformance with quality standards, and satisfaction with manufacturing specifications, while soft (organic, intangible or infrastructure) elements are more concerned with the human aspects of a quality system such as the involvement of managers and employees (in terms of training and internal cooperation), and relations with customers and suppliers. Most of the analyzed researches assert that hard elements promote quality performance, while soft elements (except for few empirical cases) foster innovation.

Among the various classifications, some of them are summarized in the next pages in Tables 3 (a,b):

Table 3 (a,b) - A multidimensional classification of TQM CSF's

Table 3.a

Author(s)	Multidimensional classifications
Flynn, Schroeder, & Sakakibara (1995)	**Core practices**: (1) process flow management; (2) product design process; (3) statistical control feedback. **Infrastructure practices**: (1) customer relationship; (2) supplier relationship; (3) work attitudes; (4) workforce management; (5) top management support.
Powell (1995)	**Intangible factors**: (1) committed leadership; (2) adoption and communication of TQM; (3) closer customer relationship; (4) closer supplier relationship; (5) open organization; (6) employee empowerment. **Tangible factors**: (1) benchmarking; (2) increased training; (3) employee empowerment; (4) zero-defects mentality; (5) flexible manufacturing; (6) process improvement; (7) measurement.
Ahire, Golhar, & Waller (1996)	**Soft elements**: (1) top management commitment; (2) supplier quality management; (3) customer focus; (4) employee involvement; (5) employee training; (6) employee empowerment. **Hard elements**: (1) SPC (Statistical Process Control) usage; (2) benchmarking; (3) internal quality information usage; (4) design quality management.
Dow, Samson, & Ford (1999)	**People**: (1) workforce commitment; (2) shared vision; (3) customer focus; (4) use of teams; (5) personnel training; (6) co-operative supplier relations. **Tools**: (1) use of benchmarking; (2) use of advanced manufacturing systems; (3) use of JIT principles.

Table 3.b

Author(s)	Multidimensional classifications
Prajogo & Sohal (2004)	**Organic elements**: (1) leadership; (2) strategic planning; (3) people management. **Mechanistic elements**: (1) customer focus; (2) process management; (3) information & analysis; (4) product quality; (5) product innovation.
Rahman & Bullock (2005)	**Soft elements**: (1) workforce commitment; (2) shared vision; (3) customer focus; (4) use of teams; (5) personnel training; (6) co-operative supplier relations. **Hard elements**: (1) computer based technologies; (2) JIT principles; (3) technology utilization; (4) continuous improvement enablers.
Naor, Goldstein, Linderman, & Schroeder (2008)	**Core practices**: (1) quality information; (2) process management; (3) product design. **Infrastructure practices**: (1) top management support; (2) workforce management; (3) supplier involvement; (4) customer involvement.

2.5 What is Innovation

The current dynamic and competitive economic environment creates increasingly complex challenges for companies in meeting the needs of customers and markets. In this context, the concept of innovation is recognized to play a central role that has been considered as essential for organizational competitiveness and growth. This awareness has generated a great quantity of literature on the subject and innovation has become an extensive concept that can be perceived in different ways (Smith, Busi, Ball, & Van Der Meer, 2008). This section aims to provide an overview of what innovation is, through the different conceptualizations provided by the literature.

2.5.1 Defining Innovation

Gopalakrishnan & Damanpour (1997) asserted the absence of a generally accepted definition of innovation, arguing that researchers from different fields and disciplines conceptualize innovation differently and have different views on the impact on company's productivity, growth, survival, and performance. Furthermore, Baregheh, Rowley, & Sambrook (2009) underlined these conclusions by presenting a set of organizational innovation definitions from different disciplinary literatures of economics, organization studies, innovation and entrepreneurship, knowledge management, marketing, business and management, and technology, science and engineering.

Whilst literature presents a great variety of innovation definitions, is commonly agreed that Joseph Schumpeter originated the modern concept of innovation, which it has been defined as a socio-economic phenomenon which leads to the introduction of new products, new methods of production, new sources of supply, and to the exploitation of new markets, and new ways to organize business (Schumpeter, 1942). Over the years, definitions have emerged in line with those provided by Schumpeter, which take into account the different types of innovation identified by him. For instance, Freeman (1982) defined innovation as the first commercial transaction involving new products, process, systems or devices. More recently, Afuah (2003) defined innovation as the use of technological and market knowledge to offer a new product or service that the customer

will want. In addition, Hobday (2005) proposed a strict definition where innovation is considered the successful introduction of a new or improved product or process to the marketplace.

An issue frequently discussed in literature concerns the distinction between innovation and invention. Tidd, Bessant, & Pavitt (2005) asserted that one of the problems in managing innovation is due to the confusion that people show about the term innovation, often confused with that of invention. Fagerberg (2013), in underlining Schumpeter's contribution, explained this distinction by defining invention as the first occurrence of a new product or process ideas, while innovation is the first attempt to carry out these ideas into practice. In addition, the author argued that, in order to turn an invention into an innovation, the innovator must combine knowledge, skills, abilities, and resources (Fagerberg, 2013).

This distinction is important because it underlines that inventions come out from knowledge, resources, and capabilities and innovation represents the next step, that is, the transformation of the invention into a product/service or something that can be commercialized. According to this point of view, Schön (1967) attributed different roles to inventors and innovators, arguing that the former create the idea of a new technology, while the latter bring the invention into use. In conclusion, the concept of invention must be distinguished from that of innovation, the first come out from the generation and development of an idea and does not necessarily results in the introduction on the market of a new product or process, that is, not necessarily become an innovation.

2.5.2 The Process and Outcome Perspectives

Innovation can be considered from a process or an outcome perspective. According to Quintane, Casselman, Reiche, & Nylund (2011), Schumpeter in defining innovation as the first introduction of a new product, process, method, or system, highlighted a dual nature of innovation as both a process (the introduction of) and as an outcome (product, process, method, system). This observation is also reflected in more recent definitions, for example Crossan & Apaydin (2010) claimed that “innovation is: the production or adoption, assimilation, and exploitation of a value-added novelty in economic and social

spheres; renewal and enlargement of products, services, and markets; development of new methods of production; and establishment of new management systems. It is both a process and an outcome".

When the emphasis is placed on terms such as products and processes (McKinley, Latham, & Braun, 2014) or more widely ideas (Gupta, Tesluk, & Taylor, 2007) that represent a novelty for the market, the definition focuses on innovation as an outcome. Furthermore, in some cases, these definitions present a classification of innovations in different categories. For example, Damanpour (1991) distinguished between technical or administrative innovation, product or process innovation, and radical or incremental innovation, each of which emphasizes the vision of innovation as an outcome. In conclusion, innovation as an outcome is a means toward achieving the internal efficiency (new systems, programs, processes) and the external competitiveness (new products or services) of the organization.

Finally, these definitions often also underline the novelty component of the object of innovation, both in terms of new product or process and of existing ideas adopted for the first time in a particular context. McKinley, Latham, & Braun (2014) defined an innovation as any novel product, service, or production process that departs significantly from prior product, service, or production process architectures. Utterback (1971) referred to innovation as an invention which has reached market introduction in the case of a new product, or it has been for the first time in a production process, in the case of a process innovation.

Studies that consider innovation as an outcome focus on determining the contextual and structural conditions that foster innovation and make a company more innovative. On the other hand, studies that consider the process perspective analyze how innovation is originated, developed, implemented and terminated over time (Gopalakrishnan & Damanpour, 1994). The process view presents definitions that highlight the events and essential phases leading to the generation of particular outcome. In these terms, an idea is developed or an invention is created, to be subsequently commercialized in the market or implemented within the company. For example, Van de Ven (1986) defined innovation as the development and implementation of new ideas. By viewing innovation from the process perspective, West & Farr (1990) described innovation as the intentional

introduction of ideas, processes, products or procedures which are new to the relevant unit of adoption, that were designed to significantly benefit the individual, the group, organization or wider society. Furthermore, other authors have considered innovation as a process consisting of different activities and practices. In particular, Garcia & Calantone (2002) defined innovation as an iterative process initiated by the perception of a new market and/or service opportunity for a technology-based invention, which leads to development, production, and marketing tasks striving for the commercial success of the invention.

Quintane, Casselman, Reiche, & Nylund (2011), after a deep review of the existing literature, identified two main stages in the innovation process. The first is defined as the phase of idea generation which includes all the steps from the idea development to the decision of implement it. The second phase is defined as the implementation phase, which consists of an experimental process whose principal goal is to transform the generated idea into an innovative result. In addition, several authors tend to include in the innovation process also the phases of commercialization and diffusion in the market.

Summarizing, all the arguments discussed in this section about the definition of innovation demonstrate that innovation is a multi-perspective dimension. The lack of clarity in defining innovation allows managers and researchers to consider which definition is more relevant to their business or their research. Since the present work is mainly focused, regarding innovation topic, on the aspects that contribute to the creation of a fertile environment for innovation, it is not vital to assume one of the previous definitions as a reference. Consequently, for this research work, innovation is considered as a phenomenon that emerges when certain contextual conditions within the company are fulfilled.

The lack of a generally and consistent definition of the term innovation is also due to the different typologies in which innovation has been classified over the years. The next section is intended to illustrate them.

2.5.3 Innovation Typologies and Characteristics

Knowing and distinguishing the different innovation typologies (in terms of subject and characteristics) is essential for a company, because each of them requires a different approach (Hurmellina-Laukkanen, Sainio, & Jauhiainen, 2008). Over the years, researchers have classified innovation in several ways that have been decided to report in this section to better understand the results about the relationship between quality and innovation emerged from the literature, which are presented in the final part of this chapter.

2.5.3.1 Administrative Innovation versus Technological Innovation

The main distinction is between administrative and technological innovation. Administrative innovations are those that change the structure of the organization or its administrative processes (Damanpour, 1987). In particular, referring to new ideas of structures and systems for the organization, this type of innovation does not focus on customer requirements, but on the need for changes and improvements of internal processes. An earlier definition provided by Evan (1966) describes administrative innovation as the implementation of an idea for a new policy regarding personnel management and the structuring of tasks and responsibilities. Finally, requiring a direct commitment of high-level managers, the administrative innovation is immediately related to the upper level management and indirectly related to the basic work activities (Kimberly & Evanisko, 1981).

In contrast, technological innovation consists of developing and introducing new technologies into processes or products (Damanpour, 1988). If administrative innovation come out in response to an internal need, technological innovation is often triggered by market conditions and customer desires (Daft, 1978). For this reason, compared to administrative innovation, technological innovation is directly linked to market success and acquisition of competitive advantage. Finally, depending on the subject and the degree of innovation, technological innovation is classified into product and process innovation, and radical and incremental innovation.

2.5.3.2 Product Innovation versus Process Innovation

Technological innovation consists of two sub-categories: product innovation and process innovation. Product innovation is the creation of a new product or service or the application of changes to existing ones (Burgelman, Christensen, & Wheelwright, 2009). Consequently, product innovation corresponds to the introduction on the market of a new or improved product or service. Cornish (1997) argued that product innovation benefits from a closer relationship between suppliers and customers, which allows learning mechanisms for both parties.

On the other hand, process innovation is focused on improving the effectiveness and efficiency of the production process (Gordon & Tarafdar, 2007) , thus representing changes in the way the organization produces its products or provides its services. Damanpour (1991) stated that process innovations are all new elements or improvements introduced in the production operations of a product or in the delivery of a service concerning input materials, task specifications, work and information flow mechanisms, and equipment.

Product and process innovation can be interrelated. Fritsch & Meschede (2001) stated that product innovation needs, in order to be realized, a process innovation. In these terms, therefore, product and process innovation can arise simultaneously: new products may require changes to internal processes or the development of new manufacturing methods. The relationship can also be interpreted in the opposite direction: new processes stimulate questions on how the new capacities can be exploited, leading to the creation of new products or to improvements in existing ones.

Finally, according to Abernathy & Utterback (1978), when a particular technology became consolidated in an industry, companies shift their focus from product innovation to process innovation. When the industry is growing, companies focus on product innovation, trying to develop a product that outweighs both consumer uncertainty and competition. When the industry become mature, it's important to focus on process innovation to improve production efficiency.

2.5.3.3 Radical Innovation versus Incremental Innovation

Both product and process innovation can be either radical or incremental. The distinction is often made by considering the degree of change that it represents and the level of risk it embodies. Radical innovation is characterized by great uncertainty and a high level of risk (Moguilnaia, et al., 2005). To be considered as radical, the innovation must incorporate new knowledge and lead to a shift in the technological paradigm. According to Garcia & Calantone (2002), a radical innovation has the ability to create a demand not yet recognized by customers, or markets that did not previously exist.

If radical innovations refer to new products, services or processes different from existing ones, incremental innovations involve corrections or alterations to existing products or service (Burgelman, Christensen, & Wheelwright, 2009). Incremental innovations, differently from radical ones, include minor changes (for instance in terms of design, functions and features) of existing technologies to meet the needs of existing customers Garcia & Calantone (2002). Finally, incremental innovations entail a low level of risk and mainly exploit current knowledge and skills.

The following table (in Figure 1) presented by Kim, Kumar, & Kumar (2012) provides an immediate comprehensions of the main differences between different innovation typologies.

Dimension	Technological innovation		Administrative innovation
	Radical innovation	Incremental innovation	
Objective	Create new customers and markets by introducing a previously unrecognized demand, replacing old technologies, or disrupting a current technology trajectory.	Meet needs of existing customers by refining, broadening, or combining a current technical trajectory, knowledge, and skills.	Increase the efficiency and the effectiveness of managerial systems and processes by obtaining new resources or adopting new programs.
Subject of innovation	Radical product innovation: products or services. Radical process innovation: processes.	Incremental product innovation: products or services. Incremental process innovation: processes.	Structures, policies, systems, and processes of management and organization.
Level of change	Major changes of technological directions, approaches, or linkages among core components.	Minor changes of existing components, design, price, function, quantity, or time.	Both major and minor changes.
Approach	Mainly a bottom-up approach initiated by lower level technicians and R&D workers.	Mainly a bottom-up approach conducted by lower level technicians and R&D workers.	Mainly a top-down approach initiated by upper level managers or administrators.
Level of risk	A high level of risk due to a high degree of complexity and technical/market uncertainties.	A low level of risk due to a greater level of certainty with known information.	Both high and low risks.
Output	Occur rarely but create entirely new product categories; identify unrecognized demands or methods; result in technological and marketing discontinuities; restructure marketplace economics.	Occur often and enrich the depth of technology innovation; improve certain dimensions of products or processes; expand brands and product categories; develop existing competencies.	Enhance organizational structures, administrative systems, and processes; add value for a firm directly or its customers indirectly.
Protection of output	Mainly protected by intellectual property law, such as patent; diffused under the technology transfer contract.	Mainly protected by intellectual property law, such as patent; diffused under the technology transfer contract.	Mainly not protected by intellectual property law; diffused by specialized agents (e.g., consulting firms).

