



Kati Tanninen

**DIFFUSION OF ADMINISTRATIVE INNOVATION:
TQM IMPLEMENTATION AND EFFECTIVENESS
IN A GLOBAL ORGANIZATION**

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ABSTRACT

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The main objective of this dissertation is to create new knowledge on an administrative innovation, its adoption, diffusion and finally its effectiveness. In this dissertation the administrative innovation is approached through a widely utilized management philosophy, namely the total quality management (TQM) strategy. TQM operationalizes a self-assessment procedure, which is based on continual improvement principles and measuring the improvements. This dissertation also captures the theme of change management as it analyzes the adoption and diffusion of the administrative innovation. It identifies innovation characteristics as well as organisational and individual factors explaining the adoption and implementation. As a special feature, this study also explores the effectiveness of the innovation based on objective data. For studying the administrative innovation (TQM model), a multinational Case Company provides a versatile ground for a deep, longitudinal analysis. The Case Company started the adoption systematically in the mid 1980s in some of its units. As part of their strategic planning today, the procedure is in use throughout the entire global company.

The empirical story begins from the innovation adoption decision that was made in the Case Company over 22 years ago. In order to be able to capture the right atmosphere and backgrounds leading to the adoption decision, key informants from that time were interviewed, since the main target was to clarify the dynamics of how an administrative innovation develops. In addition, archival material was collected and studied, available memos and data relating to the innovation, innovation adoption and later to the implementation contained altogether 20500 pages of documents. A survey was furthermore conducted at the end of 2006 focusing on questions related to the innovation, organization and leadership characteristics and the response rate totalled up to 54%. For measuring the effectiveness of the innovation implementation, the needed longitudinal objective performance data was collected. This data included the profit unit level experience of TQM, the development of the self assessment scores per profit unit and performance data per profit unit measured with profitability, productivity and customer satisfaction. The data covered the years 1995-2006.

As a result, the prerequisites for the successful adoption of an administrative innovation were defined, such as the top management involvement, support of the change agents and effective tools for implementation and measurement. The factors with the greatest effect on the depth of the implementation were the timing of the adoption and formalization. The results also indicated that the TQM model does have an effect on the company performance measured with profitability, productivity and customer satisfaction.

Consequently this thesis contributes to the present literature (i) by taking into its scope an administrative innovation and focusing on the whole innovation implementation process, from the adoption, through diffusion until its consequences, (ii) because the studied factors with an effect on

the innovation adoption and diffusion are multifaceted and grouped into individual, organizational and environmental factors, and a strong emphasis is put on the role of the individual change agents and (iii) by measuring the depth and consistency of the administrative innovation. This deep analysis was possible due to the availability of longitudinal data with triangulation possibilities.

Keywords: administrative innovation, total quality management, innovation diffusion, TQM effectiveness

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These past two years have been quite hard especially for those closest to me – my family. In particular the last year has been really challenging in many ways. My husband Ari and my precious children Eveliina (13 yrs) and Valtteri (9 yrs) have been the most flexible ever. On the other hand they have also been quite hard on me when pushing me to write the thesis in those few moments when I have not been studying. My thanks also go to my mother and father who have helped me and my family through the daily routines.

Eveliina and Valtteri – now it's finally over!

Imatra, March 2008.

Kati Tanninen

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“The future cannot be predicted.
But, even if it could, we would
not dare to act on the
prediction.”

- Arie De Geus

1 INTRODUCTION

1.1 Background and motivation

Managing companies is challenging. In order to meet the challenges, companies utilize various business control systems and tools for measurement and follow-up, like financial-based measures (e.g. budgeting) and process-based measures (e.g. total quality management), which are both popular and widely applied among companies. Total quality management (TQM) is seen as an overall philosophy which provides tools and techniques for managing processes throughout the organization. A successful implementation of TQM involves improvements in all the departments and processes, through standardization and management.

The traditional quality management philosophy was established by W. E. Deming (1986), J. M. Juran (1988) and P. B. Crosby (1979) during World War II. Especially Deming and Juran are said to be the fathers of the total quality management movement. Since its establishment, TQM and other continual improvement related tools have been widely utilized among companies. In the organizational context, the concept of continual improvement and especially the process of making improvements by introducing something new are in connection with innovation and innovativeness. The utilization of innovations and innovative environment is essential for companies, as the focus of today is on productivity and asset evaluation. Generally the definition of innovation may refer to both radical and incremental changes in products, processes or services; it may be a new idea, method or product as long as something new is introduced. Innovation may also be considered as a major driver of the economy, so the factors and characteristics that lead the innovation and innovation adoption and implementation are perceived to be critical to the decision-makers. When approached from the innovation literature perspective, TQM is defined as an administrative innovation, as it includes adopting practices aimed at better management (Ahire and Ravichandran, 2001). Generally speaking, administrative innovations are those that occur in the administrative component and affect the organization's social system (Daft, 1978; Damanpour et al., 1989). In this study the diffusion of TQM is studied through the lens of innovation diffusion theory, diffusion being a certain type of communication process through which a message is passed from one member to another (Rogers, 1995).

One area that has had a great input in the diffusion of TQM during the years is the customer requirements. Nowadays, quality and total quality management procedures are utilized in many

organizations as the means by which they maintain a competitive edge over their competitors, with a focus on the customer throughout the organization (Dale, 1999). Furthermore, Thiagaragan et al. (2001) emphasize that the primary reason for quality being a top priority in many organizations today, is the globalization of world trade and the competitive pressure caused by increasing customer demands. Plsek (1998) points out that if quality is related to continuously exceeding customer expectations in a competitive marketplace, then creative thinking and the ability to innovate are key competencies for the quality advocated in the future. Then only organizations with appropriate management systems and an organizational climate can keep TQM efforts moving forward to achieve continuous improvement (Yeung and Chan, 1999). Despite possible reported implementation difficulties, TQM has had and is expected to have further benefits and advantages for the workforce and the organization overall. It is possible to achieve the full potential of TQM if it is part of strategic planning. Gunasekaran et al. (1998) present that TQM needs to be accepted as a comprehensive and long-term management strategy with a long-term perspective for it to be successful. Visible drivers and practitioners or change agents of TQM are particularly important in the initial phases of establishing standardized procedures throughout the organization (Gunasekaran et al., 1998).

This dissertation offers a viewpoint where the widely utilized administrative innovation, TQM, is studied from the innovation diffusion perspective. Since its origins, the methodology and principles of TQM have evolved today capturing the management practises needed for successful and profitable business management. The special characteristics affecting adoption and implementation are clarified from the organization's point of view, but the less studied individual perspective, especially that of a change agent is also included.

The origins of TQM stem from the manufacturing environment; hence the industrial and manufacturing organizations have widely utilized the model and its principles and thus provide a fertile environment for research. The empirical part presents a global industrial Case Company which has implemented total quality principles for over ten years; the first units started the adoption for 13 years ago. The TQM model itself has developed during the years today covering the global organization and being part of the strategic management model. The global Case Company also provides necessary background and a base for in-depth analysis on effectiveness because the TQM has been in use for years.

In today's business, operations and actions are targeted to improve profitability. When talking about business development and continual improvement, it is particularly challenging to present how the utilization of different improvement methods and models affect the business results and profitability measures. Hence, studying the effectiveness of the administrative innovation implementation is also included in this study. Here the Case Company provided a possibility to utilize objective measures, which included, for example, financial and customer data.

1.2 The positioning and scope

According to Ravichandran (2000a), today's environment has left organizations with a single choice: innovating or creating technological and managerial innovations. The research of Mazzanti et al. (2006) stresses that the way towards organizational innovation does not have a unique imprinting, but is likely to be a mixture of wise managerial initiatives, direct and indirect worker participation and cooperative industrial relations.

In this study the diffusion of innovation is analyzed in the organizational context and the innovation is administrative, and not technical, in nature. Ravichandran (2000a) defines organizational innovation as the actualization of creating a new product, process, method or service by an organization, through concrete and committed efforts of its members and by other resources. Through continual improvement practices organizations can find better and more profitable ways to surpass the competition. Even though it can be argued that the concept and tools of continual improvement have seen little evolution since the 1980s (Cole, 2001), continual improvement and total quality management procedures are still widely utilized among organizations. Total quality management (TQM) is a set of management practices linked with the company culture that aims to provide its customers with products and services that satisfy or even exceed their needs. Finnish researchers, Savolainen (1997), Kekäle (1998) and Kujala (2002) have successfully contributed to the research and development of TQM: Kekäle and Kujala especially concentrated on studying TQM from the cultural perspective, as a cultural phenomenon, whereas the target of Savolainen was more on the quality-oriented management ideology and its spreading. The culture requires quality in all aspects of the company's operations and especially measuring the continuous improvement is important. Other Finnish researchers who have studied quality or total quality management include Tervonen (2001) and Mäki (2004).

This study concentrates on the diffusion and effectiveness of administrative innovation in a global organization.

The scope of this study is to focus on the diffusion of an administrative innovation, and the concept of total quality management (TQM) is used for studying this. TQM, which is a set of management practices, focused on customer satisfaction and continuous improvement, is widely adopted and utilized in the business world, and it has attracted a remarkable amount of attention (Lakhe and Mohanty, 1994; Gunasekaran et al., 1998; Dale, 1999; Yusof and Aspinwall, 2000): according to a Web of Science search, the topic “total quality management” received 8,095 hits. The popularity of TQM lies in the belief that by continuously improving their operations, organizations can gain competitive advantage and beat their competitors (Sitkin et al., 1994; Pun et al., 1999; Ehigie and McAndrew, 2005).

Even though TQM is widely adopted, the extent to which it produces results and improvements is somewhat unclear and researchers share partly different opinions on that; still, in the quality management literature there are studies done on the positive effects of TQM (Mann and Kehoe, 1994; Guimaraes, 1997; Gunasekaran et al., 1998; Yusof and Aspinwall, 2000; Brah et al., 2002; Boon et al., 2005; Karia and Asaari, 2006; Joiner, 2007). In the diffusion literature, on the contrary, the benefits of successful innovation implementation or its consequences have not received much attention from earlier diffusion researchers (Rogers, 1995). According to Rogers (1995), the current data about the consequences is rather “soft” in nature and is mainly based on case studies. Most of the past diffusion research has stopped with an analysis of the decision to adopt a new idea, ignoring how the decision is implemented and with what consequences. Another reason for the small number of studies on the consequences may be that it can take a rather long time before the results and benefits can be seen or they may also depend on other factors than the adoption of innovation itself (Rogers, 1995), which is true especially in the case of administrative innovation. This study also concentrates on the effectiveness of total quality management implementation in a global organization, and the ultimate target is to study the consequences of the implementation.

Furthermore, because most of the studies on administrative innovations concentrate on variation in the adoption across organizations, this study concentrates on how innovation diffuses within an organization. As the target is to study the administrative innovation, its special features as well as factors supporting and preventing the adoption are examined. The innovation decision leading to adoption and implementation is also described. Also, the dynamics of the adoption process are

illustrated and how the adopted administrative innovation is transformed during the adoption and implementation phases.

The special feature of this study is that it aims at presenting how individuals in an organization perceive an administrative innovation and its effects. The special focus in this area is on explaining the individual's change agent behavior. Change agents are defined as employees who voluntarily facilitate the implementation of TQM. Earlier studies have mainly focused on the organizational perspective rather than the individual. The conducted studies have also largely ignored the role of key persons identified in the theory of innovation diffusion, namely, the opinion leaders who act as change agents promoting the diffusion. In the change management literature, the success of implementing change is generally associated with those who facilitate and are involved in the change process (Saka, 2003). Especially the internal change agents' opinions and perceptions about the need for change and about the way to change are vital aspects to be understood (Saka, 2003). This study also examines how the organizational and environmental characteristics (cultural aspects, i.e. countries) affect the timing of the adoption and the depth of the implementation. In previous studies the time aspect has not been much studied, as only the speed with which an innovation diffuses and how it affects the level of the payback have received attention (Gibbons, 2004) or the focus has been on the timing of technical innovations (i.e. Koenig and Wigand, 2004).

In studying the adoption and implementation of an administrative innovation, this study utilizes the TQM model. The study is positioned to especially concentrate on studying the development of the self-assessment model and thus excludes analyzing other kinds of quality tools (such as ISO quality standards). The self-assessment process is based on the continual improvement philosophy. The history of TQM is only shortly described, the main focus being on studying the TQM model from the administrative innovation perspective. TQM is viewed as an administrative innovation; hence the innovation literature that will be presented largely concentrates on the special features of administrative innovations. The empirical part of this study covers one case company. Even though the Case Company is a multinational industrial company operating all over the world, the generalization of the results to other types of organizations may be somewhat limited. The Case Company data and other archived material comprise several years, the research period being 1985–2006.

A relevant theme close to diffusion of innovations is the theories of change management. When talking about patterns of diffusion, Frederickson et al. (2004) maintain that some call diffusion simply *change*, while those who favor a particular diffusion tend to call it *reform* or *innovation*.

The theory of diffusion of innovations was chosen as a theoretical framework in this study, however, the theme of this thesis could have been positioned in many research streams, for instance, in the change management literature. Our era is a period of change, which as such is not unusual, but what perhaps could be different compared to earlier times, is that this time change shall be managed (Diefenbach, 2007). The changing world can be seen everywhere: new technologies have radically changed our working methods so that work cannot be designed as was used to and there may be no preconceived notion of how to complete the work (Landry et al., 2005). Managing change is complicated, because managers cannot only focus on change. Managers must balance when and what to change and firms must manage the change in a way that also meets the financial and social performance demands.

According to the literature review of Burnes (1996) and Coram and Burnes (2001), there is no one best way to manage change. Coram and Burnes (2001) and Burnes (2004) present two possible approaches to change: planned change and emergent change. Essential for planned change is to improve the effectiveness of the human side of the organization by focusing on the performance of groups and teams. It especially stresses the importance of cooperation, meaning that the organization, the managers, recipients of change and change agents jointly identify the problems and together plan and design the specific changes (Coram and Burnes, 2001). The emergent approach to change is then based on the assumption that all organizations operate in a turbulent, dynamic and unpredictable environment. Hence, if the external world is changing in a rapid and uncertain way, organizations need to be continuously aware of what is happening around in their environment in order to be able to identify the needed developments and respond to them appropriately (Coram and Burnes, 2001). For Brown and Eisenhardt (1998) managing change means reacting, anticipating and leading. The general opinion is that when a change is introduced within a company, it should be neither too big nor too small so as to be accepted and gain employee commitment (Gotzamani and Tsiotras, 2002). In order to know how committed the employees are, organizations should also assess employees' feelings. Motivating the employees that are anticipating organizational change by letting them take part in the implementation plan for the change is important, as motivated employees are willing to support change and develop the

organization (Parish et al., 2008). Open communication and information sharing are prerequisites for successful change processes as well.

1.3 Specific research gaps

Because this study explores the adoption and implementation of an administrative innovation, namely, TQM within an organization, the specific research needs and gaps related to previous research conducted on innovation diffusion as well as on TQM will be discussed.

It has been found that adopting a TQM philosophy has been beneficial for organizations in many ways: for example, organizations adopting it have been found to be able to produce quality products and services that meet or even exceed the needs of their customers (Gunasekaran et al., 1998; Terziovski and Samson, 1999; Hides et al., 2000). Managerial issues and the role of leadership have attracted wide attention in the context of TQM success, as well as more generally in terms of organizational roles; it is the supervisors and managers who are instrumental in developing a skilled workforce and operationalizing the quality-management strategies (Golhar et al., 1997). Furthermore, the role of leadership is emphasized as a prerequisite for implementation. Longenecker and Scazzero (1996) found an interesting paradox when reviewing managerial perceptions of TQM: managers considered themselves more likely to practice TQM than their peers, yet they reported that leaders were less likely to adopt TQM principles than employees. *Previous studies have paid some attention to leadership issues, but have largely ignored the role of key persons identified in the theory of innovation diffusion, namely, opinion leaders who act as change agents promoting the diffusion.*

According to Hartley et al. (1997), Saka (2003), Massey and Williams (2006), there has been relatively little empirical research on the roles played by internal change agents in the process of developing and managing organizational change. Opinion leaders and change agents in the organization may be able to influence others' attitudes and behavior informally in the desired direction, although this informal guidance and leadership role is not a function of the individual's formal position or status in the system (Rogers, 2003). Yet, there are some exceptions to the studies that have concentrated on exploring the role of change agents, like the studies of Berranger et al., (2001) and Caldwell (2003). They have emphasized the important role of the change agents in the implementation process. According to Berranger et al., (2001), one possible reason why the diffusion may not be successful is the insufficient attention paid to the roles played by change

agents within the adoption and implementation processes. Caldwell (2003), in turn, named change agents as organizational development consultants, and also emphasized the fact that they are in a key role and at the center of organizational change, that they in fact make the change happen. Furthermore, according to Rogers (2003), interpersonal network influences from near peers are the most important ones during the adoption, and the change agents influence clients' innovation decisions in a direction deemed desirable. However, in spite of the importance of the change agents, as the role of the change agent has not found much support in the business literature so far (previous research has mostly been carried out in health care, education and government, for example), one part of this study especially takes up the role of the change agents within administrative innovations. It is particularly interesting to study the factors affecting the change agent behavior: how individual and organizational characteristics affect this behavior and what the role of the perceptions of the innovation being studied here is.

At this point it may also be good to notice that the main focus in the innovation diffusion literature has been on studying the diffusion from the organizational point of view rather than that of an individual. This may also partly explain the small number of studies conducted about change agents. Extensive previous research has concentrated on the status of TQM and the implementation of relevant tools in organizations (Longbottom and Zairi, 1996; Zbaracki, 1998; Adams and Dale, 2001; Chow and Lui, 2001; Davig et al., 2003; Lagrosen and Lagrosen, 2005), and on its adoption and implementation and subsequent performance improvement (Weech-Maldonado et al., 1999; Ravichandran and Rai, 2000; Chin et al., 2002; Ehigie and McAndrew, 2005; Rungtusanatham et al., 2005). *The focus has been on the organization rather than the individual.* Therefore, here in this study the individual perspective is presented.

Especially the implementation of TQM has inspired authors, like Sun (1999), Yusof and Aspinwall (2000), Baidoun and Zairi (2003) and Prajogo and Sohal (2004), who have studied total quality management implementation and diffusion, as well as Longbottom and Zairi (1996) and Boiral and Roy (2007) who have studied the success of the implementation process. Quite often studies have concentrated on evaluating the TQM practices against the present situation, and based on the analyses, recommendations or better models have been presented (Terziovski et al., 1999; Gunasekaran, 1999). Criticism against the TQM implementation practices has been addressed, because the motives behind its implementation might not be consistent (Boiral and Roy, 2007), TQM is not an integral part of the companies' performance management systems (Soltani et al.,

2006), and implementing organizations forget the time lag before results can be expected (Sila and Ebrahimpour, 2005).