Figure 1 - Comparison of radical, incremental, and administrative innovation - Source: Kim, Kumar, & Kumar (2012)

2.6 Innovation Capability

Innovation can only come out if the organization has the capacity to innovate. As previously mentioned, for this research work it is essential to analyze the determinants of the organization's innovation capability in order to understand why some companies are more successful in innovation than others. Lawson & Samson (2001) argued that the stronger the company's innovation capacity possesses, the more effective its innovative performance will be. In line whit this claim, an high level of innovation capability refers to the ability of the organization to develop new ideas that will be transformed into new products, processes or systems (Szeto, 2000). This section presents the different definitions of innovation capability and the main structures, systems and behaviors that facilitate the generation of innovative results.

2.6.1 Definition of Innovation Capability

In order to identify innovation capability determinants, it is first important to define and conceptualize what "innovation capability" is. It is typically considered and described as multi-dimensional construct and it has been defined in several ways.

Adler & Shenhar (1990) indirectly described innovation capacity through the organization's technological base and market's needs orientation. In their study, innovative capability is defined as: (1) the capability of developing new products that meet current market needs; (2) the capability of applying appropriate process technologies to produce these new products; (3) the capability of developing and adopting new product and processing technologies to meet future needs; and (4) the capability of responding to unexpected technology activities and opportunities created by competitors. Lawson & Samson (2001) defined innovation capability as company's ability to transform knowledge and ideas into new products, processes and systems for the benefit of company itself and its stakeholder. This definition is in line whit the previous one in stressing the capacity to develop new successful products or new efficient ways of work.

A commonly recognized aspect of great importance in innovation capacity, as suggested by Lawson's definition, is the exploitation of knowledge to improve chances of growth and survival. Lall (1992) defined innovation capability as the set of skills and knowledge needed to absorb, analyze and exploit existing technologies to introduce new products or processes. According to Kogut & Zander (1992), innovation capability is the ability to acquire knowledge (in terms of know-how and information), to manage and combine it in order to generate new applications. From these point of view, therefore, innovation is an outcome of these capabilities. Finally, Zhao, Tong, Wong, & Zhu (2005) stressed the crucial role of knowledge by defining innovation capability as both the application of relevant knowledge to the attainment of market value and as the implementation of creative ideas within the organization.

Although several authors have considered the innovation capability as a special asset of the company (Guan & Ma, 2003), the point of view that has been preferred to follow is the one that attributes to this capacity, instead, an intangible nature. Therefore, in line with the definition provided by Akman & Yilmaz (2008), it is preferable to consider innovation capability as a factor that facilitates the innovative organizational culture, the characteristics of internal promoting activities, and the capabilities of understanding and responding appropriately to the external environment.

In conclusion, the innovation capacity of a company represents its potential to create innovative outputs. This capability is generated through behaviors, systems, structures and methods thanks to which processes and practices oriented to the development of innovations take shape. The next section presents the determinants of innovation capability highlighted by selected authors. The information provided by these studies is necessary to understand which aspects are essential to create an innovative capacity and, consequently, to trigger the innovation process within the company.

2.6.2 Determinants of Innovation Capability

The determinants of innovation capability are considered as the inputs needed to create an environment in which innovation can come out. According to Davila, Epstein, & Shelton (2006), these inputs include tangible elements such as people, currency,

equipment and time, but also intangible aspects such as motivation, organizational culture and knowledge. This section presents the studies analyzed and the tangible and intangible aspects highlighted by their authors.

Lawson & Samson (2001) have developed a model in which they propose seven key elements as determinants of a company's innovation capability. The following elements have been proposed:

Vision and strategy - Successful innovation requires an innovation strategy, in line with which companies make decisions about their business and target market. A common vision that stimulates employees to find totally new ways of doing things to achieve business goals can be created.

Harnessing the competence base - This definition refers to the ability to correctly allocate resources where they are needed. This determinant includes variables such as resource management (leverage, ability combine and recombine knowledge and resources in markets, technologies and products) and innovation champions (presence of key people at different stages of the innovation process).

Organizational intelligence - Organizational intelligence is the ability to process, interpret and exploit information to reduce uncertainty and ambiguity in innovation. Organizational intelligence includes learning from customers (needs and problems) and learning about competitors (products and strategies).

Creativity and idea management - Creativity is seen as the process of generating ideas, which organizations should encourage at every level within the organization. It can come from millions small acts that cumulates in continuous improvement, or alternatively, creativity can result in a radical idea that creates new businesses.

Structure and systems - Successful innovation requires a permeable and organic organizational structure that allows collaboration between different functions. In addition, innovation requires a reward system that stimulates creative behavior.

Culture and climate - Create appropriate culture and climate which stimulate innovation within the organization. This determinant consists of key aspects for innovation such as

tolerance of ambiguity (accepting mistakes and failures and learning from them), employees empowerment (people can have different ideas and must have the opportunity to follow them) and communication (communication within the company and its network of firms facilitates knowledge sharing and the generation of ideas).

Management of technology - For an innovative company it is important to identify future developments of technologies, products or processes and to develop technology strategies, linking them with an innovation strategy.

The proposed model highlights the actions that managers should take to affect innovation success. In other words, organizations should invest in developing these aspects of innovation capacity, in order to have a higher likelihood of achieving sustainable innovation outcomes.

Wan, Ong, & Lee (2005) identified six determinants, which are briefly described below:

Communication channels - Internal communication fosters innovation because it facilitates the dissemination and fertilization of ideas within the organization. The interaction between individuals, in fact, develops and amplifies new knowledge from which new ideas of products or processes come out.

Decentralized structure - Flexibility and openness, guaranteed by decentralized structures, encourage the generation of new ideas. In addition, decentralized structure allows high communication and high empowerment of employees at the operational level.

Organizational resources - This factor considers tangible aspects such as the existence of special funds for innovation and equipment, but also intangible aspects such as the time needed to absorb failures or to explore new ideas.

Belief that innovation is important - People must be motivated to innovate. To achieve this there must be a culture that supports innovation and a system that recognizes and rewards the work of employees. In this way it is possible to obtain a total employees commitment to the development of new ideas for innovation.

Willingness to take risk - Because generally the development of an innovation is affected by uncertainty, members of the organization must show a risk-attitude. To promote this attitude, it is essential that top management shows tolerance for possible mistakes and failures.

Willingness to exchange ideas - Employees must be stimulated to express and exchange information, ideas and knowledge.

It is important, therefore, to create a climate and an environment in which people are motivated, willing to take risks and able to express and develop their ideas. To this purpose, it is important not only to accept failures and encourage employees to learn from them, but also it is necessary to implement systems that provide autonomy to employees and which reward them for the results obtained. In addition, the authors identify the organizational decentralized structure as one that fosters innovation by promoting communication and coordination between business functions.

Akman & Yilmaz (2008) have built a model related to the most important factors that influence mostly company's innovation capability. Particularly, the study examines how the innovation strategies, market orientation and technological orientation influence the innovative capability of SMEs in the developing countries:

Market orientation - Basing on the existing literature, customer orientation, competitor orientation and interfunctional co-ordination were considered as the three components of market orientation. Customer orientation refers to the attention and identification of customer needs in order to create value for them, while competitor orientation consists in understanding strengths and weaknesses of competitors and their capabilities and strategies. Finally, since market orientation is not the responsibility of a single function, interfunctional co-ordination is important to integrate company resources in order to create value for customers.

Summarizing, by being focused on customer needs, new products and new markets, organizations develop innovative capabilities. In addition, competitor orientation allows the organization to identify new opportunities and to compare its capabilities with those

of competitors, fostering creativity and innovation within the organization. Finally, it is assumed that interfunctional co-ordination is a key mechanism that ensures communication and creates an environment open to innovative ideas, positively influencing the innovative capacity of the company.

Innovation strategy - Innovation capability and innovation success require the determination of a clear strategic orientation. The authors identified six dimensions of innovation strategy: aggressiveness (combative posture in exploiting market opportunities), analysis (monitor and understand the external environment in order to recognize innovative opportunities), defensiveness (defend the current position in the market by focusing on current customer needs), futurity (anticipate future changes and innovation opportunities), proactiveness (create or look for new opportunities to exploit for new innovations), and riskiness (exploit market opportunities transforming them into innovative products and processes).

Technological orientation - Technological orientation provides companies to perceive technological opportunities and transforming them into innovations before competitors. Thus, a technological-oriented company invests in R&D and in high qualified personnel in order to exploit technological opportunities, positively influencing its innovative capability.

Smith, Busi, Ball, & Van Der Meer (2008) conducted a literature review identifying the organizational factors that influence the ability to manage innovation at the firm level. In addition to factors such as *technology*, *innovation process* and *corporate strategy* for innovation, other aspects described and presented in more detail are listed below:

Organizational structure - Organizational structure relates to the way the various areas of the organization are configured and how this impacts on its ability to manage innovation. For instance, organizational structure that involves employees teamwork is assumed to promote discussion of new ideas and, consequently, affect the overall ability of the organization to innovate.

Organizational culture - Organizational culture relates to the values and beliefs of the organization and how these impact the ability to manage innovation within the organization. It takes into consideration the organization's approach to collaboration, communication and risk.

Employees - Employees play a crucial role in affecting innovation. This factor takes into account aspects such as employees education and training and their positive impact on the innovation process. It also stresses the importance of providing employees with autonomy and empowerment in order to encourage them to participate in the innovation process. All these aspects influence employees ability to innovate.

Knowledge management - Knowledge management is related to a learning orientation and to the management and utilization of knowledge for innovation. An organization with a high level of learning orientation and knowledge generation uses this knowledge to generate and develop new ideas.

Management style and leadership - The way in which the company is managed influences the management of innovation. For example, this factor takes into account how leadership motivates employees to be more innovative.

Laforet (2011) in building their framework of organizational innovation, examined how innovations occur. First of all, they recognized in customers an important driver of innovation. Many ideas in fact can come from customers and closely working with them influences new product idea, new product launches and process innovation. Second, the authors analyzed the determinants of company innovation capacity, recognizing the importance of a collaborative structure (in terms of multi-functional or cross-functional teams), a flexible and open culture that facilitate communication, a capacity to absorb and use knowledge, and practices as benchmarking and networking. Finally, this study suggests innovation orientation, risk-taking attitude, and willingness to learn as prerequisites for successful innovation capacity.

Although people who answered to the interviews did not differentiate between what drive innovation and what is required for innovation, the answers provided can be distinguished

between drivers of innovation and determinants of innovation capacity. The following useful information for this present work, acquired from interviews, is reported:

Drivers of innovation: closer customer relationship, willingness to improve working conditions.

Innovation capacity determinants: risk taking attitude, open culture, strategy for innovation, climate (right environment where people can be free thinking, speaking, and not being penalized for failure), cross-functional team, value creation for customers (solution at less cost and innovation in design), continuous improvement spirit, learning initiatives.

Saunila & Ukko (2014) defined the intangible aspects of company's innovation capability developing a questionnaire for Finnish SMEs. After a deep review of the existing literature the authors developed a set of items and extracted, from collected data, the intangible aspects of the company's innovation capability through a factor analysis procedure. The study presents the following elements:

Participatory leadership culture - The overall atmosphere within the organization and the culture promoted by leadership must support and facilitate innovation. For example, managers should encourage initiatives, provide feedback and appreciate the work of employees, and play an active role in generating and developing ideas.

Ideation and organizing structures - Innovation requires particular structures and systems. This includes aspects such as a reward system that encourages the coming out of new ideas, and structures that enable them to be processed and developed.

Work climate and well-being - Create an environment in which employees are satisfied and a climate that encourages the development of innovations. This determinant includes key aspects such as cooperation between employees treated equally, who are encouraged through training to be multi-skilled.

Know-how development - Employee competence and knowledge play an important role. Factors such as education, voluntary learning, and the development of skills and competences need to be supported by the organization.

Regeneration - Learning from previous experiences and using the experience gained to experiment new methods of action. This element considers learning and the knowledge acquired through it as fundamental aspects to create innovations.

External knowledge - Exploit external knowledge to improve the innovation capability. The organization must encourage gaining knowledge from external contacts, both comparing its operations to other organization and developing actions with its stakeholder (customers and suppliers).

Individual activity - The innovative capabilities of individuals are important. As previous authors have already pointed out, employees know-how is a potential source of new ideas, therefore it is necessary to encourage participation in the generation of ideas and to stimulate the adoption of new methods of action.

Summarizing, the innovative capacity includes internal and external intangible aspects. In line with Lawson & Samson (2001), and Smith, Busi, Ball, & Van Der Meer (2008), the culture of innovation that guides employees is a key aspect. Since employees themselves are considered the most important means of creating innovation capacity, creative people must be motivated to create an atmosphere that supports innovation. Therefore, the organization must facilitate employee creativity both through structures and channels that support the generation of ideas, and through systems that ensure employee satisfaction. Finally, another important aspect concerns knowledge, both that is brought into the company by employees (know-how), and the one that is acquired from outside. Both sources must be supported by leadership by encouraging voluntary learning and the development of skills and abilities, and by promoting interactions with external stakeholders such as customers, suppliers and other potential partners.

This section has shown the different key aspects that contribute to the creation of the innovative capacity of a company. These information provided the basis on which a number of innovation capacity determinants were built (presented in the next chapter) that will be assumed to be supported and promoted by a quality oriented strategy. Before presenting the conceptual model, it is necessary to report the results obtained by different authors regarding the relationship between quality management and firm's

innovative performances in order to better understand the context in which the present work fits, the problem statement and the major trend highlighted by the studies.

2.7 The Relationship between Total Quality Management and Innovation

There is a need to understand if quality management could support innovation. There is a current and open debate in the literature concerning the contribution of TQM on innovation (Abrunhosa & Sá, 2008) and, although many efforts have been made to clarify whether the quality fosters company's innovation capacity, an unanimous agreement has not yet been reached. As mentioned in the introduction chapter, several studies have examined this relationship and conflicting results presented by researchers show the existence of two main different views. According to Prajogo & Sohal (2001), many arguments support that TQM fosters innovation, while others claim that TQM has a negative influence on company's innovation performance. Both positive and negative arguments are reported below.