Despite the failures reported in research, TQM is effectively diffused across and within organizations. The diffusion of TQM has been analyzed on the country level, for example, by Sun (1999) and Viadiu et al. (2006). This study complements this TQM diffusion research by focusing on *the organizational unit level* and utilizing *a global process industry company* to conduct the analysis. The existing literature focuses on the organizations' ability to adopt innovations and adoption processes (Kim and Kim, 2004; Yeon et al., 2006), on the diffusion and adoption models (Kline, 1985; Baskerville and Pries-Heje, 2001; Kamrad et al., 2005; Wang et al., 2006), and on the characteristics and elements which drive innovation diffusion (Yang and Liu, 2006) as well as the enablers and barriers to diffusion (Pries-Heje et al., 2005). The studies on how organizations adopt innovation (Kimberly and Evanisko, 1981; Damanpour et al., 1989; Subramanian and Nilakanta, 1996; Westphal et al., 1997; Damanpour and Gopalakrishnan, 1998; Ravichandran, 2000b; Ahire and Ravichandran, 2001) aim to explain the variation in adoption across organizations, rather than their internal diffusion processes. Here the objective is to study *the whole implementation process starting from the innovation adoption decision and continuing until the consequences*.

In previous organizational innovation studies the time aspect has been examined in at least three different ways: Firstly, the rate of innovation has been measured as the number of innovations an organization adopts within a given time (e.g. Damanpour and Gopalakrishnan, 2001). Secondly, the speed or breadth of adoption refers to the timing of the organizational adoption decision relative to other organizations, and to the speed of diffusion across organizations. Thirdly, the depth of the implementation is the least studied aspect, and the available depth studies are usually conducted in the context of technological innovations, and depth measures are based on the number of users of the innovation within the organization (e.g. Meyer and Goes, 1988; Koenig and Wigand, 2004). As this study focuses on studying the administrative innovation, the depth of the implementation cannot, however, be measured in the same way as in the case of a technological innovation, for instance, by the number of users, frequency or amount of use. Consequently the aim of this study is to clarify the *timing of the adoption and depth of the implementation* of TQM in a global organization. The existing TQM diffusion studies are complemented by the challenging target of developing a model for measuring the depth of the implementation using longitudinal data and examining the subject from versatile points of view. This study also proposes to present how various organizational and environmental characteristics affect the timing of the adoption and

especially the depth of the implementation. Moreover, whether the timing of the adoption has an effect on the depth of the implementation is analyzed.

According to the pioneering work of Terziovski and Samson (1999) on the *effects of TQM* and despite the long history of TQM, only little rigorous research has been conducted to establish the link between TQM practice and organizational performance, and that which has been conducted is interesting but not conclusive. There is quite extensive quality management research that has concentrated on the status of TQM and the implementation of the relevant tools in organizations (Lagrosen and Lagrosen, 2005); moreover, the adoption and performance improvement have also been studied (Ehigie and McAndrew, 2005; Rungtusanatham et al., 2005). Quite often, however, studies have concentrated on evaluating the TQM adoption practices against the present situation, and based on the analyses, recommendations or better models have been presented (Terziovski et al., 1999; Gunasekaran, 1999). Sun (1999) filled this research gap with his empirical study (survey replication) on TQM in Norway also with results about indications that TQM has on performance. Nevertheless, almost ten years later Ford and Evans (2006) commented that despite the potential benefits, the extent to which TQM procedures, for instance, self-assessments, actually produce improvements is unclear.

It can be concluded that earlier TQM studies (i) have concentrated on studying the adoption rather than the whole implementation process, (ii) are mainly cross-sectional studies rather than longitudinal ones, and (iii) have had their focus on developing measures for effectiveness (Capon et al., 1995; Lee and Quazi, 2001). The problem with these studies, however, is the versatile subjective measures instead of objective ones. Also, (iv) the cases in the past studies have been based on a single country or a couple of them instead of taking an international approach.

1.4 Research questions

As a summary, the main research gaps derived from the literature and past research were as follows:

- 1) the change agent role in general and especially the factors affecting the change agent behavior have not received much attention,
- 2) most of the diffusion studies have concentrated on studying the diffusion from the organizational perspective rather than the individual point of view,
- 3) studying the whole implementation process starting from the adoption decision, the defined steps and characteristics supporting the diffusion has not been a very commonly used approach,
- 4) the timing

of the adoption and the depth of the implementation have mainly been analyzed in the context of technical innovations, not administrative ones, and 5) when measuring the success of an innovation implementation, the consequences have not been much examined, especially in the case of administrative innovations, not to mention the utilization of objective measures.

Based on the above discussion about the specific research gaps, Figure 1 below summarizes the main objectives and variables explaining these gaps and research objectives. The presented gaps are mainly related to the boxes in Figure 1 in the middle and at the top.

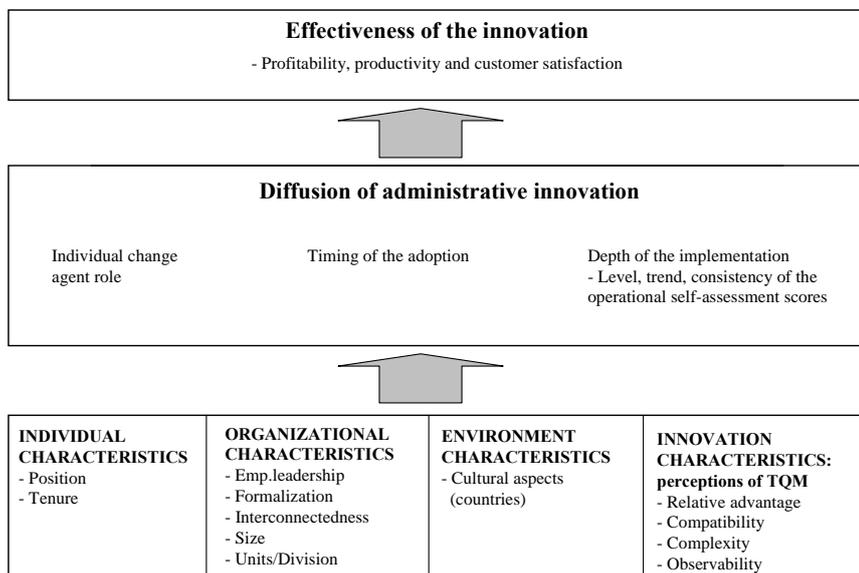


Figure 1: The main objectives and variables explaining the research gaps.

The main objective of the study based on the presented research gaps is summarized as follows:

To create new knowledge on the diffusion and effectiveness of administrative innovation in a global organization.

The main objective of the study can be split into more specific research questions. The research questions presented below compile the needed information in order to reach the main objective and help to demarcate the research area.

The main objective of the study concentrates on first describing the driving forces of the innovation adoption decision and continues to explaining the implementation and finally the whole diffusion process until the consequences. The relevant characteristics (individual, organizational, environmental and innovation characteristics) affecting the adoption and implementation are clarified. The following four research questions specify the main objective within the defined frame of reference and are as follows:

Research question 1: How TQM was adopted and fostered in a large global company?

This research question concentrates on describing how an organization proceeds in implementing TQM after it has decided to invest resources in it. The needed phases and factors supporting the adoption process are explained. Especially, what is needed for the dynamic development of TQM within an organization is discussed. Also, whether there are any special needs dependent on the particular phase of the diffusion process, for the diffusion to be dynamic, are presented. The special characteristics of administrative innovation are taken into account. This research question supports the research gap number three.

Research question 2: What factors explain individuals' perceptions of TQM and change agent behavior?

This research question concentrates on the individual perspective. It helps to clarify how organizational and individual characteristics affect how the innovation is perceived, and it also studies how organizational, innovation and individual characteristics affect the change agent behavior. Furthermore the impacts the change agent role have on the perceived effectiveness of the implementation are presented. The research gaps numbers one and two are covered in this research question.

Research question 3: How to measure the diffusion of administrative innovation within an organization and what are the determinants of the diffusion?

As the timing of the adoption as well as the depth of the implementation were not much studied in the administrative innovation context, this research question concentrates on examining these areas. The organizational and environmental characteristics that have an effect on timing are presented as well as the effect the timing has on the depth of implementing the innovation, if any. The possibility

to measure the depth of an administrative innovation (TQM) is also investigated. This research question supports the research gap number four.

Research question 4: What are the effects of TQM on productivity, profitability and customer satisfaction?

This research question assesses the consequences of an administrative innovation, more particularly, the effect the timing of the adoption and the depth of the implementation have on the performance measures. The performance measures include objective data, like profitability, productivity and customer satisfaction data. The research gap number five is answered here.

As a summary, the main objective, the research questions and the supporting questions are presented below in Table 1.

Table 1: The main objective and the four research questions.

Main objective	Research questions
<i>The main objective of this study is to create new knowledge on the diffusion and effectiveness of administrative innovation in a global organization.</i>	1 How TQM was adopted and fostered in a large global company? -> How does an organization proceed to implement TQM after it has decided to invest resources in it? -> What are the phases and what factors explain the diffusion process? -> What is needed for the dynamic development of TQM within an organization?
	2 What factors explain individuals' perceptions of TQM and change agent behavior? -> What kind of organizational and individual characteristics have an effect on the perceptions of TQM? -> What kind of organizational, individual and innovation characteristics have an effect on change agent behavior? -> Does the change agent behavior have an effect on the perceived effectiveness of the innovation?
	3 How to measure the diffusion of administrative innovation within an organization and what are the determinants of the diffusion? -> What kind of organizational and environmental characteristics have an effect on the timing of the adoption and on the depth of implementing an administrative innovation in a global environment? -> Can the depth of the administrative innovation (TQM) be measured?
	4 What are the effects of TQM on productivity, profitability and customer satisfaction? -> Does the TQM model have an effect on the performance of the company, i.e. profitability, productivity and customer satisfaction?

1.5 Concept definitions

This chapter presents the most vital concepts used in this study which are related to the innovation diffusion literature. The TQM terminology that will be used in the study is also presented. There may be some variation between the concepts used as the best and the most suitable concept is chosen to investigate each research question.

Innovation can be seen as a new product or service, a new production process technology, a new structure or administrative system or a new plan or program for organizational members (Damanpour, 1991). Innovation may also be defined as an idea, practice or object perceived new by the adopter (Rogers, 1995; Sciulli, 1998). "If the idea seems new to the individual, it is an innovation. Newness in an innovation need not just involve new knowledge. Newness of an innovation may be expressed in terms of knowledge, persuasion, or a decision to adopt." (Rogers, 1995, p. 11)

Innovations can be classified into different categories. **The types of innovations** that have gained the most attention in the literature according to Damanpour (1991) can be divided into pairs as follows: the product and process innovations (see Kubeczko et al., 2006), radical and incremental innovations (Tushman and Anderson, 1986) and technical and administrative innovations (Daft, 1978). Abrahamson (1991) has examined the innovation diffusion area from the organization point of view. Kubeczko et al. (2006) and Damanpour and Gopalakrishnan (2001) also divide innovation types into two categories as follows: 1) product innovations, meaning changes in the output of an enterprise or an organization, innovation can be either goods or services, and 2) process innovations, meaning technological innovations or innovations in the organization of an enterprise. In this study we concentrate on **administrative innovations** which are defined as innovations that occur in the administrative component and affect the social system of an organization, whereas technical innovations are innovations that occur in the operating component and affect the technical system of an organization (Damanpour et al., 1989). As administrative innovations affect the social system of an organization, the term **organizational innovation** can be used as a comprehensive concept for the type of innovation studied here and describing the context in which the innovation is diffused; however, the focus of this study is an administrative innovation and therefore the term *administrative innovation* is the main concept used in this study.

Rogers (1995) defines **diffusion** as the process by which an innovation is communicated through certain channels over time among the members of a social system. “It is a special type of communication, in that the messages are concerned with new ideas” (Rogers, 1995, p. 5). According to Rogers (ibid.), **the four main elements in the diffusion of innovations are the innovation, communication channels, time, and the social system.** The innovation, which was defined earlier, contains several **characteristics**: 1) Relative advantage is the degree to which an innovation is perceived as better than the idea it supersedes. “What does matter is whether an individual perceives the innovation as advantageous. The greater the perceived relative advantage of an innovation, the more rapid its rate of adoption will be.” (Rogers, 1995, p. 15) 2) Compatibility is defined as the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters. 3) “Complexity is the degree to which an innovation is perceived as difficult to understand and use” (ibid. p. 16). 4) “Triability is the degree to which an innovation may be experimented with on a limited basis. An innovation that is triable represents less uncertainty to the individual who is considering it for adoption, as it is possible to learn by doing.” (ibid. p. 16) 5) “Observability is the degree to which the results of an innovation are visible to others. The easier it is for individual to see the results of an innovation, the more likely they are to adopt it.” (ibid. p. 16)

The second element of the innovation diffusion is **communication channel**, which is defined as the means by which messages get from one individual to another (ibid.). The third element of innovation diffusion is **time** which is involved 1) in the innovation decision process by which an individual passes from first knowledge of an innovation through its adoption or rejection, (2) in the innovativeness of an individual or a unit, the relative earliness/lateness with which an innovation is adopted compared with other members of a system, and (3) in an innovation’s rate of adoption in a system, which is usually measured as the number of members of the system that adopt the innovation in a given time period (ibid.). The fourth element in the diffusion of innovation is **the social system**. Diffusion occurs within a social system and the social system can facilitate or impede the diffusion of innovations. The diffusion process of an administrative innovation and the characteristics affecting it represent the main focus of this study. The listed innovation characteristics are included in Research question 2, except the triability, as it was not possible to conduct any trials in this case.

Administrative innovation requires a certain social system and structure for the diffusion to be successful. This study examines four structural **organizational characteristics**. 1) Centralization is

defined as the degree to which power and control in a system are concentrated in the hands of relatively few individuals (Rogers, 1995). “Centralization has usually been found to be negatively associated with innovativeness; that is, the more that power is concentrated in an organization, the less innovative the organization tends to be” (ibid. p. 380). 2) “Complexity is the degree to which an organization’s members possess a relatively high level of knowledge and expertise. Complexity encourages organizational members to conceive and propose innovations, but may make it difficult to achieve consensus about implementing them.” (ibid. p. 380) 3) “Formalization is the degree to which an organization emphasizes following rules and procedures in the role performance of its members” (ibid. p. 380). 4) “Interconnectedness is the degree to which the units in a social system are linked by interpersonal networks. This variable is positively related to organizational innovativeness.” (ibid. p. 381) Organization characteristics are discussed in Research questions 2 and 3. In addition to these innovation and organization characteristics, **individual characteristics**, which are related to individual features, like tenure and position in the organization, are also included in this study and their effects are explained in Research question 2.

The social system includes several players including the **change agent**. “A change agent is an individual who influences clients’ innovation-decisions in a direction deemed desirable by a change agency” (Rogers, 1995, p. 27). **Opinion leadership** is the degree to which an individual is able to influence other individuals’ attitudes informally in a desired way. The important role of the change agents is described especially in Research questions 1 and 2.

In this study the time aspect is included from the viewpoint of an administrative innovation and it is presented in Research questions 1, 3 and 4. **Innovation adoption decision** describes the moment when the decision to take the innovation into use was made for the first time. This was a company-wide decision and is described in Research question 1. Rogers (1995) describes the innovation decision as a process through which an individual or organization passes from first knowledge about an innovation to the implementation and use of the new idea. After the innovation decision is made, the adoption process itself starts in the organization. In order to produce a desired outcome, the adoption decision has to be followed by a successful implementation phase (Kubeczko et al., 2006). According to Rogers (ibid.), the innovation process in organizations consists of five stages which cannot be undertaken until earlier stages have been settled. The innovation decision is included in Research question 1, which describes the whole diffusion process starting from the innovation adoption decision.

Rogers (1995) defines the organizational **innovation adoption process** as follows (Figure 2): Agenda-setting first starts the innovation adoption process in organizations. There the specific need or problem in the organization is identified and a suitable innovation as one means of coping with the problem is searched. At the second stage the organization's problem is matched with a suitable innovation, to see how well they fit. These two steps are needed for the initiation, which leads to the decision to adopt. Information gathering, conceptualizing and planning for the adoption of the innovation are done at this stage, before the actual implementation starts. The implementation phase includes redefining/restructuring, clarifying and routinizing stages. In the redefining/restructuring stage the innovation is re-invented or restructured in order to fit the organization's needs and structure more closely, or the organization structures can as well be restructured. Next the innovation is put into more widespread use in the organization, so that the meaning of the new idea gradually becomes clearer to the organization's members. When people in the organization are talking about the innovation, they gradually gain a common understanding of it; through this interaction the idea of the innovation becomes clarified. The final stage of implementing the innovation is routinizing. At this stage the innovation is no longer seen as an innovation, but as a normal procedure in the organization.

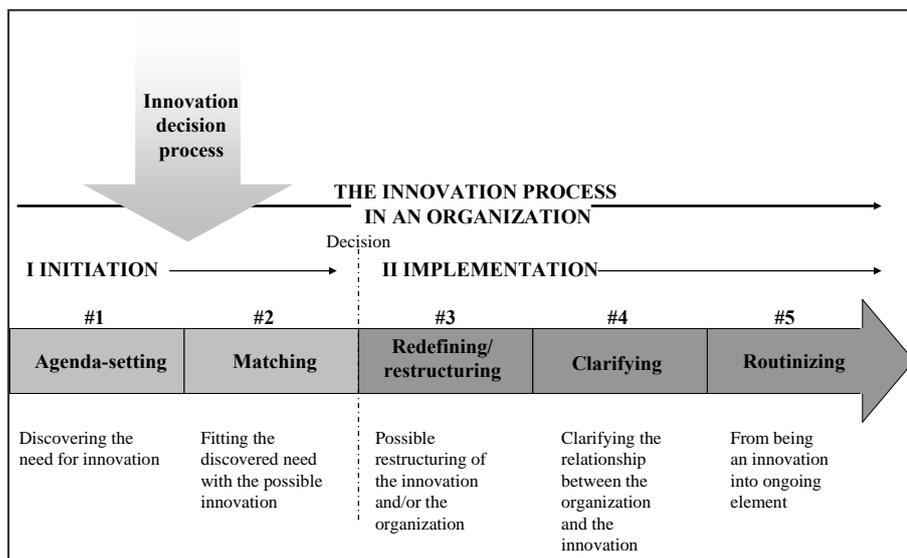


Figure 2: The innovation decision process and the innovation process in organization (adapted from Rogers, 2003, p. 392).

In Research questions 3 and 4 the **timing of the adoption** describes when the units first started to use the innovation. This study proposes to reveal whether the timing of the adoption had an effect on the depth of implementation and on the performance measures. The term **depth of the implementation** that is used in Research questions 3 and 4 refers to the diffusion within the organization. The depth of the implementation measures the output the organization achieves with the deployment of the innovation. **Implementation** as such is used to describe how the innovation is put into practice and how it develops within the organization.