2.7.1 Positive Arguments on the Relationship between TQM and Innovation

Positive arguments argue that companies which integrate TQM into their culture, systems and practices can create an atmosphere and environment conducive to innovation.

Several studies considered the multidimensionality of TQM by distinguishing between mechanistic and organic elements. By using empirical data gathered from Australian firms' managers, Prajogo & Sohal (2004) investigated the impact of both categories on organizational performance, highlighting a positive relationship between organic elements on innovation performance. Similarly, by conducting a comparative study between Australian and Singaporean organizations, Feng, Prajogo, Tan, & Sohal (2006) highlighted that organic dimensions of TQM such as leadership and people management are positively related to innovation performance. Particularly, leadership requires

creativity and empowerment, both aspects which contribute to creating an environment conducive to innovation. By proposing an alternative perspective which differs from the mostly promoted one that considers TQM as a "single package", these studies show interesting results in understanding how TQM practices with different "nature" have different impacts on firm's innovation performance.

Hoang, Igel, & Laosirihongthong (2006) examined the overall impact of TQM and the influence of each practices on innovation performance by testing, in the Vietnamese industry, the theorical model developed. Data collected among manufacturing and service firms pointed out that TQM has a positive impact on firm's innovation performance, but not all its practices enhance the firm's innovativeness. Results suggest practices namely leadership and people management, process and strategic management, and open organization are positively related to innovation.

Santos-Vijande & Alvarez-González (2007) recognized that TQM is a management system that creates an innovation organizational culture by generating risk attitudes and willingness to innovate. However, the authors pointed out the moderating role of market turbulence on the effect of TQM to the innovative predisposition, showing that this effect is lower in market stability conditions. Furthermore, independently of the competitive conditions, results suggest the positive effect of TQM on the adoption of administrative innovations with a higher degree of novelty respects firm's major competitors. Finally, the mediating role of the innovativeness in sustaining a positive relationship between TQM implementation and technological innovation outcomes was pointed out.

Martínez-Costa & Martínez-Lorente (2008) developed and tested a model using a sample of Spanish organizations. After analyzing the innovation and quality management practices of these companies, the authors concluded that TQM represents an excellent environment to foster innovation by positively influencing both product and process innovation. Simultaneously, by presenting a study among R&D divisions of South Korean manufacturing firms, Prajogo & Hong (2008) confirmed the effectiveness of TQM practices on product innovation performance, supporting therefore a significative positive impact of TQM principles and practices implementation on company's innovative capability.

Abrunhosa, Moura, & Sá (2008) investigated the role of TQM in supporting innovation in the Portuguese footwear industry. After collecting data from several firms in order to test the proposed framework, the authors pointed out that TQM practices such as teamwork, communication, and supportive people management practices have a positive impact on technological innovation, while results concerning other practices namely autonomy, consultation, and flexibility have not highlighted a significant relationship between these practices with technological innovation.

Sadikoglu & Zehir (2010) investigated the relationship between TQM practices and innovation performance by considering the mediating effect of employee performance. Results support the hypothesis that TQM is positively and significantly related to innovation both directly and indirectly through employee performance, since the improvement of employee commitment, motivation and satisfaction lead to the generation of innovative ideas for new products and services.

Kim, Kumar, & Kumar (2012) examined which quality management practices are related to different innovation typologies: product and process innovation (both radical and incremental) and administrative innovation. The proposed framework and hypothesis were test among ISO 9000-certified manufacturing and service firms. Results show that TQM practices have, through process management, a positive influence on all innovation typologies. Furthermore process management is directly and positively associated with all type of innovation considered. On year later, Moreno-Luzon, Gil-Marques, & Valls-Pasola (2013) proposed a model which relates TQM practices to incremental and radical innovation, taking into account cultural change as a mediator element. Data collected among a sample of Spanish firms highlighted that practices concerning customer orientation, people management, and process management have a direct and positive impact on incremental innovation. On the other hand, results do not support a positive relationship between the same practices and radical innovation. Summarizing, since results of this study point out that TQM is positively associated to innovation (even if only significantly in relation to incremental one), it can be confirmed that this study supports the existence of a positive relationship.

Fernandes, Lourenço, & Madeira Silva (2014) developed a study based on empirical data collected through a questionnaire answered by ISO:2008 certified organizations.

Generally, the authors concluded that the adoption of TQM supports innovation activities despite the conflicting results obtained. A positive relationship has been pointed out between top management leadership and organizational innovation. Furthermore, focusing on customer has a positive impact on product innovation, because it is associated with obtaining information on current and future needs of customers. Finally, continuous improvement and the use of quality tools in product design promote all innovation typologies considered in the study (product, process, R&D, marketing and organizational innovation).

2.7.2 Negative Arguments on the Relationship between TQM and Innovation

In the literature it is possible to find both studies that show how only some aspects of TQM negatively influence innovation, and researches that totally reject the hypothesis of a positive relationship between the implementation of TQM practices and innovative performance.

Regarding the last case, Singh & Smith (2004) explored the relationship between TQM and innovation by collecting data among Australian manufacturing organizations, however results did not empirically confirm that TQM is related to innovation performance. Sá & Abrunhosa, 2007 collected data from SMEs in the Portuguese footwear industry which were used to investigate the relationship between what the authors defined as TQM principles and firm's technological innovation performance. The authors considered people management practices, proposing several TQM enablers of innovation such as autonomy, internal communication, consultation, formalization and qualitative flexibility. However, in correlating these factors to the different dimensions of innovation considered, results showed not significant correlation. Particularly, regarding formalization, a negative correlation was pointed out, because it requires control of tasks which often is associated with lower possibility to be creative.

Concerning studies which presented conflicting results among different TQM practices, Hoang, Igel, & Laosirihongthong (2006) found that education and training have a positive impact on new products development, but a negative influence on the level of newness.

Furthermore, Fernandes, Lourenço, & Madeira Silva (2014) found that customer focus has a negative impact on innovation management because it imply a short term vision. In addition, process management limits development and technological innovation, and marketing innovation because the implementation of a quality management system requires a vision that considers certain business areas less important. Finally, the results suggest that relationships with suppliers limit product and process innovation because companies could prefer to change their products or processes to better integrate them with the goods and services provided by suppliers.

A summary of results on the relationship between TQM and innovation from various literature sources are further presented in a tabulated form in Appendix.

The above results show the complexity of the relationship between TQM and innovation. Some studies pointed out a positive and significant impact of quality management on the innovative results of the organization, while others showed the absence of empirical evidence in relating TQM to innovation. The existing literature suggests that the specific elements considered in operationalizing TQM and innovation could be the cause of the conflicting arguments highlighted on their relationship (Abrunhosa & Sá, 2008). In line with this claim, the multidimensionality of the TQM could provide an explanation. Total quality management is multidimensional in nature (López-Mielgo, Montes-Peón, & Vázquez-Ordás, 2009) and the implementation of hard elements could inhibit innovation, while soft elements could support the development of an innovative environment.

Several studies analyzed the direct relationship between the different quality management practices considered and innovation, while others investigated whether the implementation of the TQM, on the whole, has a positive impact on the innovative performance of the company. Also, some studies have considered only product innovation, others also process innovation and others have made a distinction between radical and incremental innovation and between technological and administrative innovation. This could explain the existence of conflicting results pointed out by different authors.

2.8 Chapter Conclusions

This chapter has reported all the information acquired during the literature review phase, on the basis of which the conceptual model will be developed. The most relevant concepts and information for this study on quality management concern the culture of quality and the Total Quality Management philosophy. In particular, the first part of the chapter discussed how a quality orientation can be ensured by an organizational culture based on quality at both the technical and managerial level, which it is built and developed by completely embracing the philosophy of TQM. To understand this philosophy of quality management, it was therefore necessary to report its main critical success factors, which include both the principles of this philosophy, and the practices and techniques necessary to implement them. On the other hand, concerning the theme of innovation, the main concepts that will be used for the development of the conceptual model are those described in section 2.6. In this section have been reported the different determinants that play a fundamental role in creating a business environment conducive to innovation, which the top management must take into account in order to develop the innovation capability of the company. Lastly, section 2.7 deals with the main results on the relationship between quality and innovation, supporting the reader in better understanding how the impact of the TQM on the innovation performance of companies is still unclear.

CHAPTER 3

THEORY DEVELOPMENT

3.1 Introduction

This chapter illustrates the proposed research conceptual model to examine the relationship between quality orientation and innovation capability. Based on the literature review, section 3.2 of the chapter presents the development of: (1) a set of TQM principles through which a company demonstrates its quality orientation; (2) a set of TQM core aspects that a quality-oriented corporate strategy should takes into account; (3) a set of innovation capability determinants which contributes to creating an environment conducive to innovation. Finally, in section 3.3, the chapter also includes the development of the hypotheses which suppose that core aspects of quality-oriented corporate strategy support the coming out of innovation capability determinants.

3.2 Conceptual model

The extensive literature shows several studies which propose different conceptual models aiming to analyze the relationship between TQM practices and innovation typologies or performance, but no model investigating the relationship between TQM and the determinants of a company's innovation capability was found.

In the interest of filling this lack, the conceptual model, showed in the next page, has been developed.

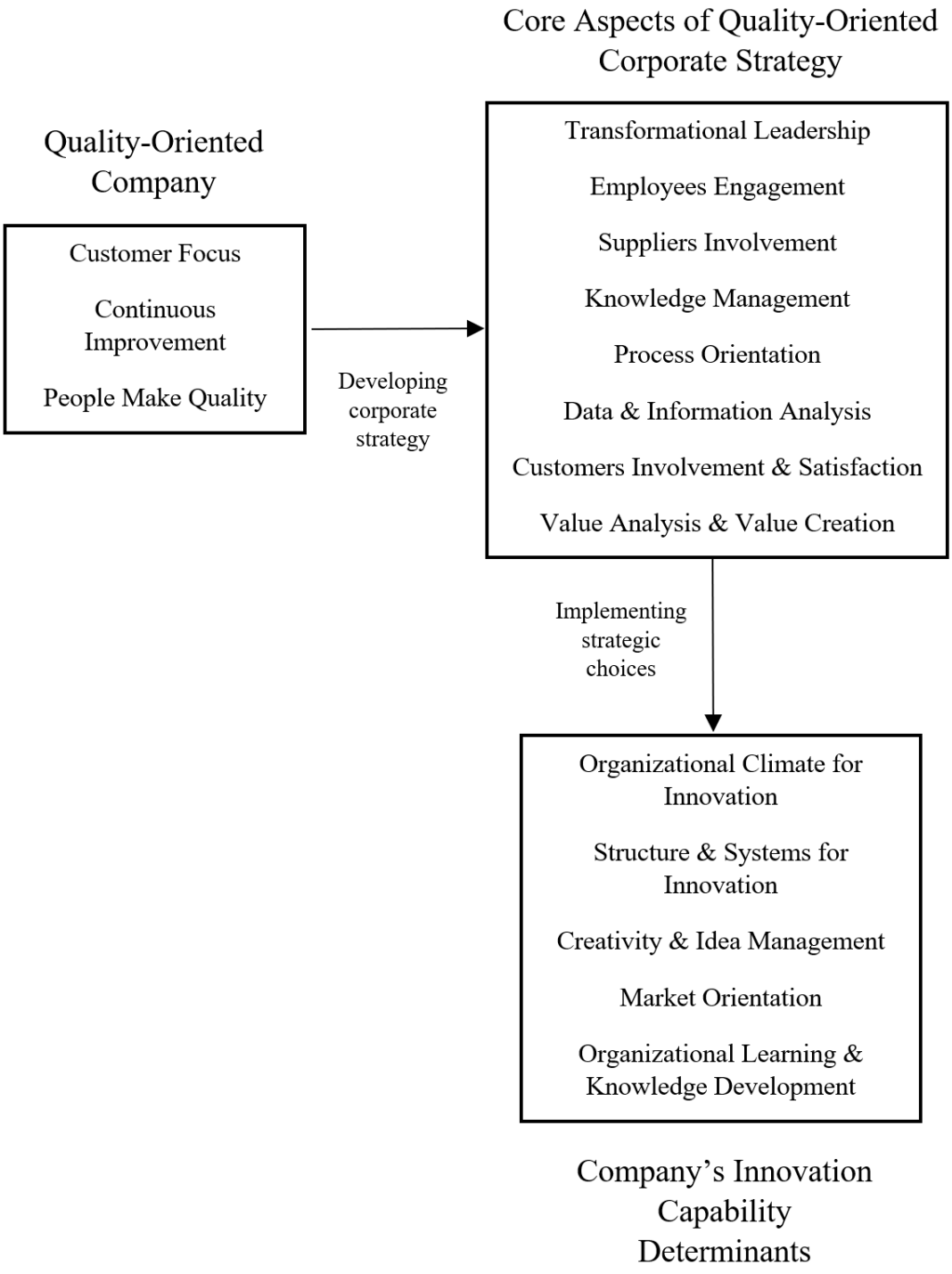

Figure 2 - Conceptual model

The model is presented by using a three-blocks structure. The first and second blocks represent a quality-centered business. Particularly, as explained in the previous chapter, many researchers have expressed different TQM critical success factors without

distinguishing between principles, practices and techniques. Through the first block and the second one, the proposed model presents a distinction between TQM principles and practices: the former are considered the means through which creating a culture of quality, while the latter are included in what in this research is defined as quality-oriented strategy. Considering principles and practices at the same level can create confusion since principles can be implemented only with the use of practices (Boaden, 1997) therefore information acquired from literature has been re-elaborated. Finally, the last block represents the determinants of innovation capability that can be positively supported by promoting a quality orientation through the TQM. Again, it was necessary to re-elaborate the information acquired in the literature in order to propose a set of innovation capability determinants that include aspects in common with quality management.

3.2.1 Quality Orientation: TQM Fundamental Principles

In order to present a quality orientation, companies must recognize and embrace the TQM philosophy, which implicitly involves a shift from the current organization culture to one that is focused on quality as a strategic key to success (Dellana & Hauser, 1999). This research considers TQM as a management philosophy characterized by fundamental principles which are implemented in order to create a work conscious environment focused on quality. Highlighting these principles it is therefore necessary to define what is meant for quality-oriented company. Based on the studies which presented TQM critical success factors, it has been decided to consider Customer Focus, Continuous Improvement, and People Make Quality as the three main pillars of the TQM philosophy. Studies which have contributed in developing this set of principles are reported in the next pages in Tables 4 (a,b,c).

Table 4 (a,b,c) - TQM fundamental principles

Table 4.a

TQM Fundamental Principle	Embodied Concepts	Studies
Customer Focus	Customer satisfaction	Anderson, Rungtusanatham, & Schroeder (1994); Black & Porter (1996); Lai (2003).
	Customer involvement	Flynn, Schoeder, & Sakakibaba (1994).
	Customer relationship	Powell (1995).
	Customer focus	Conca, Llopis, & Tarí (2004); Rad (2005); Chowdhury, Paul, & Das (2007); Abdullah, Uli, & Tarí (2008); Bayazit (2003); Dow, Samson, & Ford (1999), Ahire, Golhar, & Waller (1996).
	Customer knowledge	Salaheldin (2009).

Table 4.b

TQM Fundamental Principle	Embodied Concepts	Studies
Continuous Improvement	Continuous improvement	Anderson, Rungtusanatham, & Schroeder (1994); Hackman & Wageman (1995); Conca, Llopis, & Tarí (2004); Rad (2005); Chowdhury, Paul, & Das (2007); Salaheldin (2009).
	Process improvement	Powell (1995).
	Quality improvement measurement systems	Black & Porter (1996); Lai (2003).

Table 4.c

TQM Fundamental Principle	Embodied Concepts	Studies
People Make Quality	Training	Saraph, Benson, & Schroeder (1989); Ahire, Golhar, & Waller (1996); Dow, Samson, & Ford (1999); Bayazit (2003); Chowdhury, Paul, & Das (2007); Abdullah, Uli, & Tarí (2008); Salaheldin (2009).
	Employees fulfillment	Anderson, Rungtusanatham, & Schroeder (1994).
	Employees empowerment	Powell (1995); Ahire, Golhar, & Waller (1996); Salaheldin (2009).
	Employees involvement	Ahire, Golhar, & Waller (1996); Rad (2005); Abdullah, Uli, & Tarí (2008); Salaheldin (2009).
	Teamwork	Black & Porter (1996); Lai (2003); Bayazit (2003); Rad (2005).
	Reward and recognition	Chowdhury, Paul, & Das (2007); Abdullah, Uli, & Tarí (2008).

Referring to Tables 2 (a,b,c) in Chapter two, Customer Focus was considered a critical factor for TQM implementation success both explicitly and implicitly through elements such as customer knowledge, customer satisfaction orientation. Similar considerations can be reported with regard to Continuous Improvement. Finally, People Make Quality is a term used to highlight the crucial role of employees in achieving higher quality performance. Therefore, this principle has been developed by taking into account TQM critical aspects regarding both the organization's upper levels such as top management commitment and support, and people management practices such as training, employees fulfillment, employees empowerment, employees involvement, teamwork, and reward

and recognition. Each of the three proposed principles is described in detail in the next sections.

3.2.1.1 Customer focus

The importance of customer focus has always been considered of great relevance, gaining over the years more and more weight in achieving high business performance. Organizations that do not attribute the right importance to customer focus often struggle in facing market competition. Market orientation, especially to the end customer, allows companies to align their technological capabilities and knowledge with the market, obtaining consistent responses to customer requirements and needs (Perdomo-Ortiz, González-Benito, & Galende, 2006).

Customer focus is a fundamental principle in TQM philosophy, it expresses the need to have a deep market orientation, which allows the creation of products or services that constantly meet customer needs. Indeed, customer focus is considered as the means by which ensuring the correct definition, understanding, and satisfaction of end customers' uncovered needs.

The previous statement proposes customer satisfaction as the ultimate goal of customer focus. Particularly, customer satisfaction is expressed through the attention paid by the organization to the design and delivery of products or services that meet customer expectations (Dean & Bowen, 1994). Therefore, practices commonly used to implement the principle of customer focus include the promotion of closer relationships with customers not only to gather key information about their needs and requirements, but also to receive feedback about how their expectations are being met.

In conclusion, to ensure the successful implementation of a quality system, every decision made by the organization should be customer-oriented (Ooi, 2009). For this reason, in developing a quality oriented strategy, aspects such as customer satisfaction and customer involvement in product/service design development must be taken into account. Including these key aspects in the corporate strategy can help the company in achieving higher quality performance.

3.2.1.2 Continuous Improvement

For organization's success, continuous improvement in quality is fundamental. For this reason, organization's effort for continuous improvement is considered as crucial in TQM philosophy. According to Dean & Bowen (1994), this principle represents a commitment to constant examination of technical and administrative processes in search of new solutions and better ways of work. Therefore, continuous improvement consists of a global approach in examining processes, products or services in order to find opportunities to reduce costs, non-conformance, cycle times and variability.

The integration of continuous improvement principles into the culture of a quality-oriented company is exhibited through a corporate strategy that shows a deep process orientation. This orientation is translated into a collection of practices which are included in two main activities: process control and process improvement. Following Jha, Noori, & Michela (1996) study, these activities mainly consist in understanding and documenting the processes (identification of value-added versus non-value-added activities, and their analysis in terms of cost, quality, and other relevant measures for equipment, labour, and material inputs), simplification and improvement (reduce, combine or eliminate activities, improve the performance of equipment, labour, and material inputs), stabilization of the process at its new level, and performance monitoring in order to set new targets for future improvements.

The above statements show that continuous improvement is mainly related to processes with the aim to eliminate elements with no value-addition by replacing them with those which create added-value both for the company itself and for the end customer. Continuous improvement therefore involves both an internal and external focus. Process improvement, in fact, helps the company to meet the ever-changing needs of their customers by providing new solutions or improvements in existing products or services in terms of higher quality, lower price and timeliness in delivery.

In conclusion, this principle represents a way of working and conducting the company. Continuous Improvement is not only about processes, but also the general internal conditions of the organization. Therefore, it does not only consist of applying practices for process control and improvement, but it requires a top management commitment in

creating a working environment in which this principle guides the work performed by employees. According to the TQM philosophy, these aspects are fundamental to provide better products and services to customers, and consequently to become more competitive.

3.2.1.3 People Make Quality

For goals such as customer satisfaction and continuous improvement, the thought immediately turns to the new technologies, new designs or new tools through which it is possible to achieve them. However, these represent the output of a solutions development process in which the people who work in the company are involved. Often, therefore, it is common mistake to not directly consider people as the most important means by which to ensure the achievement of the desired performance. In TQM philosophy, People Make Quality principle highlights the crucial role of people, both managers and employees, in creating a quality orientation.

Leadership plays an essential part in a context of quality management and reflects the commitment of top management in creating an environment in which quality is the main goal of everyday activities. To achieve this target, top management must establish the mechanisms and systems through which guarantee a general involvement in quality programs at the operational level. According to Fuentes Fuentes, Lloréns Montes, & Molina Fernández (2006) managers must show a total commitment to quality by driving, involving and assessing rather than planning, running and controlling.

Company's goals are not related to a single department, but the responsibility lies with all business functions and the people who are part of them. For this reason, the main task of top management is to promote the alignment of people behavior within the company with the organization's strategic quality goals. Therefore, as will be explained later, employees must be engaged so that their skills and knowledge can bring benefits to the organization. Regarding people engagement, several critical aspects should be taken into account by a quality-oriented strategy: training allows employees to attain higher skills, education helps to create a quality awareness among employees, empowerment leads to greater autonomy in decision-making process (Powell, 1995), and a rewards & recognitions system motivates and stimulates employee commitment to quality improvement (Chowdhury, Paul, & Das, 2007).

Summarizing, TQM philosophy is composed by a set of mutually reinforcing principles (Dean & Bowen, 1994). A customer focus is necessary to understand the end customer's needs, which represent the basis for triggering the improvement process. In performing activities concerning these principles, people play an essential role. Top management must stimulate employees to have closer relationships with customers in order to understand their requirements, and must create an environment where individuals are motivated to express their skills and knowledge in the long process which starts with the translation of the information acquired and ends with the achievement of customer satisfaction.

3.2.2 Core Aspects of Quality-Oriented Corporate Strategy

As mentioned in section 2.3, TQM is a management philosophy that supports and promotes a quality-oriented culture within the company. The relationship between culture and strategy is highly complex and it is often difficult to separate the effects strategy and culture have on each other (Smith, Busi, Ball, & Van Der Meer, 2008) .In other words, it is like wondering: “which came first, the chicken or the egg?”. In this research it has been decided to consider that company’s culture drives the development of a corporate strategy which reflects values and goals of the organization. Therefore, since this study considers TQM as the key to gaining competitive advantage, the corporate strategy must be aligned with its principles by taking into account the following aspects: Transformational Leadership, Employees Engagement, Knowledge Management, Suppliers Involvement, Customers Involvement & Satisfaction, Data & Information Management, Process Orientation, and Value Analysis & Value Creation.

3.2.2.1 Transformational Leadership

As People Make Quality principle suggests, successful quality management starts at the high levels of a company. Leaders foster, by acting as reference models, a quality orientation in all levels of the organization by allowing all members to identify with them, and to internalize their behaviors and principles. In this way, the top management ensures

that the principles of TQM are fully implemented, continually sought and improved in practices (Wilkinson & Witcher, 1993).

The three TQM principles proposed in this research suggest that leaders should focus on customer and continuous improvement, by continuously involving people within the organization. The TQM principles awareness promoted by leaders is crucial to create an organization that continually views quality as the primary goal (Zhang, 2000). What has been defined in several studies as transformational leadership seems to encompass the necessary behaviors to achieve this purpose. As suggested by Waldman (1993), transformational leaders in a TQM culture are distinguished by their willingness to take risk and their propensity to a mission that focuses on products that constantly meet end customer needs. Furthermore, transformational leadership has been identified as an important means to encourage the change, by promoting the implementation of ongoing changes in procedures and systems in order to make improvements.

It is leaders' responsibility to communicate organization's vision and goals, and creating and designing systems that involve every member of the organization to achieve its goals. Managers must therefore think how to effectively involve people, motivating them to participate. Therefore, transformational leaders encourage people to continually improve job and quality skills, motivate individuals to accept change, dedicate time to quality training and encouraging new ideas by providing autonomy to employees in decision making process and by rewarding and recognizing their initiatives (Waldman, 1993). As Zairi (1994) asserted: "leadership in the context of TQM is not about power, authority and control, it is more about empowerment, recognition, coaching and developing others."

Support from leaders is critical to the successful implementation of TQM practices and consequently to achieve high quality performance. The successfully quality-oriented companies tend to have leaders that effectively involve people and motivate them in the management of quality (Lakshman, 2006). Mangers should allow and encourage employees to take necessary action in order to carry out the organization' strategy. Therefore, leaders promote the development of closer relationship with customer in order to absorb detailed information about his needs, and stronger relationship with suppliers certified for quality in order to ensure higher quality inputs for manufacturing processes

(Ahire, Golhar, & Waller, 1996). Finally, leaders must promote internal cooperation among employees in order to work cooperatively in achieving organization's goals.

Summarizing, this aspect encompasses all the information presented by the literature within constructs such as "top management commitment", "leadership" and similar terms. In a TQM context, leadership reflects the company's quality orientation by creating a work environment which is conscious of the importance of aspects such as customer satisfaction, continuous improvement, employee involvement, and cooperation with the external environment. However, according to Ahire, Golhar, & Waller (1996), top management should not only give high priority to quality, but should also demonstrate its quality commitment through actions in support of TQM practices. Finally, based on the stressed importance in TQM success, the following characteristics of leadership behavior has been taken into account:

- encourage the change;
- promote communication;
- stimulate employees participation;
- promote cultural alignment;
- encourage cooperation (both external and internal).

3.2.2.2 Employees Engagement

The most important factor for TQM implementation is the role played by people within the company. Indeed, most successful TQM implementations depend heavily on changes in employees' work attitudes (Karia & Asaari, 2006). Since employees are the main driver of business success, every individual at every level and every department must be engaged and motivated to participate in quality management activities. To this purpose, the use of suggestion schemes can stimulate employees participation. Through these practices employees can express their ideas and suggestions for continuous quality improvements concerning every aspect of the organization (And & Sohal, 2008).

Employees' original ideas and suggestions should not only be considered, but also rewarded by leaders. Therefore, in order to stimulate employee participation, organizations should also recognize and reward the work of employees. An appropriate

system of recognitions and rewards has been shown to stimulate grater employee involvement and to improve quality significantly (Ahire, Golhar, & Waller, 1996). It is responsibility of leaders to develop a system that stimulates creativity and enthusiasm, by rewarding employees for their efforts in achieving quality goals. Common recognitions and rewards include monetary and non-monetary rewards such as working condition improvement, salary promotion, and position promotion (Chowdhury, Paul, & Das, 2007). By considering the above statements it can be concluded that a system of rewards and recognitions leads employees to be satisfied in performing their tasks.

People engagement practices aim to create an environment that elicits the best from employees. In a TQM context this goal is also achieved by empowering company employees by increasing their autonomy and responsibility on assigned tasks, thus allowing them to be innovative in implementing their own solutions to problems . (Karia & Asaari, 2006). Employees participation and satisfaction can be achieved by delegating autonomy in decision making process, because it conducts to the development and implementation of own ideas and solutions. Finally, by empowering employees to make decisions and decentralizing the decision-making process, organizations recognize skills and competences of their employees in solving problems and taking initiatives to carry out the corporate mission.

For leaders, empowering their subordinates does not mean only shifting the responsibility among them, but also provide the necessary support so that they can perform their work in autonomy (Ahire, Golhar, & Waller, 1996). For this purpose, a quality-oriented company should invest in training in order to provide to employees the technical and behavioral skills that their tasks require. Quality-oriented training should be provided to allow employees to attain higher skills and should include training in both techniques, such as statistical methods and tools, and managerial skills in problem solving, decision making, leadership, and team building (Sun, Hui, Tam, & Frick, 2000). In conclusion, employees must be trained and educated in quality concept and tools in order to understand quality-related issues. Brown (1992) highlighted the importance of education and training programs by providing several considerations. First, awareness programs are needed to inform people of what TQM is. Second, education develop appropriate attitudes and values relating to quality. Finally, training helps in equipping people with the tools

and techniques of quality improvement. In conclusion, a company should consider education and training programs as an investment to gain employees commitment in quality programs.