Research question 4 concentrates on examining the **consequences** of the innovation implementation. "Consequences are the changes that occur to an individual or to a social system as a result of the adoption or rejection of an innovation. Invention and diffusion are but means to an ultimate end: the consequences of adoption of an innovation." (Rogers, 1995, p. 405)

As the target is to study an administrative innovation, it is operationalized through the concept of **total quality management**. "Total quality management (TQM) has been described as a management philosophy and a way of thinking that has helped many organizations towards achieving world-class status" (Yusof and Aspinwall, 2000, p. 281). TQM is perceived as a long-term process which requires considerable dedication and hard work to achieve the vision (Dale, 1999). "At its core, TQM involves changes to the goals of the organization and the ways and means to achieve them" (Ahire and Ravichandran, 2001, p. 447). TQM is a prime example of an administrative innovation, and innovation diffusion theories provide an appropriate theoretical lens to examine TQM implementation. Researchers around the world partly share their views about the concepts and definitions of total quality management but also have differing thoughts. Moreover, the terminology around total quality management is very rich and differs a lot. Instead of using the term total quality management, many researchers write about quality management (Fischer and Nijhof 2005, Wiele and Brown 2002, Laszlo 1999, Crosby, 1979) or **continual improvement** (Levy, 2003). Alike in this study the terms **TQM model** and continual improvement process are both used to describe the administrative innovation in question. The Case Company uses the term Business Excellence (BE) model, which becomes evident in the conducted survey, for example.

The TQM model used in this study is the **self-assessment** procedure. "A self-assessment enables an organization to identify and document its core values, key business factors, business objectives, and other critical elements" (Calhoun, 2002, p. 51). During the self-assessment, the organization compares its achievements and procedures against one of the selected quality award models. There

are several quality award models available, but they all include almost the same kind of areas against which organizations assess and score themselves, such as leadership and strategy, customer focus, information and human resources, processes and business results. “A scoring system also has an important role in the self-assessment process, because an organization is likely to evaluate itself based on these scoring guidelines and launch improvement activities in those areas receiving a low score” (Kujala, 2002, p. 51). In this study the received scores are used for measuring the depth of the implementation.

1.6 The structure of the study

The thesis includes five chapters. Chapter 1 introduces the research subject on a general level and gives an overview of the research area. It begins by motivating the background and relevance for the study, positioning it to the relevant literature and defining the scope for the study. A review of the relevant literature is then conducted to identify research gaps and to formulate four specific research questions. The introduction proceeds with defining the core concepts used in the study, and concludes by providing an overview of the structure of the thesis. Chapter 2 delivers the theoretical viewpoint concentrating on the innovation diffusion literature, but also presents needed TQM writings. Based on the research questions and available diffusion and TQM literature the hypotheses are presented. At the end of Chapter 2 the overall picture including the hypotheses is also delineated. Chapter 3 clarifies the background of the Case Company, research methodology and collected data, and Chapter 4 presents the analyses and results. Discussions and conclusions summarize the theoretical contributions and managerial implications in Chapter 5 which also defines the limitations and topics for further research. Figure 3 below presents the summary of the structure of the thesis.

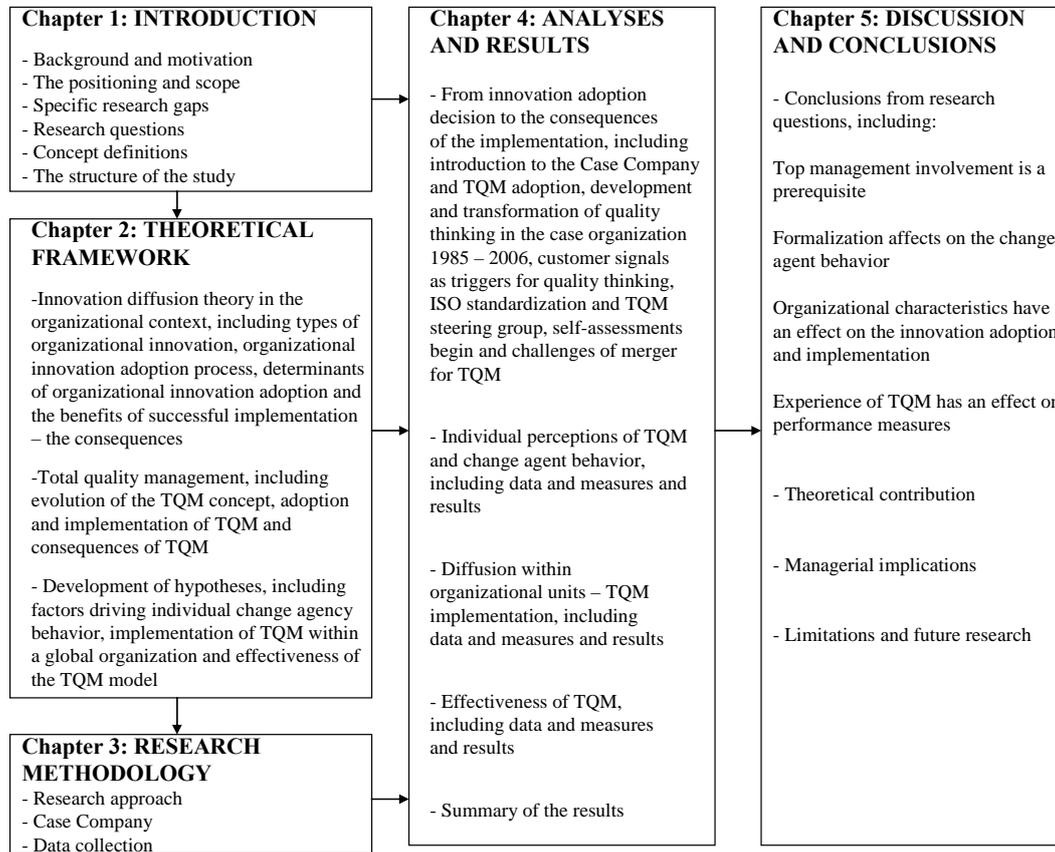


Figure 3: The structure of the study.

Table 2 below summarizes more exactly the content of the study.

Table 2: Summary of the content of the study.

	RQ 1	RQ 2	RQ 3	RQ 4
Research question	How TQM was adopted and fostered in a large global company?	What factors explain individuals' perceptions of TQM and change agent behavior?	How to measure the diffusion of administrative innovation within an organization and what are the determinants of the diffusion?	What are the effects of TQM on productivity, profitability and customer satisfaction?
Objective	To explore the adoption and implementation of administrative innovation, TQM	To study how individuals in an organization perceive an administrative innovation and its effects	To study the effects of the timing of the adoption and depth of the implementation of administrative innovation in a global organization	To study the consequences of an administrative innovation
Supportive research questions	<ul style="list-style-type: none"> • How does an organization proceed to implement TQM after it has decided to invest resources in it? • What are the phases and what factors explain the diffusion process? • What is needed for the dynamic development of TQM within an organization? 	<ul style="list-style-type: none"> • What kind of organizational and individual characteristics have an effect on the perceptions of TQM? • What kind of organizational, individual and innovation characteristics have an effect on change agent behavior? • Does the change agent behavior have an effect on the perceived effectiveness of the innovation? 	<ul style="list-style-type: none"> • What kind of organizational and environmental characteristics have an effect on the timing of the adoption and on the depth of implementing an administrative innovation in a global environment? • Can the depth of the administrative innovation (TQM) be measured? 	<ul style="list-style-type: none"> • Does the TQM model have an effect on the performance of the company, i.e. profitability, productivity and customer satisfaction?
Used data	Case Company archival material (memos and documents), interviews, survey	Survey	Survey, Case Company data (self-assessment scores, timing of the adoption)	Case Company data: timing of the adoption, results of operational scores, profitability, productivity, customer satisfaction data
Main contributions	Identification of the factors supporting the transformation of an administrative innovation	Characteristics supporting individuals' voluntariness in change processes	The role of timing and organizational characteristics on depth, measure for depth of implementation	Experience and implementation of TQM has an effect on performance measures

2 THEORETICAL FRAMEWORK

This theoretical part concentrates on two main areas. On the one hand the literature on the innovation diffusion concentrating on administrative innovations and especially innovation adoption and implementation within organizations and its special features are presented. On the other hand, the TQM literature is used to complete the theoretical setting. The innovation diffusion literature, however, represents the dominating area. The TQM literature presented here in this study concentrates on the viewpoint of administrative innovations.

2.1 Innovation diffusion theory in the organizational context

Innovation diffusion is described as a particular type of communication process where the message about a new idea is shared and given out from one member to another in a social system. Innovation may be defined as a new product or service, a new production process technology, a new structure or an administrative system; it may also be a new plan or program for organizational members (Damanpour, 1991). The types of innovations that have gained the most attention in the literature according to Damanpour (1991) can be divided into pairs as follows: the product and process innovations (see Kubeczko et al., 2006), radical and incremental innovations (Tushman and Anderson, 1986) and technical and administrative innovations (Daft, 1978).

2.1.1 Types of organizational innovation

In this study the main focus is on administrative innovations (organizational innovation, e.g. Abrahamson, 1991). Administrative and technical innovations include potentially different decision-making processes (Daft, 1978), and together they represent changes introduced in a wide range of activities in the organization (Damanpour, 1991). Technical innovations concentrate on the products, services and production process technology, and they may occur in an operating component and affect the technical system (Daft, 1978; Damanpour et al., 1989) and are thus rather measurable. The easier it is to see the advantages of the innovation, the easier it is to make the innovation adoption decision. Assessment criteria for a technical innovation are usually much clearer and concrete than for an administrative one (Nelson et al., 2004). Numerous studies have focused on technical and product innovations, like those of Davis et al. (1989), Karahanna et al. (1999), Templeton and Byrd (2003), Brandyberry (2003), Nguyen et al. (2003), Yi et al. (2006) and Vicente and Lopez (2006), and the main research targets have been information technology and

information systems. When studying technical innovations, DeCanio et al. (2000) reported that the organizational structure is a crucial element in innovation diffusion with an effect on the adoption of innovations.

Administrative innovations are different from technical innovations in a sense that they are not concentrated only on one concrete item or technique. Administrative innovations are more related to management activities and procedures and are thus connected with the organization's social system (Damanpour, 1991). Administrative innovations are defined as those that involve an administrative component and affect the organization's social system. This makes them more difficult to measure compared to, for example, product innovations (Daft, 1978; Damanpour et al., 1989; Damanpour, 1991). TQM as a management philosophy is one example of administrative innovation. Westphal et al. (1997), Ravichandran (2000b) and Ahire and Ravichandran (2001) have also studied administrative innovations. Gabris et al. (2001) have studied the association between administrative leadership, elected board behavior and administrative innovation at the municipal level. Their results suggest that leadership credibility does influence perceptions toward board behavior and managerial innovation (Gabris et al., 2001). Page (2005) examined administrative innovations in the human services in public administration (new public management), and based on his results, the new public management has developed through a continuous process of evolution rather than a discontinuous revolution. Lin and Chen (2007) conclude in their research that when innovation becomes a way of life, companies are not only competing in terms of the innovation itself, but also of the ability to utilize the innovation in the best possible way and especially to transfer that advantage into competitiveness. According to their research work, administrative innovations may play a key role in receiving and predicting the ultimate benefits of innovation, for instance, the power on company sales (Lin and Chen, 2007).

2.1.2. Organizational innovation adoption process

As was earlier already pointed out, this study concentrates on exploring the administrative innovation in a global organization. The adoption process of an innovation is determined by the actual innovation itself, because the nature and type of innovation influences the particular adoption process. There are several models of the adoption process available. One of the models is the organizational innovation adoption process defined by Rogers (1995) who established that it includes steps from recognizing the need for the innovation in the organization to routinizing the innovation to become part of normal daily life. In Rogers' model, the first two steps are needed for

the initiation, which are information gathering and conceptualizing and planning for the adoption of the innovation. These two actions lead to the decision to adopt. These mentioned phases are needed before the actual implementation can start. The actual implementation includes redefining or restructuring, clarifying and routinizing phases (Rogers, 1995).

Besides the different adoption models, the diverse decision-making processes are needed based on the type of innovation (Daft, 1978), like in the case of administrative and technical innovations, which both require own criteria and specific features.

Rogers (2003) describes the innovation decision as a process through which an individual or organization passes from the first knowledge of an innovation to the implementation and use of the new idea. As soon as the positive decision towards the innovation is made, the adoption process itself starts in the organization towards successful implementation and finally towards the consequences (Kubeczko et al., 2006). According to Damanpour (1991), the innovation adoption process includes steps leading to the innovation adoption decision as well as activities supporting the use of the innovation. One reason for a plethora of studies on technical innovations may be that, for example, according to Damanpour and Gopalakrishnan (2001) organizations adopt more product innovations and even faster than process innovations. Generally, the innovation literature has concentrated on the ability to adopt the innovation and the innovation adoption and diffusion process as such (e.g. Kim and Kim, 2004; Yeon et al., 2006). There is also quite extensive research about the diffusion and adoption models, like the studies of Kline (1985), Baskerville and Pries-Heje (2001), Kamrad et al. (2005) and Wang et al. (2006). Yang and Liu (2006) have studied the characteristics and elements of innovation diffusion, and the enablers and barriers to diffusion have also been studied by Pries-Heje et al. (2005). As a summary, the previous studies that have been conducted on the innovation diffusion in the organizational context (Kimberly and Evanisko, 1981; Damanpour et al., 1989; Subramanian and Nilakanta, 1996; Westphal et al., 1997; Damanpour and Gopalakrishnan, 1998; Ravichandran, 2000b; Ahire and Ravichandran, 2001) mostly focus on describing the variation in adoption and implementation across organizations, rather than the internal diffusion processes within the organizations and in particular on how the innovation diffuses and expands. Furthermore, the available studies within the organization concentrate on successful adoption decisions and models and not on studying what actually happens between the innovation adoption decision and the implementation (and consequences) from a wider perspective.

2.1.3. Determinants of organizational innovation adoption

Besides the type of innovation, the characteristics of the potential adopters (both the individual as well as the organization) have an effect on the diffusion of innovation. The determinants included in this study to describe organizational innovation adoption include four kinds of characteristics: 1) innovation characteristics which Rogers (2003) describes to be relative advantage, compatibility, complexity, trialability and observability; 2) organizational characteristics which according to Rogers (2003) are leadership, centralization, formalization and interconnectedness; 3) individual characteristics that include the position in the organization and tenure; and 4) environmental characteristics which are here based on the location (i.e. country) of the unit under examination.

The studies taking the internal or individual perspective include those conducted by Kimberly and Evanisko (1981) and Lewis and Seibold (1993). The aim in the former was to examine the combined effects of individual, organizational and contextual variables on the organizational adoption of innovation, whereas Lewis and Seibold's (1993) study on intraorganizational adoption included both individual and organizational level factors in the theoretical framework. As an example, these earlier studies on administrative innovation have suggested that low employee professionalism, high centralization in decision-making and high formalization of behavior support the adoption of administrative innovations (Kimberly and Evanisko, 1981; Damanpour, 1991; Subramanian and Nilakanta, 1996; Damanpour and Gopalakrishnan, 1998). Quite the contrary, in the case of technical innovations, professionalism, low centralization and low formalization promote the adoption (Kimberly and Evanisko, 1981; Damanpour and Gopalakrishnan, 1998). Deffuant et al. (2005) proposed an individual-based model of innovation diffusion and explored its main dynamic properties. Their results highlight the influence of social opinion, namely, the difficulty of diffusing innovations that have a low social image, even though they would bring significant improvements for the individual; still, due to poor social image, the diffusion will be difficult. Therefore innovation diffusion with high individual benefit and poor social image will not be as successful as innovation diffusion with good social image and low individual benefit (Deffuant et al., 2005).

The diffusion process of an administrative innovation within the organization is dependent on the characteristics of the innovation itself, on the organization-level factors and individuals that influence the adoption process. Because the benefits of administrative innovations cannot be very easily perceived and their realization may take time, individuals as change agents have an important

role in the adoption process. The change agents in the organization affect the attitudes and behavior of the other members of the organization in the desired direction, both through their formal position and informal influence. Especially interpersonal network influence from peers is necessary during the adoption (Rogers, 1995). Opinion leaders are at the center of interpersonal communication networks, and they are able to influence other individuals' attitudes and behavior informally in a desired way despite their formal position (Rogers, 1995). Opinion leaders as change agents may have an important role in the innovation adoption and implementation process (e.g. Berranger et al., 2001; Caldwell, 2003). Change agents recognize and create the need for change by several ways, like diagnosing problems, creating intent to change and translating it into action (Solem, 2000). Change agents can be seen in two roles: first, as adopters of the innovation themselves and second, as innovators who use and develop the innovation to change the organization (Sevcik, 2004).

Organization-level factors such as the organizational structure have an effect on the behavior of individuals within the organization and, further, on the innovation adoption process (Young et al., 2001; Vincent et al., 2005). Network ties affect organizational innovativeness positively (Rogers, 1995; Westphal et al., 1997). The findings of Emmanouilides and Davies (2007) indicate that social interaction directs the adoption process. Larsen and Ballal (2005) also specify that informal networks influence diffusion. Nelson et al. (2004) demonstrate that innovation adoption depends on how information regarding the performance of an innovation is generated and spread. The observation of the use of the innovation and consequences achieved by others also promotes the diffusion of administrative innovation within the organization. Rogers (2003) defines a communication network consisting of interconnected individuals who are linked by patterned flows of information. In addition to the role of an opinion leader or change agent and the importance of interaction, Nelson et al. (2004) present another dimension important for the implementation and diffusion process, namely, how closely an innovation can be specified and replicated by other users, so that everybody is evaluating the same target. The extent to which the benefits of adoption are affected by the number of users (so-called network effects), who have already adopted the innovation, is also a useful aspect and speeds the diffusion (Nelson et al., 2004).

All in all, companies should adapt the innovation the way that best fits their strategic framework and capabilities (Westerman et al., 2006). It is also good to remember that some innovations are not as important to organizations as others; the importance also depends on the potential benefits received and the ability to adopt (Hackney et al., 2006).

2.1.4 The benefits of successful implementation – the consequences

Consequences can be defined as the benefits of the successful implementation of an innovation or the desired target of the implementation. Still, in spite of the importance of consequences, most of the previous innovation diffusion studies focus on the decision to adopt the innovation, ignoring what really happens within an organization after it makes the decision to adopt an innovation until it has implemented the innovation with a successful outcome. Whatever the nature of the innovation, the measurability of the consequences of innovation adoption has a remarkable role in innovation adoption and diffusion since the more visible the benefits of the innovation are, the easier it is to make the innovation decision.

Most of the innovation diffusion studies focus on the decision to adopt an innovation, ignoring how this choice is implemented, and what the consequences of adopting an innovation are. Reasons for the scarcity of studies on consequences may be the fact that consequences usually occur after a relatively long period or they may also depend on other factors than the adoption and implementation of the innovation itself (Rogers, 1995). This is true especially when talking about administrative innovations. Other problems in measuring the consequences of innovation run from causal ambiguity; cause-and-effect relationships may be difficult to determine precisely. One example of studies that consider the consequences of innovation is Kilmon and Fagan (2007), who used Rogers' theory as a frame of reference when they explored the adoption of course management software at a faculty in a nursing program. Their primary focus was on the consequences or outcomes of the adoption process from the faculty perspective.

Generally, technical innovations are perceived rather measurable since they focus on products, services and production process technology. They may also occur in an operating component or affect the technical system (Daft, 1978; Damanpour et al., 1989). The criteria for assessing technical innovations are thus usually much clearer and concrete than for administrative ones (Nelson et al., 2004). Administrative innovations are perceived as more difficult to measure, because they involve administrative components and affect the organization's social system (Daft, 1978; Damanpour et al., 1989; Damanpour, 1991). For the same reasons, the benefits of administrative innovations may not be very easily perceived and their realization may take time. Several researchers, like Rogers (1995), Solem (2000), Berranger et al. (2001), Caldwell (2003), Sevcik (2004) have emphasized the extremely important role of change agents and opinion leaders in supporting the adoption and diffusion towards to desired target, the consequences. Accordingly with Nelson et al. (2004) the

consequences and performance effects of administrative innovations usually cannot be easily measured with common, accepted performance criteria. The type of innovation and the context where the innovation is adopted must be taken into account when assessing the consequences and importance of an innovation for the organization.