Commitment means that employees are continually focused to company's main goals. Another essential element in TQM to ensure employees participation and commitment is teambuilding. Therefore, top management must focus on building cohesive teams. In a TQM context, teamwork is important because it promotes communication and exposes employees to different points of view (Hackman & Wageman, 1995). Therefore, the use of teams fosters the development of knowledge and skills through interaction between members, ensures the flow of information between people belonging to different business areas, and allows members to receive feedback about the ideas proposed. In addition, cooperation between employees improve and accelerate the problem solving process. Ahire & Ravichandran (2001) proposed two ways to foster a cooperative behavior: quality circles and cross-functional teams. Quality circles consist of informal teams from five to ten members, usually from the same department or function, that focus on quality improvement. Cross-functional teams are typically composed of a small group of members from multiple functional departments and formed with a clear objective of solving problems related to a product, or to a part of a peculiar business process.

In a nutshell, in a TQM context, employees are seen as internal customers who must be fully engaged in companies activities. First, they must be encouraged to coming up with ideas and leaders should recognize and reward the individuals or teams for their excellent suggestions (Chowdhury, Paul, & Das, 2007). The extent to which people implement their ideas depends mostly on their freedom to operate with autonomy. In this sense, empowering people is fundamental because more efficient and quick solutions can be found by those individuals who carry out their tasks on a daily basis. However, as Ahire, Golhar, & Waller (1996) argued, employee empowerment and involvement are not effective unless employees have received a formal and systematic training in quality management. Finally, for TQM is important to remove barriers among different departments. In this terms, teamwork ensure communication and a continuous learning process among employees.

The following critical factors have been taken into account:

- use of suggestion schemes;
- recognitions and rewards system;
- employees empowerment;
- training and education programs;
- leaders trust and feedback;
- teamwork and cooperation.

As reported below in Figure 3, in a TQM context, all these critical factors contribute in ensuring the engagement of employees.

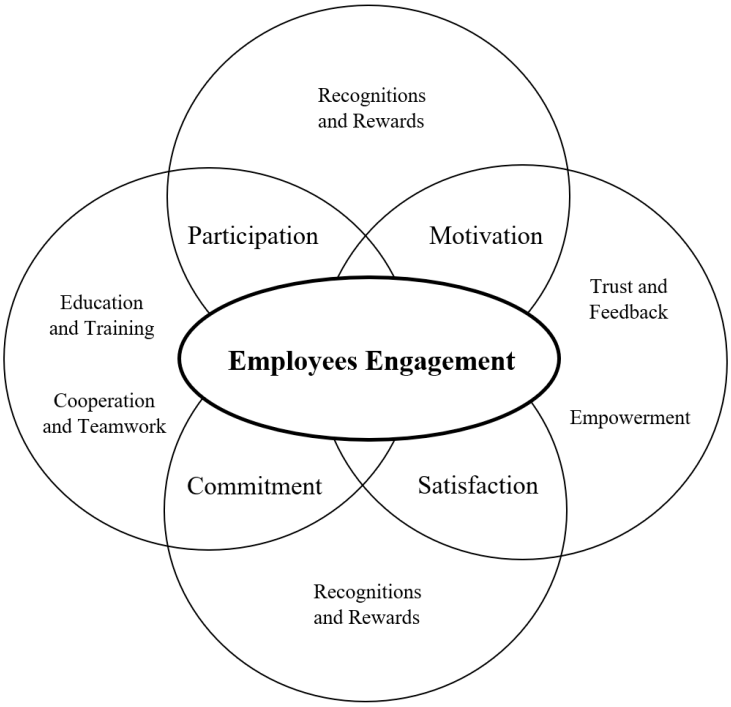

Figure 3 - Employees Engagement critical factors

3.2.2.3 Suppliers Involvement

Supplier related practices are widely emphasized in quality management literature because materials and purchased parts are often a major source of quality problems (Flynn, Schoeder, & Sakakibaba, 1994). Indeed, superior quality of suppliers materials and services are necessary to gain high quality finals products. Moreover, low quality incoming parts not only do not allow to generate high quality results, but often they add

significantly buyer's cost in terms of inspection, rework and returns, purchasing and overproduction (Ahire, Golhar, & Waller, 1996).

Therefore, in order to avoid extra costs due to the poor quality of incoming materials, companies must evaluate supplier capability and commitment in offering quality products and services. Several authors stressed the importance of using practices to choose potential suppliers and evaluate their performance once a relationship has been established. For example, Claunch (1993) suggested to carry out a pre-survey, qualification survey and a certification evaluation for qualified suppliers. The purpose of the pre-survey is to gain as much information about the supplier as possible to determine its capability and capacity. The selected suppliers are then assessed through a qualification survey and a "Certification Status" is attributed to those who guarantee 100% quality, on-time delivery, and correct counts. Moreover, once the collaboration has been established, it is necessary to measure suppliers performance in different ways, such considering conformity of supplied parts to specifications, reliability and durability of supplied parts (Ahire, Golhar, & Waller, 1996) or using performance metrics such as on-time delivery, percent defects, and price (Ahire & Ravichandran, 2001).

The above statements suggest how TQM requires a close cooperation with suppliers and the establishment of long-term relationship with them. This collaborative approach allows organizations and suppliers to work together closely, seeking mutual benefits by sharing risks and rewards of their professional relationship (Gallear & Ghobadian, 2004). Therefore, in a TQM context, companies need to move from typical buyers-suppliers long-term contracts to a collaborative relationship which encourages participation and commitment in quality improvement and solving quality problems. For instance, quality-oriented companies need full cooperation from their suppliers to design and develop new products (Ahire & Ravichandran, 2001), and on the other hand, they must regularly participate in suppliers quality initiatives, and give feedback on performance to improve their product (Zhang, 2000). Finally, once the cooperation has been established, the organization must keep records of suppliers performance in order to identify improvements opportunity in their processes.

In conclusion, for a quality-oriented company it is necessary to integrate suppliers in their quality programs by establishing very close relationships with them, based on long-terms

common interests. Supplier-based quality practices provide a means to increase the likelihood of an organization to have reliable suppliers who are willing to work towards the company's goals of achieving quality excellence (Ahire & Ravichandran, 2001).

3.2.2.4 Knowledge Management

In the last twenty years, many researchers have stressed the importance of knowledge management, well reflected in the definition provided by Quintas, Lefrere, & Jones (1997) which regarded knowledge management as "the process of continually managing knowledge of all kinds to meet existing and emerging needs, to identify and exploit existing and acquired knowledge assets and to develop new opportunities". The different definitions highlighted in the literature describe knowledge management as a process that starts with the acquisition of knowledge and continues with the sharing of information acquired among all levels of the organization with the aim of applying and exploiting it to create value. For the above considerations, knowledge management aims to create synergies between different departments and members of an organization, to add value for customers and to accelerate the process of identifying new opportunities and improvements. Consequently, the presented model suggests that a quality-oriented company should consider knowledge and its management as a key aspect to achieve quality goals.

Customer focus TQM principle stresses the importance of creating products and services that constantly meet customer needs and expectations. To achieve this goal, customer focus-related practices incorporate the gathering of information about their needs and expectations and then to distribute such information within the firm itself (Ooi, 2009). Therefore, since the information provided by customers is the main source from which drawing quality improvements in products and processes, any decision taken by the organization must take into account suggestions, reminders, expectations and whether these are being satisfied. O'Dell, Wiig, & Odem (1999) further emphasized that customer focus principle leads to capture information about customers, develop and transfer knowledge, understand customers' needs and preferences, and use the knowledge of the organization to solve customer problems. Summarizing, as mentioned above, in a quality-oriented company the knowledge management process generally starts with knowledge acquisition on customers.

Companies that implement TQM must therefore find the information and knowledge they need to improve not only the products and services offered to the customer, but also the internal processes. Regarding internal processes performed within the organization, continuous improvement principle requires a global commitment in examining and controlling processes in order to find improvement opportunities. For this purpose, while the use of process control tools and techniques helps to obtain key information, the transfer of information and knowledge acquired represent the following step to achieve the desired improvements. In addition, Ju, Lin, Lin, & Kuo (2006) argued the importance of preserving through recordings the knowledge generated by process control in order to improve efficiency and reduce time in problem solving.

Knowledge acquisition can arise also with conversations and interactions with firm's suppliers. As mentioned in section 3.2.2.3, a quality-oriented company must establish relationships with its suppliers based on strict cooperation in order to discover new knowledge from them. According to Tseng (2009), supplier knowledge is important in linking customer needs and expectations with suppliers capabilities and resources. Furthermore, the knowledge flow is bi-directional. Cooperation with suppliers must allow a transfer of mutual knowledge in order to ensure successful outcomes from this relationship. According to Molina, Lloréns-Montes, & Ruiz-Moreno (2007), because TQM orients the relations with suppliers toward the long term and also insists that relations be established only with a small number of them, a corporate strategy based on this management philosophy must encourage the development of common or related knowledge, making the transfers more efficient.

Once acquired, knowledge must be disseminated (or transferred) within the company. By following Darr, Argote, & Epple (1995), and Ooi (2009) studies, knowledge transfer comes out when one organizational unit learns from the experience of another. Therefore, employees behavior is essential to ensure the transfer of acquired knowledge. Leaders must act as helpers of organizational learning in the workplace by helping to cultivate a knowledge management behavior environment in which employees are encouraged to transfer and apply their knowledge (Molina, Lloréns-Montes, & Ruiz-Moreno, 2007). To this purpose, the use of teamwork required by TQM helps knowledge transfer by promoting face-to-face interactions between members, which consequently facilitate the problem solving process and the coming up of new ideas. Finally, since TQM requires

also individuals empowerment and autonomy, it is essential for those who have to take decisions, to look for knowledge and to transfer it to employee work groups.

3.2.2.5 Process Orientation

Quality products or services can only come from the quality of processes by which they are designed and produced. The TQM philosophy emphasizes the study of internal processes in order to execute them more and more effectively to provide customers with products and services of ever increasing value at every lower costs (Rad, 2005). A quality oriented company must therefore show a strong process orientation to achieve higher quality. First of all, it is necessary that processes are properly designed to meet quality requirements. Secondly, processes must be monitored and appropriate control tools must be used to highlight any problems and identify their causes. Finally, in line with the principle of continuous improvement proposed by the TQM, the results obtained from statistical process control are used to identify opportunities for improvement.

Design process management is an important aspect both for products and processes. According to Ahire & Ravichandran (2001), superior products design should be accompanied by a cost-efficient process design to ensure production at a cheap price. Process design includes all those activities necessary to develop a process that meets product features that satisfy customer needs. According to this statement, Juran stressed the importance of several questions that a company must face up to guide the design of a new process such as “What mechanisms do we need to create or deliver certain product characteristics (and meet quality goals) over and over again without deficiencies?” (Juran & Godfrey, 1998).

Once a new process has been developed, TQM promotes the search for continuous opportunities for improvement. This requires continuous process monitoring and quality tracking, allowing abnormal changes to be identified in process steps, to capture sudden deviations from specifications and identify errors and problems (Ahire & Ravichandran, 2001). Process control consists of focusing on specific quality goals, evaluating the process performance, and comparing them with the goals. Juran suggested to choose “control subject” such as process features which most directly affect product features (Juran & Godfrey, 1998).

Over the years, a wide variety of statistical control tools (SPCs) has been developed and used to help quality-oriented companies in monitoring changes and identifying areas where improvements are needed. Three of the most commonly used tools are control charts (used to determine whether the variance produced by the process is random or attributable to specific causes), Pareto analysis (used to identify the major factors that contribute to a problem), and Cost-of-quality analysis (used to highlight the cost savings that can be achieved by doing the work right at the first time) (Hackman & Wageman, 1995). These tools allow companies to determine when a process needs improvements or to identify cost saving opportunities. Other effective tools for process control and improvement are Failure Mode Effective Analysis (FMEA), sampling, and inspection. Furthermore, in solving problems and identifying improvements, what Hackman & Wageman (1995) defined as process-management heuristics can also be used. According to the author, several techniques such as brainstorming help quality teams to use the collective knowledge in identifying and analyzing opportunities to improve quality. In particular, brainstorming taps the creativity of group members in generating ideas about the potential causes of a problem and their possible solutions. In addition, the use of flowcharts could help members in identifying those activities that add no value.

In conclusion, statistical process control becomes the core for both quality improvement and quality maintenance in minimizing production cost and attaining consistency of products and services (Zhang Q. , 2001). Particularly, the analysis of data and the situations that employees have to deal with requires a cooperation between them, that triggers both learning mechanisms between employees and the development of new ideas.

3.2.2.6 Data & Information Analysis

Data and information analysis has been pointed out by several authors as an important component in a TQM context. In addition, if it is also considered that in the modern era the survival and competitive advantage of a company depend heavily on the quality and availability of data and information, there is a strong need to collect and analyze data and information from both internal processes and external environment. Furthermore, there is a strong belief that data and information analysis is vital to support knowledge acquisition, transfer and application in the knowledge management process.

Quality improvement is a data-driven process. As it has been explained in the previous section on process control, the use of SPC tools is crucial to collect and analyze data for the purpose of quality improvement. Tools such as cause-and-effect analysis and Pareto charts are aimed at helping organizations to process information effectively (Dean & Bowen, 1994). In addition to these manufacturing process tools, an organization must make use of tools such as matrix data analysis, relations diagrams, and tree diagrams to collect and analyze non-qualitative and verbal data in different business functions such as sales, marketing and R&D. Thus, accurate information and data will facilitate the decision-making process by supporting employees in their initiatives.

The external environment provides a deep source of information to push up the process of never ending improvement proposed by TQM philosophy. For this purpose, in addition to the widely stressed closer relationships with customers and suppliers, also benchmarking technique contribute to accelerate the cycle of continuous improvement. Benchmarking is the process of comparing and measuring an organization's operation or its internal process against of a best-in-class performed from inside or outside its industry (Chowdhury, Paul, & Das, 2007). Particularly, there are two different type of benchmarking: an internal benchmarking which consists in collecting, analyzing and comparing data on similar practices from different parts of the organization, and external benchmarking where the same activities are performed with the aim to compare practices, techniques and performance with those of main competitors. Once all these activities has been performed, it is possible to identify gaps between own performance and those which represent the best way to conduct the business, consequently triggering the improvement process to close these gaps (Zairi & Hutton, 1995).