However, when assessing the consequences and importance of the innovation for the organization, the type of innovation and the context where the innovation is adopted must always be taken into account. As was earlier suggested, not all innovations are at the same level of relevance within the organization and the degree of relevance depends on the potential benefits received and the ability to adopt.

As a summary, the main conclusions of the available innovation diffusion literature from the viewpoint of this study are as follows: (1) The previous organizational innovation diffusion literature has mainly concentrated on the organizational point of view; still, there are a few exceptions taking the internal or individual perspective, like the studies done by Kimberly and Evanisko (1981) and Lewis and Seibold (1993). (2) Furthermore, innovation diffusion research conducted in the organizational context has mainly aimed at explaining the variations in adoption and implementation across organizations, rather than studying the processes within them. (3) Moreover, as the main target here is to study the administrative innovation, and based on the literature, when compared with the technical innovations, administrative innovations are more difficult to measure. When the benefits of the innovation are not immediately observable, early adopters have an important role as a reference group. This is one reason, why the individual perspective should be emphasized and especially the role of the change agents and opinion leaders. These key persons are able to push the innovation forward and support first the innovation decision and later the implementation and diffusion processes. In spite of its importance, this viewpoint is not much present in the current innovation diffusion literature, and, for example, Hartley et al. (1997), Saka (2003) and Massey and Williams (2006) have pointed out that there is relatively little empirical research on the roles played by internal change agents in the process of developing and managing organizational change. (4) Also, when reviewing previous administrative innovation studies, the effectiveness and the depth of the implementation have been largely ignored in the studies and the available depth studies are related to technical innovations, not within the administrative context (Meyer and Goes, 1988; Koenig and Wigand, 2004). (5) In order to show whether the innovation has been effective or not, the consequences of the implementation should be

clarified. Still, most of the innovation diffusion studies focus on the innovation decisions and adoption models.

2.2 Total quality management

TQM is today very popular and widely adopted within organizations all around the world. It is used for continual improvement activities, and organizations utilize the different TQM models and self-assessment tools for describing, developing and measuring different functions within organizations: for example, leadership, strategy and planning, customer focus, information and analysis, human resources and processes. TQM has developed during the last two decades from simple inspection and quality control activities into what it is today. Quality systems and quality standards are often used when organizations move towards TQM activities. These systems and standards give companies the opportunity to exercise their quality practices systematically and also to assess their achievements and measure how they stand up compared to standard requirements.

In the following, the development history of total quality management, its key steps and the most important elements are described, as during the recent decades the quality management philosophy itself has gone through a process of change (Wiele and Brown, 2002).

2.2.1 Evolution of the TQM concept

Constructing a universal definition for TQM is almost impossible, and the available definitions vary significantly depending on the context where they are used. There are also different points of view about the content of TQM: according to Yeung and Chan (1999), the ideas of TQM consist of three major components, namely, philosophies, systems and tools, and Hellsten and Klefsjö (2000) have named the components as values, techniques and tools. After examining the different TQM researchers, Tarí (2005) reported that there is no unique model for a good TQM program, since TQM is a network of interdependent components, critical factors, practices, techniques and tools. The usage of different tools and techniques are often connected with the TQM process, which seems to be one common feature of the different definitions. In fact the ideas of continual improvement activities and total quality thinking have stimulated the development and use of quality techniques and systems.

The principles underlying total quality thinking can be understood by examining the careers of Deming (1986), Juran (1988) and Crosby (1979), the fathers of the modern quality movement. Each of the three shares partly the same, common principles of the quality approach as well as unique and differing opinions. Landesberg (1999) writes about the different paths of Deming and Juran: Deming provided a new theory for managing organizations and human enterprises. He believed that a system must have an aim that is clear to everyone; the organization must also be managed effectively. Juran on the contrary provided an analytical approach to managing quality. He provided advice on quality planning, quality control and quality improvement. While Deming described a systematic view of the organization, Juran prescribed how to manage quality functions (Landesberg, 1999). For Crosby (1979) quality is an achievable, measurable, profitable entity that can be installed once there is commitment and understanding. According to Dale (1999), Deming's thesis shows that quality, through a reduction in statistical variation, improves productivity and competitive position. For Juran quality is *fitness for use*, which is broken down into quality of design, quality of conformance and field service. Juran's approach to quality improvement includes increased conformance and decreased cost of quality (Dale, 1999).

The history of quality thinking shows that during the last two decades simple inspection activities, which have mainly concentrated on after-the-event screening process with no preventive activities, have been replaced or supplemented by quality control. Primary attention in quality control was given to production processes, delivering the end-product quality as experienced by the external customer (Hoogervorst et al., 2005). Quality mistakes were followed and fixed and the emphasis was on today's events. As the development continued, quality control was further refined into a prevention-based system, quality assurance, the target of which was to improve the quality in question. About the concept of quality, one of the recent researchers, Ojasalo (2006) has studied the perspective of what quality means for the individual and for the company in the business-to-business market. As a result, he reports that quality for the individual refers to the benefits that the individual perceives to contribute to his or her own well-being, and quality for the company refers to the benefits which contribute to organizational goals and well-being in a holistic sense.

When organizations move towards TQM activities, a quality system is one of the key building blocks in the development (Dale, 1999) during which organizations need to establish, communicate and assess their requirements in order to achieve operational effectiveness and quality (Bigelow, 2002). ISO 9000 quality certificates provide one possibility for organizations to get an independent and public audit and thus become *ISO 9000 certified*.

There is extensive past research on the use and effects of ISO (see e.g., Gondhalekar et al., 1995; Tsiotras and Gotzamani, 1996; Dale, 1999; Leung et al., 1999; Sun, 2000; Escanciano et al., 2001; Singels et al., 2001). The listed benefits include measurement criteria and a structured approach to quality improvement. The ISO standard is also seen to help reduce faulty products and errors and further customer complaints. Some studies have also found ISO certification to have positive effects on profitability and productivity (Dale, 1999; Leung et al., 1999; Sun, 2000; Escanciano et al., 2001).

Despite the benefits, the ISO system has also received criticism. Some of the critics claim that companies concentrate too much on the certification process itself which usually means an increase in bureaucracy and extra costs (Tsiotras and Gotzamani, 1996; Low and Omar, 1997; Singels et al., 2001; Poksinska et al., 2006). There are also studies that emphasize that companies should not solely rely on the quality systems approach (Najmi and Kehoe, 2000; Sun et al., 2004). ISO 9000 certification alone may not improve results without also applying the TQM philosophy in the company (Martínez-Lorente and Martínez-Costa, 2004). And when the company decides to develop its quality thinking from ISO towards TQM, the success will be dependent on a company-wide understanding of why such a transition is being pursued (Meegan and Taylor, 1997) and whether it has a strategy with regard to quality development in place (Najmi and Kehoe, 2000).

2.2.2 Adoption and implementation of TQM

The implementation process of an administrative innovation, such as TQM, broadly follows the same logic and phases as the adoption and implementation of other types of innovations. Its implementation, however, also involves some characteristics that differ from the implementation of more simple types of innovations. For example, adopting new technical instruments or machinery in an organization does not necessarily involve changes in other organizational elements. The adoption of administrative innovation, however, may have major effects on other parts of the organizational system. In other words, administrative innovation is often systemic by nature, whereas technical innovations may more often be modular and thereby more easily implemented without other changes in the organization. Hence, in the implementation of TQM, there are some characteristics that are specific to systemic administrative innovations and should be thoroughly considered when planning the adoption and development of TQM in an organization. In Finland Savolainen (1997) has studied how and why the management ideology (quality oriented management ideology)

develops in an organization over time. She described the development process by two main dimensions: the spreading and the shaping of quality ideology. As a contribution, a new language and conceptual system for describing the permeation of a management ideology was generated. Kujala (2002) studied TQM as a cultural phenomenon, and the role and impact of TQM was examined based upon how it ensures that an organization will meet its mission and ultimate objective of long-term survival. As a result, the conceptual model of TQM based on an organizational cultural model and frameworks for analyzing the role and impact of TQM in organizational level were created.

The way from quality systems and standards towards total quality thinking is not an easy task for companies, and hence the implementation may take years. The reasons for TQM failures listed in previous studies include ineffective implementation, the lack of a suitable corporate climate and resistance from various people, poorly identified performance measurement systems and the lack of a continuous monitoring process, insufficiency of management support as well as failure to integrate TQM into existing managerial systems, and the non-existence of an appropriate reward and recognition system and suitable training (Motwani, 2001; Brah et al., 2002; Soltani, 2005). Sila and Ebrahimpour (2002) suggest that the long period of time that it takes for the results to take effect is one reason for the failures, whereas according to Lam (1995), the fact that success depends on broad employee involvement and commitment has been forgotten. Moreover, the type of organization in which TQM concepts are applied and the definition used may also lead to failure if they are not the right solutions for the organization in question (Bergquist et al., 2005).

As the way towards TQM activities is not easy, there are several models available describing the implementation step by step. Ahire and Ravichandran (2001) provide one framework for TQM implementation. Their model is based on innovation diffusion framework and consists of four stages starting from the top management's commitment, followed with adjustment and organizational acceptance and continuing until benefiting from the improvement. There is not much research on the total implementation process as such, describing the whole process starting from the decision to adopt and continuing until the final implementation and consequences. As the main target of starting the TQM model adoption is to improve competitiveness, through for example customer satisfaction and improved profitability, the measurement of the benefits should also be included in the analysis. Sometimes the benefits of the administrative innovation may be difficult to see as the results may be realized with a delay. The results of an administrative innovation are not as visible either as the ones from a technical innovation (like product innovation). Without clear

performance measurement criteria the diffusion of an administrative innovation, like TQM, within the organization may be slow and therefore, the utilization of innovations may be insufficient. This may also affect the low benefits from the innovation.

2.2.3 Consequences of TQM

Since the primary goal of implementing quality improvement programs is to increase competitiveness, a review of the key operating and financial performance measurements is needed. Measuring the benefits of adopting a quality management system may be problematic since those benefits may be realized with a delay and they may also depend on the success in changing other elements in the organization. However, without some clear performance criteria the diffusion of innovation within the organization may be slow and, hence, the utilization of innovations may be insufficient and the benefits from administrative innovation low.

There are techniques for measuring quality in detail in narrow contexts (i.e. statistical quality tools such as SPC and Taguchi Methods), but few measure the success of a TQM program as a whole. Quality awards are one possibility for assessing TQM (Capon et al., 1995). Quality awards provide a framework for organizations to measure their position against a set of universal criteria and to identify their strengths and weaknesses in the key areas of business (Ghobadian and Woo, 1996). Organizations need to effectively establish, communicate and assess their requirements in order to achieve operational excellence (Bigelow, 2002). With self-assessments organizations measure their activities against the quality award criteria. Reasons for starting self-assessments according to Dale (1999) are, for example, to find and direct opportunities for improvement, to create a focus on the TQM criteria, to provide new motivation for the improvement process and to manage the business. As a result of the self-assessments, organizations get their strengths and improvement areas defined. A self-assessment enables an organization to identify and document its core values, key business factors, business objectives and other critical elements (Calhoun, 2002; Ford and Evans, 2006). Self-assessments are widely utilized within companies of all sizes and economic sectors. Ford and Evans (2006) see that the framework of the used criteria has appeared to bolster the interest in self-assessments. One of the most common criteria used is the American Quality Award Criteria, called Malcolm Baldrige National Quality Award Criteria (shortly MB); another often used one is the European Quality Award Criteria (EFQM model). There is also a wide range of national quality awards available that organizations may utilize. The findings of Lee and Quazi (2001) support the idea that companies do benefit from self-assessments.

In general, the implementation of assessment criteria and quality management systems help organizations to keep up with the challenges they face (Wisner and Eakins, 1994; Da Rosa et al., 2001). The quality award winners have been of interest in several previous studies. For example, Jacob et al. (2004) examined how Baldrige Award winners perform in terms of accounting and financial metrics. Their results suggest that the award winners perform better than the industry medians in terms of profitability and assets utilization (Jacob et al., 2004). Yusof and Aspinwall (2000) mention the support for the creation of a culture of trust, participation, and teamwork as the advantages of quality management adoption. The quality award criteria are designed to help organizations use an aligned approach to organizational performance management – it is a process that makes quality a more tangible asset and far more attainable for organizations (Vokurka, 2001; Calhoun, 2002). There are studies about the benefits of the quality award criteria (Ghobadian and Woo, 1996; DeBaylo, 1999; Vokurka, 2001; Calhoun, 2002) as well as of the self-assessments (Wiele et al., 1996; Lee and Quazi, 2001; Calhoun, 2002; Ford and Evans, 2006). In addition to providing the basis for measurement and benchmarking, organizational and personal learning are also mentioned as advantages of the award criteria as well as the ultimate end of TQM – improved performance (Wiele et al., 1996; DeBaylo, 1999; Calhoun, 2002). Several studies concentrate on the critical factors of TQM, about the things that are needed for the implementation and finally the consequences to be successful, like those of Terziowski et al. (1999), Montes et al. (2003) and Karia and Asaari (2006). Correspondingly, many researchers have studied the reasons for TQM failures, such as Motwani (2001), Brah et al. (2002) and Soltani (2005).

The consequences of total quality activities have been studied from various points of view: studies have found a positive relationship between TQM practices and employees' work-related attitudes (Guimaraes, 1997; Gunasekaran et al., 1998; Yusof and Aspinwall, 2000; Brah et al., 2002; Boon et al., 2005; Karia and Asaari, 2006), and cost savings and improved profitability and productivity have been associated with the adoption of TQM (Zairi et al., 1994; Gunasekaran et al., 1998; Brah et al., 2002; Montes et al., 2003). TQM models are also seen to support the organizational culture and encourage teamwork (Yusof and Aspinwall, 2000). The perspective of quality award winners is also included in the studies (Jacob et al., 2004).

As it is a question about an administrative innovation, TQM, and it is clear that the consequences are not as visible as in other types of innovations might be, it is especially interesting and challenging to study the roles of the opinion leaders and change agents, as their role is important in

supporting the adoption. The roles of the change agents have not been widely examined from this point of view, especially that of the innovation diffusion. Savolainen (1997) has studied the roles of the change agents as well using the term *actor*. According to the results, there are several forces in organizational intellectual fields, meaning that there are different types of actors, both managerial and non-managerial with distinct degrees of influence and in different combinations. The top and upper management's influence determines the attitude towards new doctrines and develops into a binding element in the permeation process. Non-managerial actors function with the management and through cooperation.

As a summary, the main conclusions of the TQM literature from the viewpoint of this study are as follows: (1) The previous TQM literature has mainly concentrated on studying the TQM models and critical and supporting factors, not that much described the whole implementation process starting from the innovation decision and continuing until the consequences. What really happens within this process? (2) Further, when studying the administrative innovations, the organizational point of view is important, because quite often in a case of administrative innovation, it may have an influence on the organizational structure and may even require restructuring of the organization. Still, besides this organization perspective, it is the individuals who make up the organization, and it is the individuals who can make the organizational restructuring happen. This is why the individual perspective is also important and should be included in the studies. This study presents the TQM adoption and implementation from the individual point of view as well. (3) The change agent role is important, but there is not much TQM research on that. Especially in the early phases of the TQM adoption the role of the change agents is crucial. Also, along the diffusion process change agents may act as a reference group and thus be an example for the rest of the organization. (4) There are quite comprehensive studies on the benefits of TQM; still, there is not that much TQM research from the administrative innovation perspective. Furthermore, the available case studies on TQM implementation and consequences have been on quite a general level and have thus neglected a deeper understanding of the consequences. They have focused on studying one area (e.g. profitability) at a time, and not several areas (e.g. different measures, like, financial and customer measures) at the same time.

As TQM is an organization-wide activity, it has to reach every individual within it, and commitment to total quality needs to encompass the whole workforce: as pointed out, failures in implementing TQM are largely to do with employee commitment and involvement (Crosby, 1984; Lakhe and Mohanty, 1994; Lam, 1995; Tamimi and Sebastianelli, 1998; Senge, 1999). The level

and quality of participation in the whole organization, including that of the top management, are the critical factors that determine the effectiveness and success of its TQM efforts (Longenecker et al., 1994; Tummala and Tang, 1996; Golhar et al., 1997; Levy, 2003). Karia and Asaari (2006) also point to the importance of change in employees' attitudes and activities.

2.3 Development of hypotheses

This chapter provides a detailed synthesis of the innovation diffusion theory and the TQM literature in order to derive specific hypotheses from the research questions. The first research question is of descriptive nature, and thus the first set of hypotheses will be related to Research question 2, followed by Research questions 3 and 4.

2.3.1 Factors driving individual change agency behavior

Research question 2 investigates what factors explain individuals' perceptions of TQM and change agent behavior. This question concentrates on the individual perspective, especially on the role of the change agent. It helps to clarify what factors support change agent behavior and what the role of the change agents is in perceiving the innovation effective.

Many factors have an effect on the successful adoption and implementation of TQM. According to the theory of innovation diffusion, both individual and organizational level factors may account for the adoption of innovations. The role of the change agent in the implementation process is examined in the work of Berranger et al. (2001) and Caldwell (2003), for example. According to the former, one possible reason why the implementation may not be successful is the insufficient attention given to the role played by change agents in the diffusion and adoption process. Caldwell (2003), in turn, names change agents as organizational development consultants, and also emphasizes the fact that they are in a key role and at the center of organizational change, that they make change happen. However, as the role of the change agent is not widely established in the innovation diffusion literature so far and there in the field of business (previous research having been carried out in health care, education and government, for example), this study concentrates on the literature on innovation adoption and implementation. The hypotheses have been developed in order to explain how individual and organizational characteristics affect the perceived innovation characteristics and, furthermore, the change agent behavior. It is assumed that as far as these perceived characteristics affect adoption behavior, they are also to affect the individual

organizational members' change agent behavior. The role of the change agent could be compared with the role of lead users (von Hippel, 1986) who persuade others and whose present strong needs will become general in the future. Accordingly, the change agent role could be seen as a more advanced and deeper form of adoption.

The literature on innovation diffusion provides a set of innovation characteristics that may affect an individual's adoption behavior, and the first hypothesis is thus proposed as follows:

H1: Perceived TQM characteristics have an effect on the individual organizational members' change agent behavior.

The nature and effects of these innovation characteristics are next discussed and based on the literature, more specific hypotheses will be presented.

Rogers (2003) defines *relative advantage* as the degree to which an innovation is perceived as better than the idea it supersedes. The degree of relative advantage can be measured in different ways - in economic terms, but also in terms of social prestige, convenience, and satisfaction. What does matter is whether an individual perceives the innovation to be advantageous: the greater the perceived relative advantage, the more rapid is its rate of adoption (Karahanna et al., 1999; Rogers, 2003).