Finally, in a TQM context it is crucial to develop an appropriate system of measurement procedures. Taking into account all the core aspects of a corporate quality-oriented strategy presented in the previous sections, it can be concluded that all the practices implemented by the organization need the support of measurement tools such as customer surveys, employees surveys, suppliers assessment, statistical process control tools and benchmarking techniques. The TQM literature suggests that organizations which collect and analyze this types of information and data will be more successful than others in quality initiatives.

3.2.2.7 Customer Involvement & Satisfaction

As mentioned in section 3.2.1.1, meeting customers' needs is the key element of TQM philosophy. Recognizing customer needs, demands and expectations is crucial to plan and execute all those activities to improve both the products and the processes through which they are realized. In order to successfully gain competitive advantage, a quality oriented company must: (1) respond quickly to customers' demand with new ideas and technologies; (2) produce products that satisfy or exceed customers' expectations; and (3) anticipate and respond to customers' evolving needs and wants (Chowdhury, Paul, & Das, 2007).

In order to ensure fast and consistent responses to present and future customer needs, the organization must assess them regularly and adjust its operations accordingly (Ahire, Golhar, & Waller, Development and validation of TQM implementation constructs, 1996). Therefore, for quality-oriented company, involving customers in quality activities and programs, and maintaining closer relationships with them is more than an imperative. According to Flynn, Schoeder, & Sakakibaba (1994) the customer should be closely involved in the product design and development process, with inputs at every stage of this process. First of all, the customer must be involved in activities to better understand his needs and demand in order to create a product that leads to his satisfaction. For this purpose, the Quality Function Deployment (QFD) is a powerful tool that allows organizations to drive the development of a new product towards the real needs of those who use it. It is therefore necessary to involve the customer in the design of the new product through personal or group interviews in which each individual expresses his or her own idea of the characteristics and functionalities that the product must show and those ones must be avoided.

While tools such as QFD allow organizations to define the customer, understand his needs, and develop a new product based on the information acquired, customers' feedback are helpful in making improvements on existing products. Therefore, dynamic customer expectations should be tracked and quality efforts adjusted accordingly: by (1) receiving customer feedback, (2) transmitting the feedback to employees in charge of effecting product and process changes, and (3) executing changes based on the customer feedback (Ahire & Ravichandran, 2001).

Customer satisfaction represents the degree to which an organization's customers continually perceive that their needs are being met by the organization's products and services (Anderson, Rungtusanatham, & Schroeder, 1994). A quality-oriented company must therefore consider customer satisfaction as the final goal of all activities carried out within the organization. For this reason, organizations must not only listen customers regarding their needs, but they have also to consider different mechanisms through which understand whether the expectations are met or, on the contrary, complaints could be pointed out. The customer focus required by TQM is therefore showed by the frequency and rigor of customer satisfaction surveys (Ahire, Golhar, & Waller, 1996). Consequently, a customer orientation should include the collection and analysis of customer complaint information, market investigations, and customer satisfaction surveys to evaluate weather corrective actions on products and processes would be necessary (Zhang, Waszink, & Wijngaard, 2000).

Summarizing, a quality-oriented company must develop mechanisms to determine customers' needs and to understand the extent in which them are being meet. For this purpose, the use of customers' feedback helps the company to avoid that products/services offered do not meet customers' needs and consequently do not lead to their satisfaction. Secondly, customer involvement implicitly consider him or her both a new product co-creator by his contribution in product design and development processes, and as an end-user by his involvement in testing new products (Nambisan, 2002). By acting as a co-creator, customer helps in reducing time, waste and in improving the alignment of results with market expectations, while their involvement in product testing enables firms to detect product flaws early in the development cycle and to minimize costly redesign and rework (Nambisan, 2002).

3.2.2.8 Value Analysis and Value Creation

A company gains competitive advantage when it achieves a higher profitability than competitors. In other words, the competitive advantage is strictly related to the company's ability to create value for customers by guaranteeing the satisfaction of their needs and expectations. The growing market competitiveness requires companies to develop strategies focused on the creation of value with a dual purpose: generating value to end

customer and the company itself. One commonly used method for creating a "value culture" within the organization is the Value Analysis (VA). Value Analysis has been described as a method to increase product value (Romano, Formentini, Bandera, & Tomasella, 2010), which simultaneously allows companies to reduce costs and ensure quality (Pires & Avila, 2015). Because of these reasons, Value Analysis must be taken into account by quality-oriented companies in order to achieve customers satisfaction effectively and to improve internal process efficiently.

Customer satisfaction depends on the organization's ability to create value both by satisfying uncovered needs and providing already existing products and services at a lower price. In this context, Value Analysis should be integrated with the Quality Function Deployment in the process of new product development. Particularly, according to Ho, Cheng, & Fong (2000), through value analysis customers are better informed about the costs associated with different levels of product quality. As a result, if the cost of different product features and functionality is too high, customers can eventually redefine its functions or the quality level required (Ho, Cheng, & Fong, 2000). In these terms, value analysis enhances the product development process by preventing unnecessary functions from being included, and consequently unnecessary costs from being incurred. This therefore allows companies to develop a product whose functionalities, features and price generate value for customers.

The philosophy of TQM is based on a never-ending search for improvement of company's processes and products. Therefore, an organization often needs to improve its products in order to provide a higher level of satisfaction without increasing the costs. In this regard, Value Analysis supports the achievement of equal or better performance at a lower cost while maintaining all the functional requirements defined by the customer (Sun & Zhao, 2010). Consequently, the set of both essential and those unnecessary functions drives the processes improvement planning. Therefore, the integration of Value Analysis with continuous improvement principle creates value for the company itself by ensuring that resources and efforts are directed to the right place for improvement, consequently providing a positive impact on process capability and company quality performance (Ho, Cheng, & Fong, 2000).

3.2.3 Company's Innovation Capability Determinants

This study is based on the assumption that innovation at company level is a process that starts from the development of the company's ability to seek, create, and absorb innovation. In this research, the innovative capacity of a company is defined through a set of determinants that positively influences the ability of a company to create an innovative environment and to manage the innovation process. The key determinants that has been considered in this research are: Organizational Climate for Innovation, Structure & Systems for Innovation, Market Orientation, Creativity & Idea Management, and Organizational Learning & Knowledge Development. These elements have been built up from the literature.

3.2.3.1 Organizational Climate for Innovation

Company's culture influences people's behavior who work in. It is therefore necessary that the behavioral models through which innovation can emerge become accepted as the way things are done in the company (Bessant, 2003). Therefore, building a climate for innovation is essential to support the development of innovative behaviors within the organization. In line with these statements, it was decided to consider a determinant defined as 'Organizational Climate for Innovation' which stresses the importance of motivating and promoting risk attitude, internal coordination, and communication among employees to encourage an innovation-oriented mindset that extracts ideas, concepts in products/services, processes, business models or successful systems (Rajapathirana & Hui, 2018).

Many studies have shown the willingness to take risks as the most common behavior of innovative companies. Because innovation is affected by uncertainty, leaders must promote a risk attitude and should tolerate the intrinsic ambiguity of projects (Wan, Ong, & Lee, 2005). Therefore, an innovative environment requires an overall approach to risk. Furthermore, innovation requires an organizational environment where people are free to think, communicate, and take action without be penalized for failures (Laforet, 2011). Particularly, leaders not only should provide freedom to conduct research, create and innovate, but also freedom to fail. When failures and mistakes occur, these are tolerated

by leaders with the imperative of transforming them into learning and improvement opportunities.

Tolerated risk must be reduced through communication, collaboration, and the exchange of information and knowledge. Communication facilitates knowledge sharing by combining the wide variety of experiences, opening dialogue, building on others ideas and exploring issues relevant to innovation (Lawson & Samson, 2001). Accordingly, Wan, Ong, & Lee (2005) suggested that an important issue for innovation is the willingness to exchange ideas. Therefore, it is necessary to create an organizational environment opened to new ideas, which allows to quickly and easily transform them into opportunities for innovation (Akman & Yilmaz, 2008). To this purpose, cross-functional coordination enables the communication and exchange of information and knowledge about customers, processes, and competitors between the functional departments of a company, allowing them to work together, consequently creating working conditions suitable for innovation.

As can be deduced, the best way to develop an organizational climate for innovation is to invest in people. The company's internal climate must motivate people to make their mark personally contributing to business results (Bessant, 2003). To achieve this goal, providing powers to employees in decision-making process is necessary. In this way, the top management recognizes that employees may have different visions for the future, and seeks to incorporate these opinions into their direction of innovation (Lawson & Samson, 2001). This climate of respect and trust in employees therefore encourages them to experiment new product or process ideas.

3.2.3.2 Structure & Systems for Innovation

'Structure and Systems for Innovation' determinant takes into account structure and systems which are likely to have a positive effect on innovation capability. Creating consistency between innovation behavior and the company's structure and systems is crucial in developing an overall innovation capability (Saunila & Ukko, 2014).

As pointed out in the previous section, a climate conducive to innovation includes employee empowerment, and communication between all business areas. Therefore,

developing and sustaining innovation capabilities requires a decentralized and flexible structure that promotes communication, cooperation, and the involvement of all people in the innovation process. Firms should motivate and enable innovative behavior by creating permeable business boundaries between functions, product groups, and businesses (Lawson & Samson, 2001). Accordingly, although every single individual in a company is a potential source of ideas for innovations, a structure that favours teamwork increases the overall ability of the organization to innovate. In conclusion, if in an innovative company the information flow must be predominantly horizontal and the decision-making power must be decentralized, the more decentralized, permeable and organic is the organizational structure, the greater the potential for innovative ideas to spring (Lawson & Samson, 2001).

Innovativeness requires intrinsic motivation that pushes the individual to persevere in facing challenges inherent in the creative work (Huhtala & Parzefall, 2007). Therefore, organizations must develop systems which motivate and foster the creative behavior. To this purpose, several authors stressed the importance of rewards and recognitions systems which encourage and appreciate creativity, consequently favouring staff engagement in the innovation process. In companies where innovation is the driving force, an effective rewards system motivates employees to take risks, to develop successful new products, and to generate more new product ideas (Gupta & Singhal, 1993). These systems typically include public recognition and financial bonuses.

3.2.3.3 Creativity & Idea Management

Creativity has been conceptualized in different ways but is commonly considered as the process of generating new ideas for products, services or processes. Therefore, creativity of employees that forms a source of new ideas, which in their turn create the starting point for innovation (van Dijk & van den Ende, 2002). Since employees are a potential rich source of ideas, they should be encouraged to take part in the early stages of a new project to ensure that a constant supply of ideas is generated to input into the innovation process (Smith, Busi, Ball, & Van Der Meer, 2008).

‘Creativity and idea management’ determinant refers to the mechanisms built up and used to capture and manage ideas from employees, consequently creating and enhancing the

company's innovation capability. Therefore, it is important providing to employees channels to share their ideas for specific focused business needs (Gamlin, Yourd, & Patrick, 2007). For this purpose, suggestion system is considered an important mechanism which contribute to develop the company's innovation capability by collecting and evaluating employees' ideas. Particularly, suggestion scheme supports innovation capability by processing these ideas into innovative project proposals. Finally, an active idea management system should promote and collect ideas about customer needs, new technologies looking for a new application, new applications of old products, new products for old applications, process improvement, and continuous improvement (Gamlin, Yourd, & Patrick, 2007).

Creativity and new ideas may be knowledge-driven (how do we apply new knowledge?) or vision-driven (this is our goal, what new knowledge do we need?) (Lawson & Samson, 2001). This underlines that an effective creativity and idea management should also include employees training and education on organization goals, new available technologies, problem-solving skills, and market-orientation practices in order to provide employees the necessary resources to have a positive impact on the innovation process.

3.2.3.4 Market Orientation

Innovative companies differentiate from less innovative ones by their market orientation. A market-orientation supports openness to innovations and innovative ideas. Narver & Slater (1990) defined market orientation as a necessary company's characteristic to create superior value for end customers and for the organization itself through successful innovations. The proposed determinant takes into account the following three components of a market orientation: customers orientation, competitors orientation, and partners orientation.

In line with the literature, this study suggests that customers orientation expands company's innovation capability through the identification of target customers and their needs. This allows companies to know their customers and have the necessary information to meet their needs and solve their problems. This lays the foundation for reducing the uncertainty that typically affects innovations, leading to the development of new products or services that will succeed in the market. Therefore, in order to create an

innovative capacity, managers must encourage employees to investigate customers' needs and problems in order facilitate the development of added-value projects. In other words, innovation capability depends on firm's ability in turning its attention to final customers (Akman & Yilmaz, 2008).

On the other hand, competitors orientation refers to define and analyze competitors' activities and strategies, and develop suitable responses (Akman & Yilmaz, 2008). Consequently, competitors orientation stimulate comparison between company's own capabilities and competitors' capabilities, allowing the innovative capacity to come out by internalizing competitors' strengths through imitation and improvement (Lawson & Samson, 2001). On the contrary, competitors-oriented firms can develop their innovation capability not through imitation, but by creating products that are differentiated from those of competitors. In conclusion, the reasoning that associates focus on competitors and innovative capacity is based on the idea that the interest for competitors' capabilities products and strategies introduces a stimulus for companies to innovate in order to face competition.

Managing the product development process internally has become over the years more difficult for companies. Therefore, companies have begun to look beyond the boundaries of their organization looking for collaborations, to rely on external ideas, technologies, and resources. Becoming part of networks, collaborations or strategic alliances can facilitate the sharing of resources, information, and knowledge which helps companies to create an innovation capability and accelerate the processes of innovation development (Brettel & Cleven, 2011). In fact, partnerships with external entities such as suppliers, competitors, and research institutes allow companies to access to critical capabilities not possessed or to explore their own capabilities using them for other companies. These partnerships arise mainly with the aim to join knowledge, skills and resources in order to develop a new technology or penetrate a new market faster or simply in a less costly way.

3.2.3.5 Organizational Learning & Knowledge Development

Skills, knowledge, and information play an important role in developing a company's capability for innovation. This determinant stresses the importance of knowledge and skills acquired through a variety of channels. First, interactions with external sources such

as customers, competitors, and suppliers can provide information the firm does not have. Second, learning from past projects, training programs, and the inter-functional interactions could provide the necessary experience and knowledge to create innovations. 'Organizational Learning & Knowledge Development' therefore suggests that organizations with an orientation towards learning, information acquisition, and knowledge generation could develop new ideas (Smith, Busi, Ball, & Van Der Meer, 2008) and reduce the inherent uncertainty and ambiguity of innovation (Lawson & Samson, 2001).