Davis (1989) developed a model to explain the individual's adoption of information technology, and identified two key characteristics: perceived usefulness and ease of use. He defines *perceived usefulness* as the degree to which a person believes that using a particular system would enhance his or her job performance: it could thus be seen as one type of relative advantage. Davis examined the joint direct effect of the two variables on use: as a result, users are driven to adopt an applicant primarily because of the functions it performs for them and secondarily for how easy it is to get the system to perform those functions.

As stated above, relative advantage and usefulness are considered to have a strong positive effect on adoption. It would also be logical to assume that an individual would consider these characteristics to be a prerequisite for starting to promote the implementation of an innovation as a change agent. Based on the above discussion the following hypothesis is presented:

H1a: Perceived relative advantage has a positive effect on the individual organizational members' change agent behavior.

Compatibility defines the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of its potential adopters. If an idea is incompatible with the values and norms of a social system it will not be adopted as rapidly as one that is compatible (Rogers, 2003). As TQM affects the mission and core values of the adopting company, compatibility with the cultural, social, and business environment needs to be considered carefully (Abraham et al., 1999; Mehra and Agrawal, 2003). In the TQM context it is also important for the human resource strategy to be compatible with the nature of TQM – in other words the workforce should be willing to be empowered and ready to take responsibility for quality (Golhar et al., 1997).

Therefore, it seems that compatibility positively affects adoption and thus the individual organizational members' change agent behavior. The following hypothesis based on this discussion is as follows:

H1b: Compatibility has a positive effect on the individual organizational members' change agent behavior.

Complexity is defined as the degree to which an innovation is perceived as difficult to understand and use. New ideas that are simpler and clearer are adopted more rapidly than those that require the adopter to develop new skills and understanding (Rogers, 2003). Ravichandran (2000b) presents TQM as a complex administrative innovation that encompasses a cluster of quality-oriented practices, namely, the adoption of administrative programs, processes or techniques that are new to the adopting organization or individual. Moreover, as TQM is a relatively complex innovation, it will affect all the parts of the organization (Westphal et al., 1997) and the perceived complexity can also vary between individuals.

In the context of information technology acceptance, the perceived ease of use rather than complexity is often used as a determinant of adoption (Davis, 1989; Hung et al., 2003; Yi et al., 2006). Hung et al. (2003) point out that the attitude towards information technology innovations becomes more positive in line with individual innovativeness in the adoption. Their results indicate that the critical success factors influencing the adoption include the ease of use, peer influence and facilitating conditions.

The complexity and difficulty of use have generally been found to reduce the likelihood of adoption. It is thus presupposed that the result is the same with the interest in acting as a change agent, and based on this the following hypothesis is presented:

H1c: Complexity has a negative effect on the individual organizational members' change agent behavior.

According to Rogers (2003), *observability* is the degree to which the results of an innovation are visible to others, and the easier it is for individuals to see the results, the more likely they are to adopt it. The role of observability in the adoption of TQM has been emphasized in the studies conducted by Czuchry et al. (1997) and Abraham et al. (1999), who bring up the importance of open and effective communication in the adoption process. Fisscher and Nijhof (2005) also point out that TQM requires organizations to make visible to the outside world what they are doing, that they are doing the right things and doing them in the right way.

Based on the above, in the case of TQM adoption, observability positively affects adoption and supposedly also the change agency. Therefore, the following hypothesis is presented:

H1d: Observability has a positive effect on the individual organizational members' change agent behavior.

As this second research question concentrates on the innovation adoption from the individual perspective, the effects of individual characteristics on the perceptions of TQM cannot be ignored. Also, the relevant literature is reviewed in order to propose links between individual characteristics and the individual organizational members' change agent behavior in terms of facilitating the implementation of TQM. The hypothesis is proposed as follows:

H2: Individual characteristics have an effect on perceived TQM characteristics and the individual organizational members' change agent behavior.

The direction of the effects of the individual characteristics are discussed and presented below. Lewis and Seibold (1993) distinguish between formal and personal user characteristics. Formal characteristics include hierarchical level, seniority, span of control (number of reporting

subordinates), job function, formal relationships between users (e.g., authority, reporting and resource exchange relationships) and the characteristics of the users' organizational unit. Personal characteristics include general motivation, level of commitment to work or the organization, perceptions of either the goals or the mission of the organization, personal agendas, individual skills and expertise. This study concentrates on the formal characteristics because the cross-cultural nature of our sample would have seriously challenged the valid and reliable measurement of personal characteristics. Formal characteristics have also been found to (partly) determine users' responses to innovations and their involvement in them (Kossek, 1989).

Early studies on innovation diffusion report a fairly consistent positive relationship between early adoption and education and higher-status occupations (Skalski et al., 2006). Moreover, managerial issues and the role of the managers have attracted wide attention in discussions about the success of TQM: the role of the managers and a higher occupational status positively affect the adoption (Dale, 1999; Skalski et al., 2006).

According to the above writings, the following hypothesis is presented and also presupposed that as the position in the organization has a positive effect on the perceived innovation characteristics, it also affects positively the change agency activity:

H2a: A higher-status position in the organization has a positive effect on the perceived TQM characteristics and the individual organizational members' change agent behavior.

Washington and Hacker (2005) studied why change fails. They controlled for a set of possible factors that could affect an individual's resistance to change, one of which was age – age controls for the conventional wisdom that older people are more likely to resist change – and the other was tenure, or the number of years the respondent has been working for the company. In another study Ahuja and Thatcher (2005) looked at the influence of demographic values on attempts to innovate, using variables such as age, education and job tenure. They found that education and job tenure did not significantly influence such attempts.

According to Kimberly and Evanisko (1981), existing theoretical perspectives on adoption suggest the importance of four sets of individual level variables: job tenure, cosmopolitanism, educational background, and the nature of organizational involvement on the managerial level. They hypothesize that tenure and the educational level are positively related to the adoption of

administrative innovations. Their results indicate that in the case of the administrative innovation, neither tenure nor educational level acted as a significant predictor. According to the above adoption-oriented discussion about age and tenure, it is also supposed that the described characteristics also affect the individual organizational members' change agent behavior, and consequently the following hypothesis is proposed:

H2b: Tenure has a negative effect on perceived TQM characteristics and the individual organizational members' change agent behavior.

In the context of organizational innovation adoption, it is also vital to remember that the individuals are embedded in their immediate organizational structures and cultures. In addition to individual characteristics, the successful adoption of innovations requires a strong supportive organizational structure, which is why the role of key organizational factors cannot be ignored (Kimberly and Evanisko, 1981; Sciulli, 1998). Brandyberry (2003) studied the relationships between the adoption of computer-aided design (CAD) and five organizational characteristics – bureaucratic control, internal communication, external communication, organizational innovation and firm size – that are likely to affect adoption. Their results suggest that there are differences and similarities between organizational influences associated with the adoption models, but bureaucratic control and internal and external communication did have an effect on the likelihood of the firm's adopting CAD. In the TQM context, the roles of a supportive organizational infrastructure and organizational culture have been found important during implementation (Czuchry et al., 1997; Yeung and Chan, 1999). Since TQM implementation has an impact on the structures, systems and procedures, mission and core values, there is a need for open and effective corporate transformation (Czuchry et al., 1997; Abraham et al., 1999). Here in this study the analysis relies on the importance of the organizational characteristics, their effect on the adoption and implementation and thus also on the individual organizational members' change agent behavior. The following hypothesis is proposed:

H3: Organizational characteristics have an effect on perceived TQM characteristics and on the individual organizational members' change agent behavior.

The effects of the organizational characteristics are presented more precisely below. *Complete management involvement and commitment* is needed in order for the implementation to be successful (Karahanna et al., 1999; Ravichandran, 2000b; Brown et al., 2004; London, 2005). The better a person's leadership skills are, the less resistant that person might be to change, and the

findings suggest that the respondents who understood the change were more likely to be enthusiastic about it (Washington and Hacker, 2005). Dulewicz and Higgs (2005) contend that effective leadership is increasingly being seen in terms of a combination of personal characteristics: a range of skills and behaviors that need to be in place; a range of styles related to the context in which leadership is exercised; and a range of ways in which the leadership behaviors are exercised in a way that matches the personal style of the individual leader. In the case of TQM, it was found that management support for quality was positively related to swift adoption, and this variable was also positively related to adoption intensity (Ravichandran, 2000b). Longenecker and Scazzero (1996) found in their review of managerial perceptions of TQM that managers considered themselves more likely to practice it than their peers in the organization, and managers reported that leaders were less likely to practice TQM principles than employees. Deming (1994) also writes that quality must be determined by the top management and cannot be delegated – which is why management transformation is required. If there is no leadership, quality and productivity will result only as fortunate accidents. The aim of leadership should be to improve the performance of man and machine, to improve quality, to increase output, and to simultaneously bring pride of workmanship to people, because leadership plays a significant role in shaping the total quality focus of companies (Scherkenbach, 1991; Sila and Ebrahimpour, 2005). Consistently with the above writings, it is more likely that organizations where executives are committed to quality improvement will adopt TQM in their systems development swiftly and completely. Based on this it is also supposed that leadership also affects similarly the change agency, and the following hypothesis is proposed:

H3a: Leadership has a positive effect on perceived TQM characteristics and on the individual organizational members' change agent behavior.

Rogers (1995) defines *centralization* as the degree to which power and control in a system are concentrated in the hands of relatively few individuals. According to Sciulli (1998), centralization refers to the hierarchical level of authority and the extent to which individuals may participate in the decision-making within an organization. The work of Green et al. (2004) suggests that the relationships between perceived control and the diffusion of an innovation are not simple. Centralization has been hypothesized as being negatively related to the adoption of innovations in the core technology, and positively related to the adoption of administrative innovations (Kimberly and Evanisko, 1981). Lower perceived control over whether or not to adopt an innovation (low voluntariness) has been found to have a positive relation to its use (Green et al., 2004), whereas

responsibility issues versus control have become part of the management of quality. On the role of the manager, Fisscher and Nijhof (2005) write that a good balance between control and release can strengthen quality management systems. Autonomy frees employees from schedules and tight control systems. It is thought to be related to enhanced levels of innovation, and it is likely to correlate positively with attempts at IT innovation (Ahuja and Thatcher, 2005). When Subramanian and Nilakanta (1996) examined the relationships between the innovativeness of firms and their organizational characteristics and performance in the context of administrative innovations, they reported that a high level of centralization was associated with early and consistent adoption.

Here in this case it is supposed that the more space and freedom the employees have, the more likely they are to participate and act in the role of the change agent. The following hypothesis is based on this assumption:

H3b: Centralization has a negative effect on perceived TQM characteristics and on the individual organizational members' change agent behavior.

Formalization is another commonly analyzed characteristic, which goes with centralization (Brandyberry, 2003). Rogers (1995) defines formalization as the degree to which an organization emphasizes the following of rules and procedures in the performance of its members. Tight formalization inhibits considerations of innovation, but encourages its implementation (Rogers, 1995). Sciulli (1998) defines formalization as the degrees of job codification and rule observation that exist in a firm. Giving too much freedom in terms of using an innovation can serve to decrease the developers' satisfaction with it (Green et al., 2004). According to the study conducted by Subramanian and Nilakanta (1996), high levels of formalization are associated with the consistent adoption of administrative innovations. The following hypothesis is presented according to the above discussion:

H3c: Formalization has a positive effect on perceived TQM characteristics and on the individual organizational members' change agent behavior.

Interconnectedness is the degree to which the units in a social system are linked by networks, and new ideas can flow more easily if the organization has higher network interconnectedness. Interconnectedness is positively related to organizational innovativeness, and network ties with other adopters should encourage conformity in the form of TQM adoption (Rogers, 1995; Westphal

et al., 1997; Emmanouilides and Davies, 2007). The presence or absence of social interaction seems to direct the diffusion process, and according to the research results reported by Emmanouilides and Davies (2007), direct and indirect interactions may play an important role in the adoption process. Within TQM, social networks may influence the practice of adopting organizations to inform decision makers about its normative form as it emerges over time. Adopters who seek efficiency gains and face relatively minor institutional pressures may find that social ties with other adopters facilitate their efforts to match or customize quality practices with the efficiency needs and opportunities facing their organizations (Westphal et al., 1997). Based on this it is supposed that as interconnectedness and internal communication are important for the adoption, they are also needed for the change agent roles to be attractive and wanted. The following hypothesis is thus presented:

H3d: Interconnectedness has a positive effect on perceived TQM characteristics and on the individual organizational members' change agent behavior.

The benefits of adopting a TQM philosophy have been shown to apply to many businesses in spite of the differences and possible restrictions during implementation (Hides et al., 2000). It should be possible to ensure its effectiveness, especially if the task and context are first carefully analyzed before the practices are adopted (Sitkin et al., 1994). TQM offers a variety of tangible and intangible benefits culminating in cost savings for the employer and greater job satisfaction for the employee (Gunasekaran et al., 1998).

Brah et al. (2002) also found that TQM firms implemented quality-management activities better than their non-TQM counterparts, and as a result they were able to achieve a higher level of quality performance. Sila and Ebrahimpour (2005) studied TQM factors and their effect on performance, and according to their results, leadership and information and analysis carry strong implications in terms of a company's business results, and thus the effective implementation of practices related to these factors is likely to result in improved performance.

In the context of organizational change, the key role belongs to the change agents, namely, the individuals or teams that answer for initiating, leading, directing or taking direct responsibility for making change happen (Caldwell, 2003). According to Guimaraes (1997) and Laszlo (1999), the employee perspective is important because their eagerness determines the speed of the adoption, as employees are supposed to actively participate in the change process. Golhar et al. (1997) also

suggest that one of the critical factors in defining the effectiveness of TQM is the level and quality of employee participation at all levels (Guimaraes, 1997; Golhar et al., 1997; Laszlo, 1999).

It is clear from the above discussion that there are many different ways of looking at the effectiveness of TQM, and how an individual perceives its effects is dependent on his or her role in the adoption and implementation process. Nevertheless, it can be supposed that those closest to the innovation (change agents) see the effects more positively than other adopters. Here in this case it can be justified by the fact that the change agent role is taken on voluntarily, so that people who want to act in that role can be seen to be more keen and interested in TQM than others. Thus, the following hypothesis is presented:

H4: Change agents perceive the effects of TQM more positively than other adopters.

The above presented hypotheses H1–H4 are summarized in Figure 4 below.

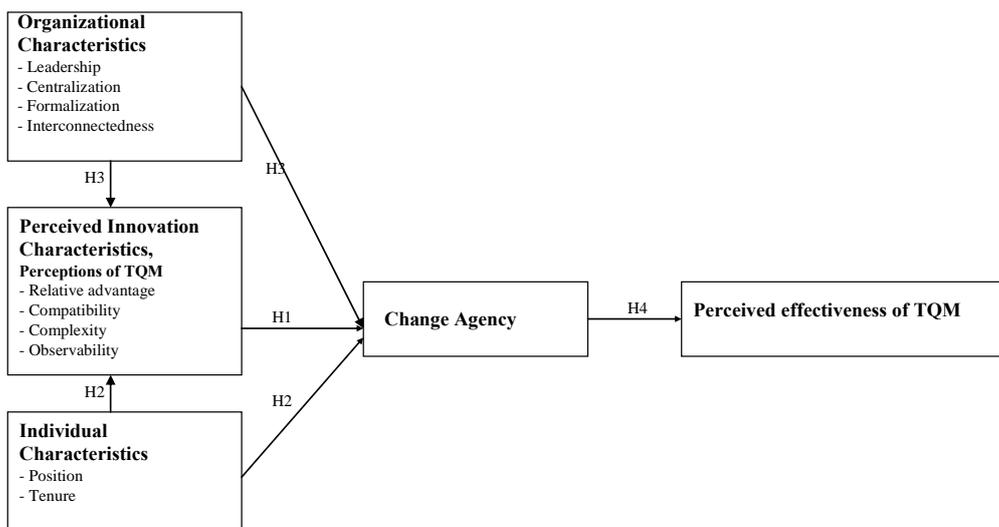


Figure 4: Hypotheses H1–H4.

2.3.2 Implementation of TQM within a global organization

Research question 3 speculates about how to measure the diffusion of an administrative innovation within an organization and what the determinants of the diffusion are. The timing of the adoption, namely, the start-up phase, and the organizational and environment characteristics affecting the timing of the adoption are studied. The depth of the implementation includes studying the current level, trend and consistency of the TQM model.

The effects of organizational characteristics

The effects the organizational characteristics have on the timing of the adoption and on the depth of the implementation are here clarified and it is presupposed that

H5: Organizational characteristics have an effect on the timing of the adoption and on the depth of the implementation.

The organizational characteristics are discussed more deeply in the following.

Based on the earlier research, one of the leading factors needed for the implementation to be successful is *complete management involvement and commitment* (Daft, 1978; Karahanna et al., 1999; Ravichandran, 2000b; Beer, 2003; Brown et al., 2004; London, 2005). In the case of TQM, it was found that management support for quality was positively related to the speed of adoption, and this variable was also positively related to the depth of adoption (Ravichandran, 2000b). Longenecker and Scazzero (1996) found in their review of managerial perceptions of TQM that managers considered themselves more likely to practice it than their peers in the organization, and managers reported that leaders were less likely to practice TQM principles than employees.

Vincent et al. (2005) categorize the factors affecting organizational innovativeness into organizational resources, organizational structure, and organizational demographics. Brandyberry (2003) studied the relationships between the adoption of computer-aided design (CAD) and five organizational characteristics, bureaucratic control, internal communication, external communication, and firm size that are likely to affect adoption. Their results suggest that there are differences and similarities between organizational influences associated with the adoption models, but bureaucratic control and internal and external communication did have an effect on the

likelihood of the firm's adopting CAD. In the TQM context, the roles of a supportive organizational infrastructure, including good management systems and organizational climate, and organizational culture have been found important during the implementation (Czuchry et al., 1997; Yeung and Chan, 1999). Brown et al. (2004) list organizational factors as those that relate to the processes and environment within the organization, like top management support, internal champion support, organizational size and use of consultants. As shown in the literature, the leadership and management commitment are needed for the successful implementation, hence it is also supposed that leadership has a positive effect on the timing of the adoption as well as on the depth of the implementation. The following hypothesis is presented:

H5a: Empowered leadership has a positive effect on the timing of the adoption and on the depth of the implementation.

In the organizational demographics category, *size* is the one most extensively studied. The meta-analysis by Damanpour (1991) shows that, in general, size has a positive effect on organizational innovativeness. Also, Rogers (2003) concluded that the size of an organization has consistently been found to be positively related to its innovativeness; thus larger organizations are more innovative. Size is also a variable that can be measured quite easily. Yusof and Aspinwall (2000) studied differences in TQM implementation between large and small businesses. As a result they found that the implementation of TQM is not and has not been an easy task for many organizations. So, in order to develop a framework that is applicable and suitable for small businesses, certain characteristics must be considered: it should be systematic and easy to understand, simple in structure, general and clear enough (Yusof and Aspinwall, 2000). In the context of information systems innovations it is generally held that the adoption and implementation is positively related to department size (Ravichandran, 2000b). According to Ravichandran (2000b), theoretically, size and adoption behavior may be positively related because increasing the size creates a critical mass that justifies investments in innovations: larger units may simply be able to better afford innovations, and it is also likely that smaller units may not have the resources to initiate and sustain change programs such as TQM. On the other hand, larger units may not only have the resources to adopt and implement TQM but also find that formal quality management methods and practices are necessary for implementing a quality culture in their large and diversified organizations. For these reasons, it is reasonable to expect larger units to adopt TQM in their systems development swiftly and completely (Ravichandran, 2000b), referring to the timing of the adoption and depth of the implementation. On the contrary to these studies, Koenig and Wigand (2004) found that the number

of employees does not predetermine the relative efficiency of e-commerce usage. The result of the study of Damanpour (1996) showed that size is more positively related to technical than to administrative innovations and that size also influences the adoption of innovations less positively than it influences the implementation of innovations. The following hypothesis presupposes that size affects positively the timing of the adoption and the depth of the implementation:

H5b: Size has a positive effect on the timing of the adoption and on the depth of the implementation.

Within the organizational structure category Hackney et al. (2006) describe the degrees of centralization and formalization as the main characteristics facilitating the adoption and implementation. The research work of Green et al. (2004) suggests that the relationships between perceived control and the diffusion of an innovation are not simple. Centralization was hypothesized as being negatively related to the adoption of innovations in the core technology, and positively related to the adoption of administrative innovations (Kimberly and Evanisko, 1981). Lower perceived control over whether or not to adopt an innovation (low voluntariness) has been found to have a positive relation to its use (Green et al., 2004), whereas responsibility issues versus control have become part of the management of quality. Fisscher and Nijhof (2005) write that a good balance between control and release can strengthen quality management systems. When Subramanian and Nilakanta (1996) examined the relationships between the innovativeness of firms and their organizational characteristics and performance in the context of administrative innovations, they reported that a high level of centralization was associated with early and consistent adoption. *Formalization* is another commonly analyzed characteristic which goes with centralization (Brandyberry, 2003). Tight formalization inhibits considerations of innovation, but encourages its implementation (Rogers, 1995). The study of Sciulli (1998) presented that adopters of both product and process innovations exhibited high levels of formalization. According to the study conducted by Subramanian and Nilakanta (1996), high levels of formalization are associated with the consistent adoption of administrative innovations. Based on the above, the following hypothesis is presented:

H5c: Centralization and formalization have a positive effect on the timing of the adoption and on the depth of the implementation.

During the implementation of TQM there is a need for open and effective corporate transformation and open communication (Czuchry et al., 1997; Abraham et al., 1999). *Interconnectedness* is the

degree to which the units in a social system are linked by networks, and new ideas can flow more easily if the organization has higher network interconnectedness. Interconnectedness is positively related to organizational innovativeness and network ties can enable organizations to learn more about TQM practices (Rogers, 1995; Westphal et al., 1997). The presence or absence of social interaction seems to direct the diffusion process, and according to the research results reported by Emmanouilides and Davies (2007), direct and indirect interactions may play an important role in the adoption process. The following hypothesis is based on the above writings:

H5d: Interconnectedness has a positive effect on the timing of the adoption and on the depth of the implementation.

The effects of environmental characteristics

Modeling the diffusion of the same innovation in several countries offers a number of benefits. If for example an innovation is released in different countries at different times, it is desirable to be able to use the data from earlier adopting countries to predict the diffusion in the later adopting countries (Meade and Islam, 2006). Modeling the innovation and diffusion process in different countries may also be a challenging task, as the effect of *different national cultures* and differences on the diffusion process gives insight into the rate of adopting the innovation (Meade and Islam, 2006).

According to the study of Sundqvist et al. (2005), the role of the culture in diffusion seems to be twofold: the time of adoption is related to the cultural distance from the innovation center, and uncertainty avoiding cultures tend to imitate, whereas, culturally similar countries tend to have similar diffusion patterns. The results of Baptista (2001) also suggest that geography plays a part in the diffusion process. Uddin (2006) provides another insight into cross-national adoption by arguing that the adaptation to an increasing variety of users, leading to adoption by an increasingly wider range of persons and enterprises at diverse locations will be some of the critical components of successful innovations.

The earlier cross-cultural innovation studies indicate that the effect of the cultural distance and the success of the adoption and implementation have been studied from the perspective of different countries, and the studies on depth have concentrated on examining how people within each country

implement the innovation. Based on the above discussion about the cultural aspects affecting the adoption, the following hypothesis is presented:

H6: Cultural distance from the innovation center has a negative effect on the timing of the adoption.

Timing and depth of implementation

Dale (1999) has pointed out that the appropriate time to introduce TQM as well as the long-term strategy for TQM and the whole change process should be well planned and the approach determined. According to the study of Ravichandran (2000b), the speed of implementation is related to the relative timing of TQM adoption. It is assumed that the implementation should be easier in the units that start the adoption later as they can utilize the knowledge the earlier adopters have gained. The earlier starting units could be seen as model examples obtaining a rather good level at the start-up. The later starters could then learn from their experiences. A similar phenomenon called *learning effect* has been consistently found in cross-country diffusion studies; the results suggest that late adopter countries benefit from the experiences of earlier adopters in terms of faster within-country diffusion (Ganesh and Kumar, 1996; Kumar and Krishnan, 2002; Sundqvist et al., 2005). Especially in this kind of multinational diffusion setting, the awareness of the existence of the learning effect is useful for managers in their decision-making processes (Kumar and Krishnan, 2002). The benefits for the units starting later could be, according to previous studies, a better and more consistent development trend compared to the units that have been in the front line. Based on the earlier writings on the timing of the adoption, which has mainly concentrated on studying the speed of the adoption, and on the learning effect, the following hypothesis is proposed:

H7: The timing of the adoption has a negative effect on the depth of the implementation.

Figure 5 below summarizes the above presented hypotheses H5–H7.

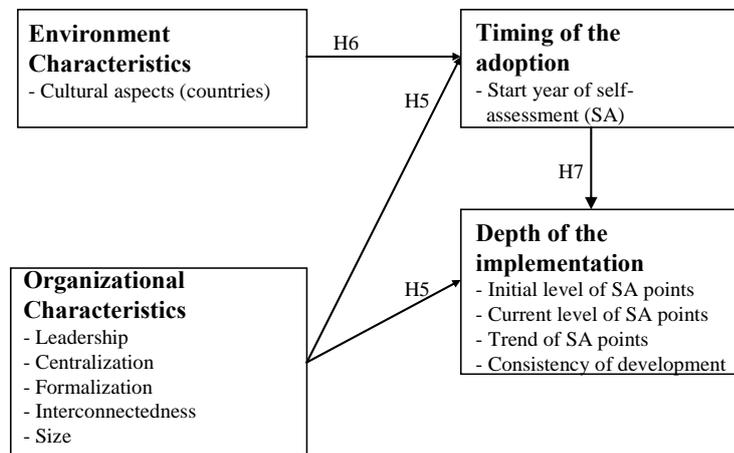


Figure 5: The hypotheses H5–H7.

2.3.3 Effectiveness of the TQM model

Research question 4 concentrates on studying the consequences of innovation implementation, when it considers what the effects of TQM are on productivity, profitability and customer satisfaction. The effects the timing of the adoption and the depth of the implementation have on the performance measures are studied. The utilized performance measures include objective data, such as profitability, productivity and customer satisfaction data.

According to Hides et al. (2000), the experiences of adopting a TQM philosophy have been shown to be beneficial to any business. Still, there are also many opposite results and opinions on the effects of TQM (Ford and Evans, 2006), and quite many researchers present that TQM alone cannot improve the results: for example, the study of Kannan et al. (1999) highlights the fact that quality initiatives alone cannot improve profitability and market share, on the contrary they write that the belief that TQM programs automatically lead to improved financial performance fails to recognize other essential elements (Kannan et al., 1999). Even though TQM can have a positive effect on operational and business results, there is no guarantee that it will definitely and alone directly produce superior profitability, since other factors may be present (Zairi et al., 1994; Terziovski and Samson, 1999; Montes et al., 2003). It must be all the business excellence enablers together that contribute collectively to the improvements (Sun, 1999). According to Zairi et al. (1994), TQM is

only a licence to practice, and Montes et al. (2003) conclude that TQM has an impact on the way organization members apply their knowledge in the organization, and therefore it affects organizational performance. Then on the other hand, advantages such as cost savings and improved productivity and profitability create the leading results for any firm that wants to succeed (Brah et al., 2002). Consequently, research exists showing that quality activities, particularly TQM, have beneficial effects on business performance (Mann and Kehoe, 1994; Pegels, 1994; Terziovski et al., 1999; Joiner, 2007).

Handfield et al. (1998) present that the positive linkage between TQM and financial performance occurs through two processes: first, improved internal performance within the organization leads to less waste, improved efficiency, and ultimately higher return on assets, and second, improved customer satisfaction levels generate increased word of mouth, loyalty, brand value, and so on, leading to higher sales and market share (Handfield et al., 1998). Sun (2000) also points out the relevance of the customer satisfaction perspective in creating business performance. According to the study of Yang (2006), TQM along with human resource management significantly affected quality performance, especially with regard to customer and employee satisfaction. According to Vora (2002), customer and employee satisfaction and streamlined processes together produce improved operational and financial results which will eventually lead to business excellence. The results of Lakhali et al. (2006) reveal positive relationships between quality management practices and organizational performance.

Mann and Kehoe (1994) have shown that all the quality activities investigated, particularly TQM, had a positive effect on the business performance (Mann and Kehoe, 1994). In the same year Pegels (1994) wrote that total quality management is not just concerned with quality, because productivity, timeliness, flexibility and profitability are also important performance measures in a TQM program. Shenawy et al. (2007) used the random effect meta-analysis for studying the TQM's effect. Their results suggested a model for TQM that incorporated five major components: top management commitment and leadership, teamwork, culture, training and education, and process efficiency. According to their findings, each of these components led to competitive advantage (Shenawy et al., 2007). When effectively implemented, TQM implementations significantly improve financial performance (Hendricks and Singhal, 2000).

As the advantage of using the quality award criteria and their systematic approaches has also been in the interest of researchers, the success of the award winners has been the target of many studies.

The research work of Jacob et al. (2004) examined how Baldrige Award winners perform with respect to several accounting and financial metrics. Their results showed that the award winners performed significantly better than the industry medians in terms of profitability and assets utilization, and according to their results, the winning firms stand out as performance leaders in their industries (Jacob et al., 2004). They got the results by investigating several accounting performance metrics and the firm value of 18 Baldrige Award winners using both raw and industry adjusted measures.

On the contrary, the study of Hansson and Eriksson (2002) argues that during the implementation period, the award recipients do not necessarily perform better than their competitors and the branch indices; but on the other hand, the award recipients perform better during the post implementation period. Eriksson and Hansson (2003) have the same findings which indicate that the financial performance develops more advantageous for companies that have successfully implemented TQM, than their branch indices and stated competitors. Wisner and Eakins (1994) made a performance assessment of the US Baldrige Quality Award Winners and paid special attention to financial characteristics. While their study revealed a strong positive relationship between quality improvement programs and the competitive attributes of the Baldrige Award winners, there is no guarantee that these improvements will result in continual financial success (Wisner and Eakins, 1994).

Quality improvement programs should not be viewed as a trivial solution for companies, but rather a means with which to build and maintain a strong competitive foundation that will ensure the opportunity for financial success (Wisner and Eakins, 1994). Therefore, generally speaking, the implementation of assessment criteria and quality management systems helps organizations to keep up with the challenges they face (Wisner and Eakins, 1994; Da Rosa et al., 2001).

After starting the implementation, however, the results do not appear immediately. Firms wanting to implement TQM effectively must have patience. It may take a rather long time to implement TQM as it requires major organizational changes in the culture and employee mindset; that is why the benefits will also be realized in the long run (Hendricks and Singhal, 2000). The findings of Agus and Abdullah (2000) moreover indicate that the length of TQM implementation has a significant impact on the companies' financial performance, because the long-term TQM adopters are found to outperform short-term adopters. The results of the study of Sun (1999) presented that the number of years of practising quality management is significantly related to both the implementation of TQM

enablers and the results achieved from TQM as well as ISO certification. The longer a company has practiced TQM, the better will its results be. The implementation of TQM must be seen as a long period of continuous improvement, and not as a fast turnkey project. The study of Sun (1999) also suggests that there is a learning effect in TQM implementation, and companies should not be frustrated at the slow showing of benefits at the early stages of TQM implementation. The main conclusion of the study is that in order to be effective, the quality management program must be total or complete (Sun, 1999).

The relevant literature on the effects of the TQM on performance are collected below in Table 3 which shows that most of the studies have been cross-sectional rather than longitudinal ones and they have mainly been conducted on the national rather than the international level. The used performance measures have been both subjective and objective.

Table 3: The studies on the effects of TQM on performance.

Authors, year	Target	1)	2)	3)	4)	Results
Mann, R., Kehoe, D. 1994	To describe the prime effects of TQM and other quality activities on business performance	Questionnaires: random sample 142 responses (22%) and TQM sample 69 resp. (58%) Interviews with 21 org.	c	n	o & s	TQM has beneficial effects on business performance
Capon, N., Kaye, M.M., Wood., M. 1995	To explore the role of measurements in a TQM program, how much the rate of success improves when the measures are used	One company	c	n	o & s	Measuring and displaying results increases the chance of success in a TQM program
Zbaracki, M. J. 1998	To clarify the relationship between technical practices and rhetoric of TQM	Interviews, documents and observation, 5 organizations	c	n	s	Mgrs use the TQM rhetoric to develop their TQM. This develops a too optimistic view of TQM.
Sun, H., 1999	To clarify the components of TQM and their impact on performance	Questionnaire, survey, 316 comp.	c	n	o & s	Some of the TQM practices contribute to the increase of customer satisfaction and business performance
Terziovski, M., Samson, D. 1999	Test the strength of the relationships between TQM practice and organizational performance, to evaluate the results of three empirical studies conducted 1991, 1993, 1996	Manufacturing companies (n=1000, resp. rate 30%) Quantitative	c	n	o & s	TQM tends to have mixed results when covaried for company size and industry type
Heindricks, K. B., Singhal, V. R. 2000	To study the impact of TQM on financial performance	Study of nearly 600 award winners, public companies	l	n	o	TQM improves financial performance

Authors, year	Target	1)	2)	3)	4)	Results
Lee, P.M., Quazi, H. A. 2001	To use the self-assessment tool to assess quality performance in various functions of the organizations	Questionnaire, self-assessment tool used to assess quality performance	c	n	s	There is a significant correlation between the assessment scores and actual scores received from SQA (Singapore Quality Award application)
Brah, S. A., Tee, S. S. L., Rao, B. M. 2002	To determine the success factors of a quality program	Questionnaire, Statistical, 185 responses (26%)	c	n	o & s	Results suggest that TQM implementation correlates with quality performance
Montes, J., Jover, A. V., Fernán-dez, L. M. M.2003	To provide a framework for studying the relationship between TQM and organizational performance.	Conceptual	c	-	s	TQM content must fit the business strategy
Largosen, Y., Largosen, S., 2005	To study the effects of the different models and tool of quality management	Questionnaire: 265 respondents (resp.rate 53%)	c	n	s	There is a statistical correlation between the adoption of the values of TQM and successful quality management
Lakhal, L., Pasin, F., Limam, M. 2006	To explore the relationship between quality management practices and their impact on performance	Questionnaire, stat. 133 comp. survey	c	n	o & s	There is a positive relationship between quality management practices and organizational performance
Shenawy, E. E., Baker, T., Lemak, D.J. 2007	To integrate findings of empirical studies into effect of TQM on competitive advantage	Meta-analysis of 51 studies	c	i	o	The used components lead to competitive advantage
Joiner, T. A. 2007	To explore the relationship between the extent of TQM implementation and organization performance	Questionnaire 84 responses (resp.rate 53%)	c	n	s	There is a strong positive relationship between TQM practices and organization performance

1) Sample size and type (data collected), 2) Nature of the study: longitudinal (l)/cross-sectional (c), 3) Nature of the data: national (n)/international (i), 4) Performance measurement: objective (o)/subjective (s)

As the earlier studies on TQM implementation and usefulness of the TQM procedures show, there are opinions for and against its effects on the performance of the company. Based on these earlier writings, it is proposed that the length of the implementation time, for example, the timing of the adoption (experience) and the depth of the implementation of the TQM model does have an effect on the performance of the company. Based on this argument, the two hypotheses are presented as follows:

H8: The timing of the adoption of TQM has a positive effect on performance.

H9: The depth of TQM implementation has a positive effect on performance.

Figure 6 presents the summary of the hypotheses H1–H9.

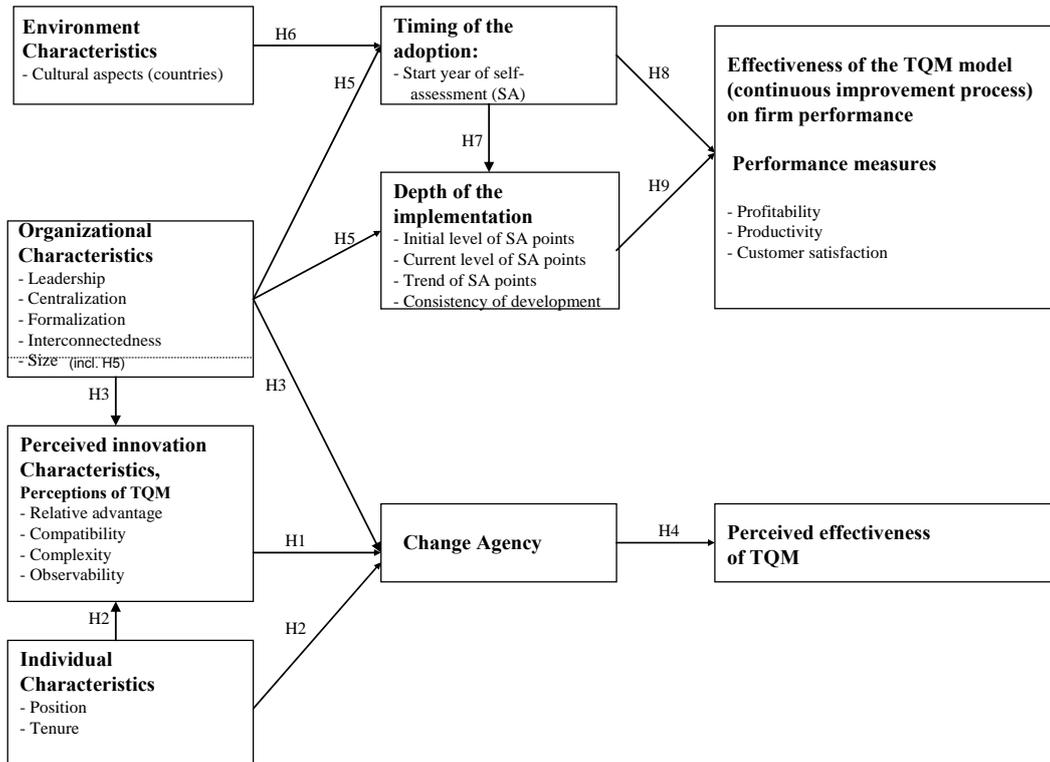


Figure 6: Summary of the hypotheses H1–H9.