Absorptive capacity is defined as the ability of companies to create and exploit new knowledge, transforming the knowledge they acquired through the learning process. This refers to all aspects of knowledge, both internal and external to the company. Concerning intra-organizational learning and the development of individual skills and knowledge, both tacit and explicit knowledge are associated to innovation within teams (Hu & Randel, 2014). For this purpose, the interaction between employees, communication and personal contacts, and on-the-job training allow knowledge to be transmitted. In conclusion, sharing knowledge among team members stimulates mutual learning, which encourages innovation (Hu & Randel, 2014).

Several authors stressed the role of external knowledge as an important source of innovations (Lawson & Samson (2001); Smith, Busi, Ball, & Van Der Meer (2008); Saunila & Ukko (2014)). In fact, an organization's innovative potential is also strongly influenced by the access to customers and competitors intelligence, and by the propensity to collaborate with external partners such as suppliers or other firms (Swink, 2006). As highlighted in section 3.2.3.4, a market orientation influences organization's learning, and the acquisition and transfer of knowledge. Tacit and explicit knowledge obtained from customer-related practices, benchmarking and collaboration with external entities affects the company's innovation capability. According to Saunila & Ukko (2014), interactions with suppliers, customers, industry associations, competitors, and other external entities can provide missing external inputs that the firm itself cannot provide.

The following Tables 5 (a,b) summarize the proposed determinants and the embodied concepts which has been considered as essentials for developing the company's innovation capability:

Table 5 (a,b) - A summary of innovation capability determinants of the model

Table 5.a

Innovation Capability Determinant	**Embodied concepts**
Organizational Climate for Innovation	Willingness to take risk Freedom to explore Tolerance of uncertainty and failures Communication Openness to new ideas and information Employees empowerment

Table 5.b

Innovation Capability Determinant	Embodied concepts
Structures & Systems for Innovation	Decentralized and flexible organizational structure Use of teams Reward & recognitions system
Creativity & Idea Management	Use of suggestion system Education and training
Market Orientation	Customer orientation Competitor orientation Partner orientation
Organizational Learning & Knowledge Development	Intra-organizational learning External knowledge External collaboration Knowledge acquisition and transfer

3.3 Hypotheses Development

Based on previous sections regarding the key aspects of a quality-oriented strategy and the determinants of innovative capability, the present section draws out the hypotheses concerning the positive influence of quality management in creating a fertile environment for innovation process. The following hypotheses are first listed in Tables 6 (a,b).

Table 6 (a,b) - Summary of developed hypotheses

Table 6.a

Total Quality Management core aspects/practices	**Developed hypotheses**
Transformational Leadership	**H1a.** In a TQM context, transformational leadership builds an organizational climate for innovation. **H1b.** In a TQM context, transformational leadership develops organizational structure and systems for innovation.
Employees Engagement	**H2a.** In a TQM context, employees engagement practices contribute in creating an organizational climate for innovation. **H2b.** In a TQM context, employees engagement practices contribute in creating organizational structure and systems for innovation. **H2c.** In a TQM context, employees engagement practices have a positive impact on creativity and idea management.
Customer Involvement & Satisfaction	**H3a.** In a TQM context, customer involvement & satisfaction contribute to promote a market orientation. **H3b.** In a TQM context, customer involvement & satisfaction contribute to promote organizational learning & knowledge development.
Suppliers Involvement	**H4a.** In a TQM context, suppliers involvement contribute to promote a market orientation. **H4b.** In a TQM context, suppliers involvement has a positive impact organizational learning & knowledge development.

Table 6.b

Total Quality Management core aspects/practices	Developed hypotheses
Data & Information Analysis	**H5a.** In a TQM context, data & information analysis leads to organizational learning and knowledge development. **H5b.** In a TQM context, data & information analysis contribute to promote a market orientation.
Value analysis & Value Creation	**H6.** In a TQM context, value analysis and value creation contribute to promote a market orientation.
Process Orientation	**H7.** In a TQM context, a process orientation creates working environment aware of the importance of organizational learning and knowledge development.
Knowledge Management	**H8**. In a TQM context, knowledge management enhance organizational learning and knowledge development needed in creating an innovation capability.

3.3.1 Transformational Leadership and Innovation Capability Determinants

By promoting TQM fundamental principles and creating an organizational awareness on quality as a primary goal, it is hypothesized that transformational leadership encompasses the necessary behavior to establish an internal climate favourable to innovation. First, by promoting the alignment on 'People Make Quality' TQM principle, leaders stress the importance of people in achieving organizational goals and competitive advantage. Aspects such as communication and cooperation between employees promoted and encouraged in a TQM context by transactional leaders are the same means through which it is possible to create an environment opened to new ideas, information and knowledge that can foster creativity, and reduce the uncertainty and ambiguity that generally affect innovations. Second, by promoting the alignment on Continuous Improvement principle, transformational leaders encourage the change, stimulating the implementation of

ongoing changes in procedures, systems, and products in order to make improvements. Therefore, transformational leadership aspects such as willingness to take risk foster employees' risk attitudes by encouraging them to think, promote their ideas and turn them into new ways of working or new products.

Furthermore, by promoting inter-functional cooperation and coordination, leadership creates an organizational structure with permeable boundaries and high possibility of horizontal communication, consequently creating the necessary organic organizational structure which favours innovation.

Consequently, the following hypotheses are formulated:

H1a. *In a TQM context, transformational leadership builds an organizational climate for innovation.*

H1b. *In a TQM context, transformational leadership develops organizational structure and systems for innovation.*

3.3.2 Employees Engagement and Innovation Capability Determinants

By focusing on people engagement practices in a TQM context, it can be highlighted a positive impact on the development of both a climate, and structures and systems for innovation. As mentioned in section 3.2.2.2, within a quality-oriented company the responsibility in decision-making process must be delegated to employees and lower level managers. This autonomy increases employees participation and satisfaction by allowing them to the development and implementation of own ideas and solutions to problems, consequently creating work conditions suitable for innovation. Therefore, the following hypothesis is formulated:

H2a. *In a TQM context, employees engagement practices contribute in creating an organizational climate for innovation.*

Employee empowerment leads to the decentralization of decision-making power. A company with decentralized power improves the ability to quickly respond to market changes. Different managers and employees associated with different units, different markets, and different products are able to process and receive information quickly, succeeding in finding efficient solutions to these changes using their own creativity. Therefore, a decentralized decision-making system leads to a decentralized organizational structure which has been considered as fundamental in developing and sustaining an innovation capability.

Furthermore, in a TQM context, teamwork is important because it promotes the development of knowledge and skills through interactions between members, and communication between people belonging to the same function or different business areas. Therefore, the use of teams has a beneficial effect on innovation capability by exposing employees to different points of view and allowing them to receive feedback on the ideas proposed. Since teamwork is essential in TQM to ensure participation and commitment in business activities, a quality-oriented company will show a flexible organizational structure, fostering innovation by creating permeable business boundaries between functions.

Finally, 'Employees Engagement' section also takes into account the importance of reward and recognize employees commitment in quality goals. In a quality -oriented company a rewards and recognitions system stimulates creativity and enthusiasm by rewarding employees ideas and suggestions. Consequently, this system has a beneficial effect on the innovation capability of the company by favouring staff engagement in the innovation process. As mentioned in section 3.2.3.2, an effective rewards and recognitions system motivates employees to take risks, and fosters a creative behavior.

Therefore, the following hypothesis is formulated:

H2b. *In a TQM context, employees engagement practices contribute in creating organizational structure and systems for innovation.*

In a quality-oriented company every individual must be engaged and motivated to express ideas and suggestions for continuous quality improvements. Therefore, a quality-oriented

strategy has to take into account the use of suggestion systems to stimulate employees participation. This is an important channel that allows employees to share their ideas, contributing therefore to develop the company's innovation capability. In fact, suggestion schemes could have a positive impact on triggering the innovation process through the collection and evaluation of employees' ideas.

Furthermore, a quality-oriented company invests in training in order to provide to employees the technical and behavioral skills that their tasks require. Training is needed for enhancing employees knowledge and their skills on data collection and use. Appropriate training and education programs offer the opportunity to develop and sustain the company innovation capability by training people on continuous improvement goals, new available technologies, problem-solving skills, and market-orientation practices.

Therefore, the following hypothesis is formulated:

H2c. *In a TQM context, employees engagement practices have a positive impact on creativity and idea management.*

3.3.3 Customer Involvement & Satisfaction and Innovation Capability Determinants

The 'Customer Focus' principle in TQM philosophy underlines the importance of recognizing customers' needs and expectations to effectively perform improvement activities of products and processes through which they are made. Therefore, by including aspects such as customer involvement and satisfaction in the quality-oriented strategy, the principle of Customer Focus drives companies to have a strong customer orientation. This allows companies to know their customers and to exploit them as the main source of new product ideas. In addition, if a quality-oriented strategy emphasizes the role of customer as a co-creator, this vision is also valid with respect to innovation in considering customers as partners in the co-development of new technology product. Furthermore, customer satisfaction as the main goal of a quality-oriented company leads to the collection and analysis of customer complaints information, market investigations, and customer satisfaction surveys in order to get the necessary information both to effectively

meet their needs and solve their problems with new ideas and technologies, and to reduce the uncertainty that typically affects innovations.

In conclusion, in order to create an innovation capability, the customer's involvement and the ultimate goal of his satisfaction represent a stimulus to innovation by promoting a strong customer orientation to constantly know the customer's needs and create products that meet these needs. Therefore, the following hypothesis is formulated:

H3a. *In a TQM context, customer involvement & satisfaction contribute to promote a market orientation.*

Customer involvement and satisfaction related practices are means by which a knowledge base on customers and their needs can be developed. Customer surveys are one of the many channels through which access to the necessary knowledge to trigger the innovation process. For instance, companies can learn through feedbacks provided by customers, which allow to identify product strengths and weaknesses, and accordingly generate ideas to improve the product or service offered. Summarizing, when customers are involved, the company has a great opportunity to learn from them, building a knowledge base to accelerate the development of new product, processes or services. Therefore, the following hypothesis is formulated:

H3b. *In a TQM context, customer involvement & satisfaction contribute to promote organizational learning & knowledge development.*

3.3.4 Suppliers Involvement and Innovation Capability Determinants

TQM requires a close cooperation with suppliers and the establishment of long-term relationships with them. This collaborative approach allows organizations and suppliers to work together closely, driven by long-terms common interests. Since in a TQM context companies need to establish long-term collaborative relationship in designing and developing new products sharing risks and rewards, it is necessary monitoring supply markets and implementing practices to evaluate and select suppliers. Therefore, for a

quality-oriented company it is necessary to be market-oriented in order to identify potential suppliers just like it is essential for innovation-oriented organizations, where suppliers are considered as possible sources of innovation outside the company boundaries. Summarizing, since suppliers involvement in a TQM context promote a market orientation, the following hypothesis is formulated:

H4a. *In a TQM context, suppliers involvement contribute to promote a market orientation.*

In addition, suppliers involvement through collaborative partnerships not only provide access to critical capabilities and resources, but also favours the transfer of both tacit and explicit knowledge, and information through which companies can learn. In fact, collaborations with suppliers can be an important source of learning for the firm. Close contacts with suppliers can facilitate both the transfer of knowledge between firms and the creation of new knowledge that the company is not able to create individually. By regularly participating in new products design and development initiatives, companies may be able to expand their knowledge bases and do so more quickly and in a less costly way that they could without collaborations. Therefore, the following hypothesis is formulated:

H4b. *In a TQM context, suppliers involvement has a positive impact organizational learning & knowledge development.*

3.3.5 Data & Information Analysis and Innovation Capability Determinants

Organizational learning concerns data and information acquisition, analysis and interpretation, and distribution. Therefore, the concepts of knowledge, information and data are very related. The literature suggests that information is a data processed, stored and transferred using appropriate tools and Information Systems. While information is used in a specific context, knowledge development needs a human contribution. Learning and knowledge development depend on people ability to integrate different information.

By doing so, people can use data and information to exploit new knowledge to use in different contexts.

Customers and suppliers involvement related practices have been already stressed as a means to collect data and information which contribute to a knowledge base development, which is essential to trigger the innovative process. Furthermore, as mentioned in section 3.2.2.6, a quality-oriented company also uses benchmarking technique to accelerate the cycle of continuous improvement. Collected and analyzed data both from internal and external benchmarking promote organizational learning and knowledge development, which in turn stimulate creativity and new ideas looking for close the gaps between how "things are being done" and "how they should be done".

External benchmarking technique consists of comparing strategies, internal processes, products and performance with those of competitors in order to develop suitable responses. Therefore, implementing benchmarking technique requires that the quality-oriented company shows a market orientation in order to better collect data and information about competitors. Summarizing, the implementation of benchmarking technique leads the company to be market-oriented, which in turns affect the development of both administrative and technological innovations in order to face competition.

Consequently, the following hypotheses are formulated:

H5a. *In a TQM context, data & information analysis leads to organizational learning and knowledge development.*

H5b. *In a TQM context, data & information analysis contribute to promote a market orientation.*

3.3.6 Value Analysis & Value Creation and Innovation Capability Determinants

As mentioned in section 3.2.2.8, Value Analysis must be taken into account by quality-oriented companies in order to achieve customers satisfaction effectively and to improve internal processes efficiently. Therefore, the integration of Value Analysis with TQM principles creates value for external customers and the company itself. Since this value-

approach is implemented to create or improve the value of products or processes through the analysis of costs and functions of constituent components, value analysis and value creation consider all company stakeholders, both internals (employees and leadership) and externals (customers, partners, competitors, suppliers). Therefore, it can be concluded that one of the main consequences of an organizational approach to value analysis and value creation is a strong general market orientation, which represents for the company a source of information, collaboration, ideas, technologies, and resources to create superior value for end customers and the organization itself. Therefore, the following hypothesis concerning the positive impact of value analysis and value creation on innovation capability through the promotion of a market orientation is formulated:

H6. *In a TQM context, value analysis and value creation contribute to promote a market orientation.*

3.3.7 Process Orientation and Innovation Capability Determinants

Effective quality management requires monitoring and improvement practices, which implies close attention to process control. As mentioned in section 3.2.2.5, process orientation in a TQM context enables the generation and management of a large quantity of data, information, and knowledge, facilitating organizational learning about the functioning of internal processes. Particularly, statistical process control tools, and techniques such as sampling and inspection provide an opportunity to learn about processes, laying the foundations for both reducing the likelihood of errors and problems, and identifying areas for improvement.