From the presented hypotheses, hypotheses H1–H4 were connected with Research question 2, considering what factors explain individuals' perceptions of TQM and change agent behavior, and related to individual change agency and perceived effectiveness of the innovation. Hypotheses H5–H7 pertaining to Research question 3, exploring how to measure the diffusion of an administrative innovation within organization and what the determinants of the diffusion are, were related to diffusion within the global organization. Research question 4 about the effects of TQM on productivity, profitability and customer satisfaction concentrated on the consequences and effectiveness of the implementation and was studied with hypotheses H8 and H9.

3 RESEARCH METHODOLOGY

3.1 Research approach

Empirical studies have many alternative research paradigms. In this study a positivistic research tradition is applied. Positivism paradigm views reality as objective and a common data collection method is survey. The relaxation in this study means that a case study was chosen instead of survey across companies due to the possibility to get an exceptionally rich data set. The researcher had an access to a unit level longitudinal performance data, unit level survey data as well as company and unit level archival data. This research setting gives the opportunity to achieve a deep and profound understanding of the chosen organisational phenomena. Multiple methods are applied in the thesis because it combines elements of both quantitative and qualitative research. In the study, the research question 1 concerning how TQM was adopted and fostered in a large company is descriptive in nature and thus suitable for both qualitative and the quantitative approaches. Research questions 2, presenting the individual perspective, 3, measuring the diffusion of an administrative innovation, and 4, studying the consequences of the innovation implementation, are all explanatory in nature looking for causal relationships, and are thus approached through quantitative analysis. The rationale for method triangulation is to avoid potential validity threats that are typically based on the potential strengths and weaknesses of different methods. In this thesis the role of the qualitative explorative part is to give background for the deeper testing of selected hypotheses.

Case studies provide a ground for combining quantitative and qualitative research; therefore most case studies do involve more than one data collection method. Typically they combine different data such as archives, interviews, questionnaires and observations (Eisenhardt, 1989). Equally in this study, both the qualitative and quantitative research methods are combined, as together they offer further possibilities supporting each other and guaranteeing in-depth and intensive data collection and analysis. As the main objectives of this study concentrated on the one hand on examining the adoption and implementation of an administrative innovation and further its diffusion in the context of an organization, and on the other hand on clarifying the effectiveness and consequences of the implementation, diverse theories and empirical data are utilized. The connections between different variables are tested with quantitative analysis, and hypotheses are used for testing the concepts systematically (Bryman, 2000). Theories and the material collected exploratively from the conducted in-depth interviews are used as a guideline when moving from studying the innovation decision to further exploring the adoption and diffusion.

The *empirical data* is based on an international, global Case Company which provides an excellent environment for empirical data collection. In this kind of a large, global company there exists alteration between the different units, and it thus provides better possibilities for generalization of the results compared with the data recovered only from one country. It is also a remarkable fact that such a large pool of data was available, which is rare. The reasons for selecting this Case Company was that (1) it is global and multinational in nature which gives the opportunity to study the effects of different cultures, (2) it is a large company comprising of several business areas, which enables a comparison between different units and their possible impacts, (3) the company represents an industrial process company producing wood-based products which gives a firm ground for studying TQM, and (4) this company was already quite familiar with TQM practices as it had adopted them for over ten years ago, which supports versatile research work. In order to be able to clarify the main objectives, the longitudinal data from the Case Company enabled studying the dynamic evolution of TQM in the organizational context. The interviews and archived material were necessary in order to be able to describe the historical development and things that pushed the implementation forward. Both the qualitative and quantitative material were essential (i.e. statistics and data as well as made decisions and feelings based on memos in order to capture what really happened).

3.2 Case Company

The Case Company operates in the global forest related industry and comprises four multinational divisions producing wood-based products in areas in which it is a global market leader. It is operated and managed as one industrial group. The Company has some 44,000 employees in more than 40 countries on five continents, and its shares are listed on three stock exchanges. It mainly serves business-to-business customers through its own sales and marketing network. Production facilities are located in Europe, North and Latin America, and Asia.

The Case Company's focus is on productivity and asset evaluation with a core product portfolio. Working closer with the customers continues to be one of the cornerstones of the Company's strategy. Continual improvement activities have been of great interest in the Company, starting from the top management. The Company believes that the success comes from improving faster than their competitors.

The Case Company applies TQM mainly through the Business Excellence (BE) model. Business Excellence is thus defined as a management approach to business development and continuous improvement, and presupposes the utilization of various TQM-related issues such as quality, environmental, and occupational health and safety systems, productivity programs, six sigma and other quality tools, as well as customer satisfaction and other surveys under the same umbrella. The ultimate target is to improve profitability, competitiveness, productivity and shareholder value in order to promote business excellence in the whole company and to reach the corporate vision as being the leading company in the world in its own branch. The continuous improvement (Business Excellence) model, and especially the self-assessment process, has been in use in the Company for years. It was introduced over ten years ago, and nowadays all divisions and units systematically take part in the continual improvement practices. This study especially concentrates on the annual self-assessment process, the aim of which is to assess performance and the causal links with the business results. The term continual improvement process refers to this self-assessment process. On a yearly basis units compile a self-assessment description from their operations including areas defined either in the Case Company's own quality criteria handbook or in the common award criteria (e.g. national quality award criteria). After the business description is done, the unit conducts a self-assessment where the described operations are assessed against the selected criteria. The self-assessment session is facilitated by one or two quality facilitators, who represent some other unit and are interested in quality issues and thus voluntarily go to other units. Facilitators assist the self-assessment day and help the unit to determine and define the strengths and weaknesses during the self-assessment. After that the target is that the unit in question defines action plans based on the areas for improvement. This process is repeated annually.

The Case Company has defined that the future focus will be on productivity and asset evaluation. Further profit improvements will be vital for the future success. To reach that goal, the Case Company will need to enhance productivity continuously and maintain an investment policy that focuses on the core areas. Another important element that will continue being part of the future strategy, is working closer with the customers. The future aspect is also present in the Case Company's values which are customer focus, performance, responsibility, emphasis on people and focus on the future.

3.3 Data collection

Similarly with most of the case studies, this work combines different data, such as available archives, interviews and questionnaires (Eisenhardt, 1989). To understand the dynamics of how administrative innovation itself metamorphoses during the adoption process, this study includes data that is collected from years 1985–2006.

The used archived material includes dozens of folders, memos, training material and all kinds of notes and paper copies from past years that were still left. The utilized memos included the original memos of the groups of the opinion leaders and change agents, namely, the persons and groups in a key role when making decisions and starting the adoption of the innovation, such as memos of the TQM steering group, Management's quality days and TQM development group. For the analysis, all the available memos were read through carefully, and the information was collected (i.e. participants and covered subjects) and summarized. The training material was located in folders or on computer files and included instructions and guidelines about the TQM model. Moreover, many positive viewpoints and lists of advantages were included in the training material to get people interested and motivated about the innovation adoption. The archived material comprised altogether approximately 20,500 pages of memos, documents and other training material.

The conducted interviews were based on a time when the decision of the innovation was made. To get that information, nine key managers acting as change agents were interviewed. Three of the interviewees were board members and other six acted in different roles (some of whom changed their roles during the adoption), such as mill management, development and TQM responsibilities and also customer role was included. One interview was conducted as a group interview, including four informants. The nine informants were selected based on the analysis of the archived material. The semi-structured interview was based on the innovation decision process steps developed by Rogers (1995): knowledge, persuasion, decision, implementation and confirmation (see Appendix 1). Rogers (1995) defines the innovation decision process as a process through which an individual, or other decision-making unit, passes from first knowledge of an innovation toward the confirmation of a decision to adopt the innovation. The interview covered issues on TQM adoption and implementation in the Case Company with some additional questions related to the challenges, but also the perceived effects of the innovation decision and adoption were included. There was altogether 420 minutes of recorded interviews. The interviews were held in the Autumn 2006. More specific data about the interviews are presented in Appendix 2.

The survey was conducted at the end of 2006. It was sent to the units that had participated in the continuous improvement process during the years 2005–2006 and directed to the unit heads, those responsible for quality and business excellence, and other management level personnel in the units. It was also sent to company-wide quality network members, some of whom acted as Business Excellence (BE) facilitators. BE facilitators help units to implement their continual improvement practices (i.e. annual self-assessments) in addition to carrying out their official tasks in the Company. Their main role is to go out to other units and facilitate their self-assessment. Persons acting in the quality/BE responsibility role usually register themselves as company-wide BE facilitators, and thus promote their own official position in this role. People in other roles and positions in the unit may also train themselves to become BE facilitators if they wish to do so. The survey was conducted electronically (email format) and it was sent to 941 randomly selected persons acting in the roles described above. Of the 941 questionnaires distributed, 493 completed ones were returned. Of these, 26 were non-eligible (email auto replies, for example). When these were taken into consideration, the final response rate was 54%. The reasons for non-eligibility included long holidays, sickness absence, and maternity leave or that the respondent had moved to another position or unit.

The first items on the questionnaire covered background information (seven questions regarding the respondent's role and experience in the Company). These were followed by 26 Likert-scaled statements about the continuous improvement process (the Business Excellence self-assessment model), the unit's self-assessment and implementation of improvement projects, the leadership culture, and organizational and environmental characteristics. These Likert-scaled questions were anchored as 1 = totally agree and 5 = totally disagree. The questionnaire concluded with three open-ended questions about the power, effectiveness, and improvement suggestions arising from the continuous improvement process (survey in Appendix 3 and cover letter in Appendix 4). In order to analyze the open comments statistically, they were coded. First the author pre-grouped the open comments, which were then coded by the author and a research assistant (Table 4 below).

Table 4: Coding of the open-ended questions.

Open questions	Coding
<p>How would you define the power and effectiveness of the continuous improvement process?</p>	<p>General evaluation -1 = Negative comment 0 = Neutral/no comment 1 = Positive comment</p> <p>Power/effectiveness evaluation 0 = No comment 1 = Competitiveness securing 2 = Systematic approach, structural & regular evaluation 3 = Participation - encourages employees</p>

The questionnaire items in the survey were adapted from existing measures. The measures for the innovation characteristics consisted of eleven items altogether based on the studies conducted by Karahanna et al. (1999) and Templeton and Byrd (2003). The organizational characteristics measures consisted of thirteen items altogether, based on the studies of Subramanian and Nilakanta (1996), Brandyberry (2003) and Nguyen et al. (2003). An open question measured the perceived effectiveness of the innovation comprising two Likert-scaled statements, adapted from Karahanna et al. (1999). A more detailed description of the measures will be presented in connection with the analyses and results in Chapter 4.

The Case Company data related to the innovation was collected on a unit level from those units that had participated in the continual improvement model, and covered altogether 163 units (which meant, in practice, all the units at the end). Case Company data included self-assessment data related to the assessment criteria and the adoption time. The used measures were starting year, the level of the total scores received from the self-assessment, both the first scores and the last scores, which were measured as a percentage of the maximum total scores. The operational self-assessment scores (% of the maximum) by assessment area were collected. This enabled a comparison of the customer, leadership, strategy and human resource scores and other data. Unit specific data was also included, such as the description of the units: size (measured with the number of employees) and location (country where the unit is located). Customer data included data on customer satisfaction. Customer satisfaction data was received from the Case Company's customer satisfaction measurement system and it was measured with overall satisfaction with the Case Company question, measured with mean value (scale 1–5). The financial measures included return on capital employed (ROCE%) and productivity measures, manufacturing productivity for measuring productivity of the production and/or manufacturing units (tons/person) and sales productivity

measuring the productivity of the sales units (sold tons/person). The used Case Company material is collected in Table 5 below.

Table 5: The Case Company data and used archived material.

Collected data	Time period	Content of the data	RQ 1	RQ 2	RQ 3	RQ 4
Analysis level			Company level	Individual level	Unit level	Unit level
Interviews – 9 informants - Innovation decision	Interviews done 2006 Based on time, 1990/1999	1990: innovation decision (first) 1999: merger (second)	Primary			
Survey – 493 responses	Survey done 2006 Based on time 2005-2006	Innovation characteristics Organization characteristics Leadership characteristics		Primary	Primary	
Survey – 493 responses	Survey done 2006	Open comments on power and effectiveness	Supporting	Primary		
Archived material	1989 - 2007	Memos, training material	Primary			
Case Company data	1999 – 2006	Unit specific data			Supporting	Supporting
Case Company data	1995 – 2006	Self-assessment data	Supporting		Primary	Primary
Case Company data	1995 – 2006	Customer satisfaction data				Primary
Case Company data	1998 – 2006 1999 – 2006 2000 – 2006	Profitability (ROCE%) Manufacturing productivity Sales productivity				Primary

4 ANALYSES AND RESULTS

4.1 From innovation adoption decision to the consequences of the implementation

This examination is based on an intensive historical analysis utilizing archival material about the Case Company and interviews with change agents. By utilizing data triangulation, the aim is critically to examine the diffusion of the innovation within the firm and the consequences of innovation adoption in the Case Company during two decades.

4.1.1 Introduction to the Case Company and TQM adoption

The archived material consists of public and classified institutional sources, like company records, internal training materials, memos and unpublished company documents. The utilized documents also included the original memos of the TQM steering group, Management's quality days, and TQM development groups. The archival material was collected until data saturation. After a careful study of the material a delineation was constructed of the adoption of administrative innovation within the organization for the years 1985–2006. Archived material comprised altogether approximately 20,500 pages of memos, documents and training material (Appendix 5).

Nine key managers were selected as key informants, who had been acting in a key position during the research period. The selection of managers was based on an intensive analysis of the archival material. Three of the interviewees were Board members and other six acted in different key roles, like the mill management, development and quality issues (Appendix 2). The semi-structured interviews covered issues on TQM adoption and implementation in the Case Company. Additional questions about the challenges and perceived effects of the innovation decision and adoption were also asked. There were altogether 420 minutes of recorded interviews, which were transcribed. Interviews were conducted in 2006.

After the data collection process the data was studied systematically, the purpose being to gain an understanding on the dynamics of how administrative innovation itself metamorphoses during the adoption process.

4.1.2 Development and transformation of quality thinking in the case organization 1985–2006

Quality thinking and quality management principles began to get attention in the Case Company in the 1980s when mill and unit managers discussed about quality thinking. Also, training was organized concentrating on quality issues. In the 1980s the ERC values (expertise, responsibility and customer orientation) were launched within the Case Company. ERC values were seen as a managerial device focusing on target setting and improvement. Figure 7 illustrates the development of quality thinking in the Case Company.

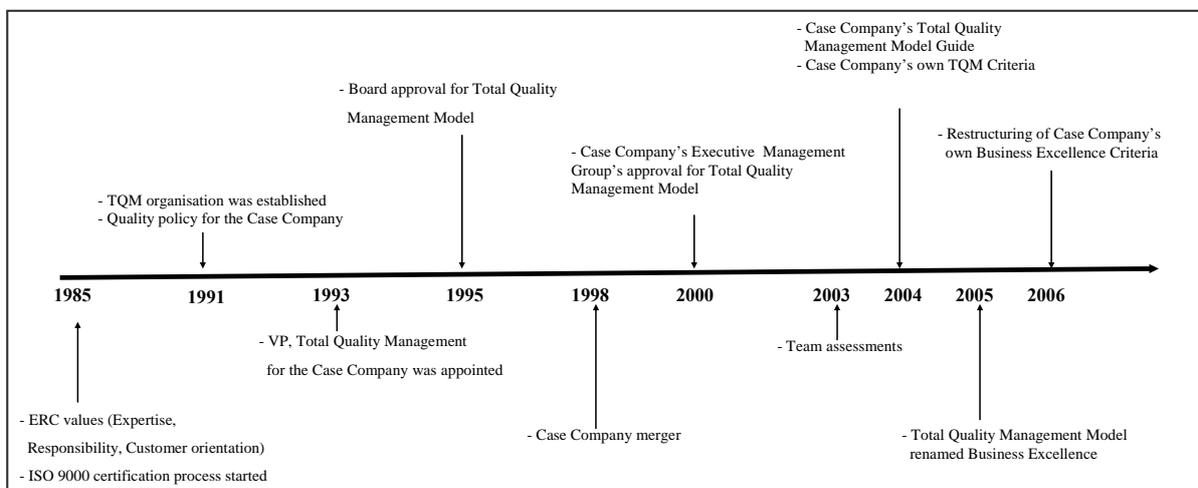


Figure 7: Quality thinking development in the Case Company 1985–2006.

4.1.3 Customer signals as triggers for quality thinking

Customers and their inquiries had a significant influence on starting systematic quality work. After the mid-1980s the first customers started to ask about standards. As was stated by an interviewee:

"Big clients were used to quality management in their own operations and they expected us to act accordingly." (Informant 7, see Appendix 2)

At that time business with Japan was also about to start and this resulted in increasing quality focus. The way of thinking among the Japanese customers was more quality centered. The basic logic with these customers was that if you make a mistake, it is not yet the end of the world; but the situation is very severe, if the product with an error that should already have been discovered earlier at the

production site was sent to the customer. It was perceived that the European way of doing business, which concentrated on handling customer complaints, was inappropriate. When the customer complained, they received a promise that the damage would be compensated for. This was not enough, however, as one interviewee referred to the customers' opinion:

"We do know that we get compensation for your mistakes but that's not what we are interested in. We are interested in things you've done so that the mistake will never happen again."
(Informant 3, see Appendix 2)

After these incidents and especially at the end of 1980, quality management issues started to gain interest within the Case Company. At the same time, one of the key persons (change agent), who was a Board member and later responsible for total quality issues, had got familiar with the quality award criteria model and understood that quality management was more than ISO 9000. The idea about the appropriateness of the quality award model for the Case Company was born.

At the end of the 1980s and the beginning of the 1990s quality thinking and quality management were the topics in the organization. It was already recognized in the Case Company that in Europe there were large companies that already utilized quality management concepts successfully. Quality work was developed as people were really getting interested in it. As one of the interviewees put it:

"I started to dig into the topic, I studied literature, participated in conferences... little by little we were convinced that this is a good thing." (Informant 1, see Appendix 2)

4.1.4 ISO standardization and TQM steering group

Systematic work towards ISO standardization started at the end of the 1980s and the beginning of the 1990s. The ISO 9000 was seen as the basis for quality thinking covering the minimum requirements for the continuation of customer relationships. Because the ISO standards were seen as the minimum requirements, a more comprehensive model for a longer time period was needed. In 1991 the Board of the Case Company named a Total Quality Management steering group, the task of which was to develop a company-wide quality management program and steer and supervise quality management actions within the company. At the same time the Board confirmed the first Quality Policy. This phase can be seen as the actual starting point of the systematic quality management activities in the Case Company.

The TQM steering group had representatives from all business lines, and another criterion for participation was that the units were to be familiar with ISO procedures. The TQM steering group reported to the Board, which acted as the highest quality management group. The task of the Board was to approve the quality management targets and quality policy and also issues related to quality costs, customer satisfaction and ISO 9000. In 1991 the main focus in the TQM steering group's meetings was issues related to ISO 9000 certification, such as the ISO 9000 model itself, its requirements and communicating of the model (Memo1991a–d, see Appendix 5). The TQM steering group was in a key role (opinion leader/change agents), when quality thinking and total quality models were launched and implemented. The TQM steering group had trained its members and some of them even taught ISO certification methods and practices outside the company. Six quality groups that concentrated on developing specific areas, such as quality costs and customer satisfaction, reported to the TQM steering group.