The link between process orientation and the establishment of a working environment awareness about the importance of organizational learning is therefore strong and it is driven by the principle of continuous improvement. Quality-oriented companies must be able to learn from their own experiences, to correct errors and problems affecting internal processes, and to use process knowledge effectively to promote improvements and changes. Quality control tools and techniques expose employees to innovative ideas, awareness of quality issues being raised, and at the same time encourage staff to think outside the box (Ang, Lee, Tan, & Chong, 2011). A strong process orientation stimulates

learning organization, which is needed in an innovative context. Summarizing, it can be concluded that process orientation, (particularly the implementation of quality control program in quality-oriented companies) contributes to organizational learning and knowledge development, so that through the main goal of improving the quality of processes, a knowledge base is created for new technologies or new ways of working. Consequently, the following hypothesis is formulated:

H7. *In a TQM context, a process orientation creates a working environment aware of the importance of organizational learning and knowledge development.*

3.3.8 Knowledge management and Innovation Capability Determinants

Knowledge management is included in many quality management aspects already considered such as teamwork, training, and relationships with suppliers and customers. Since strong market orientation has already been taken into account as a primary consequence of the interactions with external agents, a new hypothesis has not been built as it is considered a repetition.

Knowledge management is strongly responsible for the organizational learning and knowledge development essential to foster an internal environment conductive to innovative capacity. In quality management context, the information and knowledge acquired and developed is shared between all levels of the company. Knowledge management attitude enhances the organizational learning, which in turn stimulates creativity and new ideas to apply new knowledge and information acquired. Therefore, the following hypothesis is formulated:

H8. *In a TQM context, knowledge management enhance organizational learning and knowledge development needed in creating an innovation capability.*

3.4 Chapter Conclusions

This chapter has described the core part of the present research. As widely pointed out previously, the proposed conceptual model aims to clarify whether the orientation towards the TQM principles and the use of practices and techniques to implement them can implicitly create an environment that supports those key aspects recognized and described as determinants of a company's innovation capability. Particularly, the three-block structure represents the skeleton of the proposed model. The first two blocks, respectively presented in subsections 3.2.1 and 3.2.2, can be considered as a description of what is meant by quality orientation and what is necessary to include in the business strategy when deciding to base the own business on quality. The last block, described in section 3.2.3, has represented the determinants of innovation capability that can be supported by implementing a strategy based on principles, practices and techniques of total quality management. Lastly, section 3.3 has provided, through the formulation of a set of hypotheses, the explicit links that describe the proposed theory.

CHAPTER 4

CONCLUSIONS

4.1 Work Conclusions

As mentioned in the introduction chapter, nowadays in the competitive marketplace both quality and innovation are playing a fundamental role in securing a sustainable competitive advantage. Consequently, several researchers in quality field have sought to clarify whether the TQM philosophy can act as a means to foster innovation within the organization. However, the studies in literature have reported contrasting results regarding the coexistence of quality and innovation programs within the company.

Therefore, the present study was motivated by the need to better understand whether quality plays the role of the antecedent of innovation. Particularly, by wondering whether quality-oriented companies are more innovative than those that do not attribute priority to quality, this research sought to establish whether an orientation to the philosophy of TQM can lead to an organizational environment in which innovation can flourish. In order to answer to the research question and to establish whether and how quality and innovation are related, the present study proposed a conceptual model of causal relationship between a total quality orientation and the determinants of innovation capability. Particularly, the model in Fig. 2 comprises three TQM principles, eight core aspects of a quality-oriented corporate strategy, and five innovation capability determinants. The following section provides both theorical and managerial implications of the present research.

4.2 Theorical and Practical Implications

While most of the studies in the literature focuses in investigating whether the implementation of TQM helps the company in generating different typologies of

innovative outputs, this study instead aims to investigate how and why a quality orientation can promote an environment conducive to innovation. Therefore, this study tries to fill this lack in the literature about the relationship between quality and innovation. In particular, the common elements included in the TQM practices and those of the innovation determinants presented in this study propose an orientation towards the TQM as a means to build the innovation capability of a company.

To conclude, this study contributes to the development of the literature on the quality-innovation relationship in several ways. Particularly this study: (1) distinguishes the principles of TQM from the practices used to implement them; (2) provides a set of principles of the holistic philosophy of TQM which must be implemented simultaneously; (3) provides a set of core aspects (or practices) of a quality-oriented strategy; (4) provides a set of determinants of innovation capability; (5) proposes a set of hypotheses that points to a positive causal relationship between quality and innovation capability determinants.

Furthermore, regarding implications for management, the study first recommends to companies that want to gain competitive advantage through the TQM to embrace the principles of this philosophy and not just adopt techniques and tools to manage quality at the operational level. Second, this study suggests to the companies that by adopting the TQM philosophy and implementing its principles through the practices reported in the proposed model, they will be more prepared and ready to trigger the innovation process. In other words, this study suggests to managers that total quality-oriented practices proposed are positively linked to the determinants of innovation capability, consequently acting the role of enablers of an innovative environment within the company. The model test will provide the empirical evidence needed to understand whether managers should invest in TQM to achieve the benefits of both quality and innovation that are necessary in today markets to ensure a competitive advantage for the company.

4.3 Limitations and Future Lines of Study

As the last step in concluding this study, it is important to recognize its limitations and provide suggestions for future research. The main limitation of this study is the lack of a

test on the proposed model that would provide empirical evidence regarding the validity of the hypotheses formulated. Moreover, the decision of not considering innovation in its different typologies, such as product innovation or process innovation, could be considered a limitation of this study because the link between quality and innovative performance could appear not to be direct and explicit.

To conclude, it may be interesting to continue this study with the design of a questionnaire that will serve to collect data from a sample of organizations. The data obtained will be processed in order to test the relationships proposed in Tables 6 (a,b) and to confirm (or exclude) whether a quality orientation through the TQM can promote the development of the company innovation capability.

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APPENDIX

EMPIRICAL STUDIES ON THE RELATIONSHIP BETWEEN TQM AND INNOVATION

Adaptation from Kim, Kumar, & Kumar (2012)

Study	Data source	Analysis methodology	Operationalization TQM practices	Operationalization innovation outcomes	Findings TQM-innovation relationship
Prajogo & Sohal (2004)	194 manufacturing and not manufacturing Australian firms	Structural equation modeling	**Mechanistic elements**: (1) Strategic planning; (2) Information and analysis; (3) Process management; (4) Customer focus. **Organic elements**: (1) Leadership; (2) People management.	**Product innovation**: (1) Speed of innovation; (2) Number of innovations; (3) Latest technology used; (4) Level of innovativeness; (5) Being the first in the market.	TQM organic elements positively associated to innovation performance.

Study	Data source	Analysis methodology	Operationalization TQM practices	Operationalization innovation outcomes	Findings TQM-innovation relationship
Singh & Smith (2004)	418 Australian manufacturing firms	Structural equation modeling	(1) Top management leadership; (2) Employee relations; (3) Competitors; (4) Product/Process management; (5) Customer focus; (6) Information systems; (7) Relationship with suppliers.	(1) Commercialized processes/products/services; (2) Rate of innovation of new operational processes; (3) Developed world-class techniques/ technologies; (4) Rate of introduction of new products/services.	No empirical evidence about TQM impact on innovation.
Feng, Prajogo, Tan, & Sohal, (2006)	58 Singaporean firms and 194 Australian firms	Structural equation modeling	**Mechanistic dimensions**: (1) Customer focus; (2) Process management. **Organic dimensions**: (1) Leadership; (2) People management.	**Product innovation**: Source: Prajogo & Sohal (2004) (1) Speed of innovation; (2) Number of innovations; (3) Latest technology used; (4) Level of innovativeness; (5) Being the first in the market.	TQM organic dimensions are positively related to innovation.

Study	Data source	Analysis methodology	Operationalization TQM practices	Operationalization innovation outcomes	Findings TQM-innovation relationship
Hoang, Igel, & Laosirihongthong (2006)	204 manufacturing and service Vietnamese firms	Structural equation modeling	(1) Leadership and people management; (2) Education and training; (3) Process and strategic management; (4) Open organization.	**Actual innovation output**: (1) Number of new products and services (2) Share of the current annual turnover. **Level of newness**: (1) New product or new service; (2) Use of new materials or intermediate products.	Leadership and people management, process and strategic management, and open organization are positively related to innovation. Education and training shows a positive relationship with the number of new products and services, and a negative impact on the level of newness.
Santos-Vijande & Alvarez-González (2007)	93 ISO 9000-certified Spanish manufacturing and service firms	Structural equation modeling	(1) Leadership; (2) People; (3) Policy and strategy; (4) Processes and resources; (5) Partnerships.	**Technical innovation**: (1) Number of product and service innovations; (2) Number of production processes or service operations innovations. **Administrative innovation**: (1) Number of managerial innovations; (2) Number of marketing innovations in the last 5 years.	Relationship between TQM and technical innovation is mediated by innovativeness. Positive and direct relationship between TQM practices and administrative innovations.

Study	Data source	Analysis methodology	Operationalization TQM practices	Operationalization innovation outcomes	Findings TQM-innovation relationship
Sá & Abrunhosa (2007)	16 footwear Portuguese manufacturing firms	Correlation analysis	**People management practices - TQM enablers of innovation**: (1) Autonomy; (2) Internal communication; (3) Consultation; (4) Formalization; (5) Qualitative flexibility.	**Technological innovation**: (1) Mean number of innovations adopted over time (MNI); (2) Mean time of adoption of innovations (MTI); (3) Consistency of the time of adoption of innovations (CTI).	Non-significant positive correlations between TQM factors and technological innovation. Negative relationship between formalization and technological innovation.

Study	Data source	Analysis methodology	Operationalization TQM practices	Operationalization innovation outcomes	Findings TQM-innovation relationship
Martínez-Costa & Martínez-Lorente (2008)	451 manufacturing and non-manufacturing Spanish firms.	Structural equation modeling	**TQM activities and tools**: (1) Continuous improvement activity; (2) Tools for quality improvement in teamwork; (3) Statistical process control; (4) Selection of suppliers based on quality criteria; (5) Employee training; (6) Quality leadership; (7) Total preventive maintenance; (8) Meeting with customers.	**Product innovation**: (1) Number of new products/services introduced in one year; (2) Pioneering disposition to introduce new products/services; (3) Spent hours/person, teams and training dedicated to obtain new products/services. **Process innovation**: (1) Number of changes in the process introduced in one year; (2) Pioneering disposition to introduce new processes; (3) Fast response to the new processes introduced by other companies within the same sector.	Positive and significant influence of TQM practices on both product and process innovation.
Prajogo & Hong (2008)	130 R&D divisions of manufacturing South Korean	Structural equation modeling	(1) Leadership; (2) Strategic planning; (3) Customer focus; (4) Information and analysis; (5) People management; (6) Process Management.	**Product innovation**: (1) Level of newness; (2) Use of latest technology; (3) Speed of product development; (4) Number of new products; (5) Early market entrants.	Positive and significant relationship between TQM practices and product innovation.

Study	Data source	Analysis methodology	Operationalization TQM practices	Operationalization innovation outcomes	Findings TQM-innovation relationship
Abrunhosa & Sá (2008)	20 footwear Portuguese manufacturing firms	Multiple regression analysis	(1) Autonomy; (2) Communication; (3) Consultation; (4) Qualitative flexibility (rotation and teamwork); (5) Supportive people management practices.	**Process-based technological innovation**: (1) Mean number of innovations adopted over time; (2) Mean time of adoption of innovations.	Teamwork, communication, and supportive people management practices have a positive impact on technological innovation. No significant relationship of autonomy, and consultation with technological innovation.
Sadikoglu & Zehir (2010)	373 Turkeys ISO 9001:2000 certified Turkeys firms from different industries	Data envelopment analysis (DEA)	(1) Leadership; (2) Training; (3) Employee management; (4) Information and analysis; (5) Supplier management; (6) Process Management; (7) Customer focus; (8) Continuous improvement.	**Innovation performance items**: (1) The number of new products/services in our firms has increased in the last 5 years; (2) Our firms is the first one offering new products/services in the market.	TQM has a positive impact on innovation performance both directly and indirectly through employee performance.

Study	Data source	Analysis methodology	Operationalization TQM practices	Operationalization innovation outcomes	Findings TQM-innovation relationship
Kim, Kumar, & Kumar, (2012)	21 ISO 9001 Canadian manufacturing and service firms	Structural equation modeling	(1) Management leadership; (2) Training; (3) Suppler quality management; (4) Customer relations; (5) Product/service design; (6) Quality data and reporting; (7) Employee relations; (8) Process management.	**Five innovation typologies**: (1) Radical product innovation; (2) Radical process innovation; (3) Incremental product innovation; (4) Incremental process innovation; (5) Administrative innovation.	TQM practices indirectly influence, through process management, all innovation typologies. Process management has a direct, significative and positive relation with all innovation typologies.
Moreno-Luzon, Gil-Marques, & Valls-Pasola (2013)	72 Spanish firms in the furniture and textile sectors.	Partial least squares (PLS) regression analysis	(1) Process management practices; (2) People commitment practices; (3) Customer orientation practices.	**Two innovation typologies**: (1) Incremental innovation; (2) Radical innovation.	TQM practices have a significant and positive relationship with incremental innovation. TQM practices affect radical innovation only through the mediating role of cultural change.

Study	Data source	Analysis methodology	Operationalization TQM practices	Operationalization innovation outcomes	Findings TQM-innovation relationship
Fernandes, Lourenço, & Madeira Silva (2014)	218 ISO 9001:2008 certified Portuguese organizations from different sectors.	Multiple linear regression analysis	(1) Leadership; (2) Focus on customer; (3) Involvement and development of people; (4) Management by processes; (5) Ongoing improvement; (6) Relations with suppliers; (7) Results measurement; (8) Product design.	**Six innovation concepts**: (1) R&D and technological innovation; (2) Process innovation; (3) Product innovation; (4) Organizational innovation; (5) Management innovation. (6) Marketing innovation.	Positive and significative relationship between leadership and organizational innovation; customer focus and product innovation. Continuous improvement and all innovation typologies. Focus on customer has a negative impact on innovation management. Process management limits R&D and technological innovation, and marketing innovation. Relationships with suppliers limit product and process innovation.