In 1991 the Malcolm Baldrige (MB) quality award criteria was presented to the Board. After this all quality management issues were assigned to one Board member. This way quality management became part of the top management's activities. During the years 1991 and 1992 the MB model was under careful examination and part of general discussion. Quality training (with own people) was started in the units:

"We used to involve those units and mills, whose managers were willing to get familiar with the topic and act as the main instructors in their units." (Informant , see Appendix 2)

A great influence on the diffusion of TQM were the meetings, where outside experts were invited to give presentations on illustrative examples of TQM adoption. Participants in these meetings were the heads of the units and divisions, managers and Board members. The TQM steering group also organized quality days for top managers. The feedback from top managers' quality days was positive, as archival material demonstrates:

"Feedback from top management positive and quality management suggests profit potential and management commitment increasing, with quality management we can achieve both short- and long-term results and creating quality indicators is important to short-term profitability." (Memo 1991c, see Appendix 5)

As the responsibility areas of the TQM steering group grew larger, they had to start planning a quality management handbook and quality policy for the company. Emphasis was also put on communication, and it was noticed that in the implementation of TQM it was actually a question of a cultural change process.

The next step in developing the quality management system was the appointment of a full-time manager for total quality in 1993. A decision was made to proceed with quality issues without an outside consultant. A project group was established in 1994 to clarify and study the award situation, and as a result of this group work, own self-assessment model was launched. This model was presented to the Board, and it was agreed that all the principles related to the quality model must always be approved by the Board. This way it was ensured that the top management was committed to the development. However, it was not so clear, how strongly the Board was committed to quality thinking despite the fact that some members clearly supported the quality management issues.

“Although there were some doubts about how committed the Board actually was...” (Informant 6, see Appendix 2)

4.1.5 Self-assessments begin

Interest towards total quality increased. Other companies were benchmarked and people participated in quality trainings. The possibility of starting the implementation of a systematic quality management model, self-assessment, was being studied. Based on the studies and other received information the first pilot self-assessments were carried out. The pilots were useful for getting information and feedback of the models and their suitability. The piloting units were very keen and interested in quality issues. After the positive feedback from the pilot self-assessments in 1995, the Board was willing to start the implementation of a self-assessment process based on the quality award criteria. The first official self-assessments were conducted in 1995, and the first internal quality award was celebrated in the autumn 1995. At this time also the training of personnel started and quality workshops were organized around the Case Company. This work was also the basis for the creation of a quality network. In 1995 all production units were recommended to join in, and the marketing units could join depending on their possibilities. As one of the interviewees put it:

"This wasn't an absolute must, for example, if there were some large changes in business, participation was not obligatory. However, you had to have a special reason for not getting involved." (Informant 6, see Appendix 2)

Figure 8 presents the number of units that started the yearly self-assessments, namely, the diffusion of the self-assessment procedure within the Case Company.

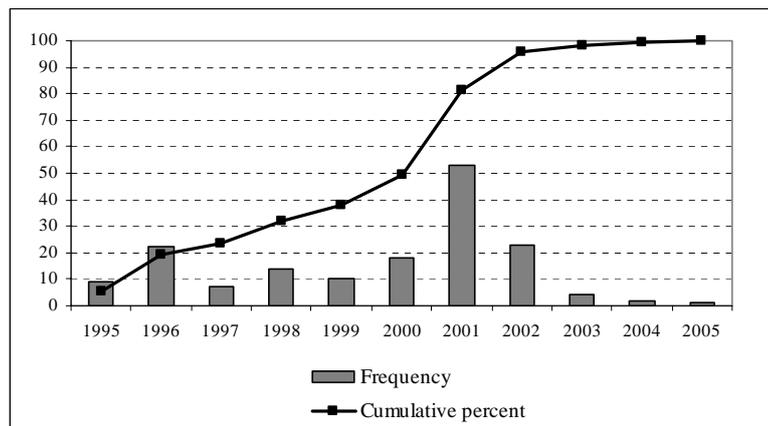


Figure 8: Adoption of self-assessment in Case Company units.

The pioneering units started in 1995, and 50% of the units had adopted self-assessment by the year 2000. In 1995 the TQM steering group planned the Case Company's Total Quality Management model (Memo1995a, see Appendix 5). At the end of 1995 the first internal quality awards were celebrated and given out for the best unit and for the unit that had most improved its operations (measured with quality award criteria). This ceremony launched the Case Company's internal quality competition which has continued ever since. The CEO of the Case Company was always present in quality award celebrations. The Board member responsible for total quality acted in the role of a change agent in that he made it possible that all the elements were put together and necessary decisions were made at the Board level.

Critical in the positive sense for the success was also that the TQM steering group was active, because it established the main principles yearly and took care of quality management training. The first quality workshops were held in 1995. In the beginning there were special workshops for Board members and division managers. After these special workshops, own change agents started to act as internal quality management trainers.

Figure 9 presents the number of self-assessments conducted yearly. The figure shows an increasing trend until the year 2003 when some units moved into an even more participatory model, the team assessment model, where more people took part in the assessment; but the assessments were not entered into the company register (“official” statistics) as such. From 2004 onwards there were around 40–50 team assessments yearly. Another reason for the decreasing number of reported self-assessments is that some units that had conducted assessments for many years, decided to reduce their workload by conducting them every second year.

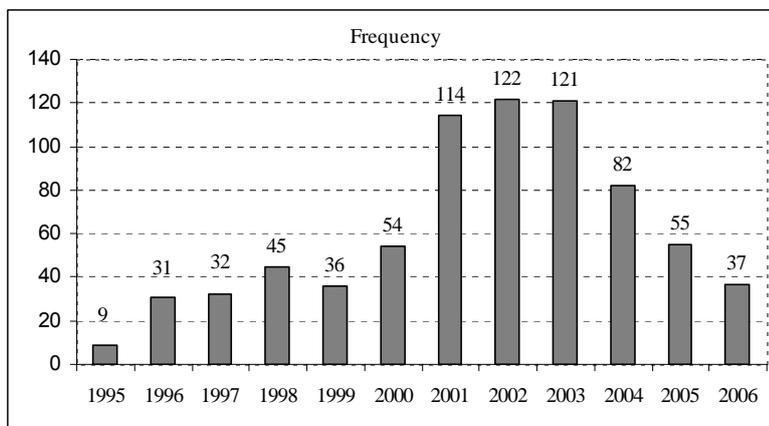


Figure 9: The number of self-assessments conducted yearly in the Case Company.

The TQM steering group continued their regular meetings. The TQM model, the self-assessment model, internal quality management competition and process were developed and critical issues discussed:

“It was realized that implementing the model requires a clear target as well as guidance and commitment, new boost, from top management. Integration of the quality prize model into the strategy process was also considered essential: the position of self-assessments can range between strategic planning and action planning.” (Memo1997a, see Appendix 5)

4.1.6 Challenges of merger for TQM

Due to major organizational changes in 1998, the TQM model was under specific examination and its benefits and weaknesses were carefully checked. The Case Company faced rather critical and challenging moments when a merger situation with the toughest competitor took place. It was a merger of equals, two companies that employed quite the same number of employees and were in the same business. The future of the quality management model was open for a while. According to the archived material it was clearly understood that the continuity of the processes had to be ensured in the merger situation.

After the merger, the person responsible for quality management in the new management team was named and the TQM model started. In the end TQM was seen as quite a useful tool in a merger management situation since it included all the necessary areas of business: leadership, strategy and planning, customer focus, information and analysis, personnel, processes and results. All these areas were evaluated from each unit's point of view and these self-assessments provided valuable information for the new management. Total quality thinking fitted well for that time, because after the merger, issues such as vision, mission, and the values of the new company were important. The TQM model, especially the self-assessment model was seen as a useful instrument for supporting management in the merged company. As one of the interviewees described the situation:

“Since we were forced to write down how we do strategy, leadership, etc. even if people know how to work together after six months and writing down what they had thought they had agreed upon. We hadn't really understood what our new colleagues had meant when they described something. And by doing all these self-assessments and actually sitting with the colleagues we learned and gained a lot in the merger process. We established a new process that was a lot quicker than otherwise we would have done.” (Informant 9, see Appendix 2)

The new TQM steering group was established. The participants were from different parts of the organization. The quality management model (self-assessment model) was approved by the new management team in 2000 to be the model of the new, merged company.

The year after the merger there were over a hundred self-assessments conducted on a yearly basis, which meant that in practice all the units took part and were involved. As more and more experience was gained from the utilization of the TQM model, it was further tailored for the use of

units of different sizes. Team self-assessments were also launched, and in 2004 own evaluation criteria were developed for the company. Until now the TQM model has been based on the previously used criteria, the national and international quality award. Many units have also taken part in external quality award competitions. Eight units have won the national quality award competition and ten units have been recognized for their excellence in quality work in the European Quality Award competition over the years. In 2005 the TQM model was renamed the Business Excellence model, and in 2006 the TQM model was restructured to better respond to the Case Company's business needs and strategy.

4.2 Individual perceptions of TQM and change agent behavior

The data was collected by means of a survey, which was sent to unit heads; those responsible for quality and business excellence, and other management level personnel in all the units that had participated in the continuous improvement process during the years 2005–2006 (see Chapter 3.3 Data collection).

4.2.1 Data and measures

The innovation (TQM) characteristics included relative advantage, complexity, compatibility and observability. Rogers (2003) suggests that innovations contain five attributes: relative advantage, compatibility, complexity, trialability and observability. Trialability, however, was not applicable in this study because it was not possible for the individuals to trial the innovation before adopting it. The measures of these characteristics consisted of eleven items altogether, which were based on the studies conducted by Karahanna et al. (1999) and Templeton and Byrd (2003). A principal component analysis was conducted and the Varimax-rotated factor loadings for each variable were examined. As a result of the principal component analysis (see Appendix 6), two components with eigenvalues greater than one emerged, explaining 61.2% of the total variance. Six items that were originally meant to measure relative advantage and complexity loaded on the second component. The items pertained to issues like being advantageous, meeting business needs, usefulness, clarity, and ease of implementation. The second component was named as *usefulness*. When the final scale for usefulness was computed as an average of the six items, the Cronbach's alpha value was .848, indicating good reliability. The five items of compatibility and observability loaded on the first component (Cronbach's alpha = .852). The items pertained to integration with existing systems and planning procedures and visibility in the unit. The original items had a reverse coding (1 = totally

agree, 5 = totally disagree), and thus low values of the final scale denote perceptions of high usefulness, compatibility and observability.

The organizational characteristics included leadership, centralization, formalization and interconnectedness. The measures of these characteristics consisted of thirteen items altogether, which were based on the studies conducted by Subramanian and Nilakanta (1996), Brandyberry (2003) and Nguyen et al. (2003). Again, a principal component analysis was conducted and the Varimax-rotated factor loadings for each variable and the Cronbach's alphas of the averaged scales were studied. As a result of the analysis (see Appendix 6), three components with eigenvalues greater than one emerged, explaining 55.8% of the total variance. Eight items describing leadership and decentralization loaded on the first component, and the component was named as *empowering leadership* (Cronbach's alpha .852). The three items of formalization loaded on the second component (Cronbach's alpha .529) and the two last items of interconnectedness loaded on the third component (Cronbach's alpha .513). The reliability coefficients for the latter two scales were well below the generally accepted guidelines, and this may result in that the true effects of formalization and interconnectedness on the perceptions of TQM and the individual's willingness to assume the change agent role are not accurately estimated (Cohen et al., 2003). The original items had a reverse coding (1 = totally agree, 5 = totally disagree), and thus low values of the final scales denote perceptions of high empowering top management support, formalization and interconnectedness.

The perceived effectiveness of the innovation was measured with one open question and two Likert-scaled statements, adapted from Karahanna et al. (1999). The wording of the questions can be seen in Appendix 3. The open question (*How would you define the power and effectiveness of the continuous improvement process?*) was coded by the nature of the comment: if it was negative, it was coded "-1", if it was positive it was coded "1", and if there was no comment, or the comment given was neutral in nature, the code "0" was used. The coding process was independently conducted by the author and a research assistant in order to assure the reliability. The two Likert-scaled statements and the coded open question were then factor analyzed. The principal component analysis (see Appendix 6) yielded one component with an eigenvalue greater than one, explaining 62.6% of the total variance. All three items loaded strongly on this component, and the final scale for effectiveness was computed as a sum of the standardized scores for the three items. The standardized scores were applied in order to eliminate the effect of varying response scales. The reliability of the final scale was satisfactory (Cronbach's alpha .686). As the original items had a

reverse coding (1 = totally agree, 5 = totally disagree), the low values of the final scale denote perceptions of high effectiveness.

4.2.2 Results

The total of 493 respondents represented 20 different nationalities, from different divisions and corporate support functions. Their working areas represented the five most important business functions: 87 (17.6%) respondents came from sales, 79 (16%) from production, 34 (6.9%) from the maintenance/services sector, 27 (5.5%) from procurement, and 119 (24.1%) from administration/finance, and the remainder (147 persons) came from all other working areas that were not classified.

The frequencies and percentages of the positions and working years of the respondents are summarized in Table 6.

Table 6: Descriptive information of the sample.

Position in the organization	N	%	N as change agent	% as change agent
Head of the unit/division	111	23	19	17
Quality/BE responsibility	90	18	39	43
Other ¹	292	59	41	14
Tenure in the organization				
Less than 2 years	10	2	1	10
2 to 5 years	43	9	8	19
6 to 10 years	78	16	18	23
Over 10 years	362	73	72	20
Total	493	100	99	20
	Mean	Std.dev.	Range	Cronbach α (# of items)
Empowering leadership	2.323	.617	1 ... 4.25	.852 (8 items)
Formalization	3.216	.681	1.33 ... 5	.529 (3 items)
Interconnectedness	2.725	.805	1 ... 5	.513 (2 items)
Usefulness	2.651	.705	1 ... 5	.848 (6 items)
Compatibility & Observability	2.674	.774	1 ... 5	.852 (5 items)
Effect	-.084	2.352	-4.78 ... 6.32	.686 (3 items)

¹⁾ Other meaning general managers, management groups, etc. in the units

Of the total 493 respondents, 99 had acted as a change agent (20%), and 97% had participated in a self-assessment (SA) session either in 2005–2006 or before 2005. Only 15 persons reported that they had never participated in a session. Seventeen percent of the surveyed heads of units and 43% of those responsible for quality/BE had worked as change agents, while two percent of the heads of units and four percent of those with BE responsibility had never taken part in a self-assessment

session. Ten percent of the employees who had been working for the Case Company for less than two years and 20% of those who had been employed there for over 10 years had acted as change agents. The highest percentage (23%) was with those with a tenure of 6–10 years. According to Table 6, empowering leadership had the lowest mean value, indicating that it was the dominating organizational characteristic, whereas the values for both innovation characteristics (usefulness and compatibility & observability) were practically the same. Table 7 gives the correlation matrix of the key variables.

Table 7: Pearson correlation coefficients.

	HU	QR	PO	T2	T5	T6	T10	EL	F	IC	U	CO	CA
HU	1												
QR	-.255**	1											
PO	-.650**	-.570**	1										
T2	-.009	-.031	.032	1									
T5	-.132**	.170**	-.021	-.044	1								
T6	-.114*	.054	.054	-.062	-.134**	1							
T10	.181**	-.144**	-.041	-.239**	-.514**	-.721**	1						
EL	-.186**	.029	.135**	-.019	.083	.011	-.056	1					
F	.093*	-.077	-.019	-.077	-.040	-.004	.054	-.185**	1				
IC	-.042	-.121**	.131**	-.014	.060	-.087	.037	.259**	.026	1			
U	-.062	-.126**	.152**	-.069	.069	.044	-.060	.339**	.156**	.430**	1		
CO	-.126**	-.067	.160**	-.052	.118**	.110*	-.154**	.506**	.126**	.326**	.677**	1	
CA	-.040	.274**	-.182**	-.036	-.011	.032	-.008	.028	.044	-.043	-.169**	-.014	1
E	-.092	-.077	.138**	-.077	.061	.022	-.036	.298**	.089	.462**	.703**	.485**	-.147**

** p < .01 and * p < .05 ; HU= head of unit, QR= quality/BE responsible, PO= other position, T2= working time <2 years, T5= 2–5 years, T6= 6–10 years, T10= GT 10years, EL= empowering leadership, F= formalization, IC= interconnectedness, U= usefulness, CO= compatibility & observability, CA= change agent, E= effectiveness

The correlation matrix indicates that the unit heads generally had a longer tenure than those responsible for quality/BE, and also tended to agree more with the practice of empowering leadership, whereas the latter perceived more interconnectedness and found TQM more useful than respondents occupying other organizational positions. Tenure was also related to perceptions, namely, the longer the respondent had been working in the company, the more compatible and observable they considered TQM.

The organizational characteristics correlated with each other statistically significantly and quite strongly: empowering leadership correlated positively with interconnectedness ($r=.259^{**}$) and negatively with formalization ($r=-.185^{**}$). Innovation characteristics are strongly associated with empowering leadership and interconnectedness, but not with formalization. The perceived effectiveness of TQM correlated positively with empowering leadership and interconnectedness,

and also with the two innovation characteristics. This suggests that respondents who come from units with lots of empowering leadership and interconnectedness consider the innovation more useful, compatible and observable, and effective.

The hypotheses were tested by means of linear and logistic regression analyses. Binary logistic regression was applied in order to predict the likelihood of acting as a change agent. Tables 8 and 9 present the results of the logistic and linear regression analyses, respectively.

Table 8: Results of the logistic regression analysis, change agency as the dependent variable.

Model fit	Chi-Square	d.f.	Pseudo R Square	% correctly classified
	58.45**	10	.182	69.1
Independent variables	B	s.e.	Wald	Exp (B)
Tenure 0-2 years	-.144	1.119	.017	.866
Tenure 2-5 years	-.548	.471	1.350	.578
Tenure 6-10 years	.155	.344	.204	1.168
Position - Head of Unit	.264	.324	.664	1.302
Position - Quality/ BE responsibility	1.642**	.301	29.819	5.168
Empowering leadership	.133	.244	.296	1.142
Formalization	.393*	.193	4.136	1.482
Interconnectedness	.229	.176	1.699	1.258
Usefulness	-1.181**	.269	19.306	.307
Compatibility & Observability	.575*	.238	5.837	1.778
Constant	-2.517**	.908	7.682	.081

* p < .05, **p < .01

The first hypothesis (H1) stated that perceived TQM characteristics have an effect on the individual organizational members' change agent behavior. This was divided into more specific hypotheses describing the nature of the effect as follows: H1a stated that perceived relative advantage has a positive effect on the individual organizational members' change agent behavior, H1b maintained that compatibility has a positive effect on the individual organizational members' change agent behavior, H1c claimed that complexity has a negative effect on the individual organizational members' change agent behavior, and H1d stated that observability has a positive effect on the individual organizational members' change agent behavior. According to the logistic regression analysis reported in Table 8, the perceived usefulness (as reported earlier, relative advantage and lack of complexity were put together and renamed usefulness) did have a significant negative coefficient on the likelihood of working as a change agent, whereas compatibility and observability had a positive coefficient. As the scales were reverse coded, this means that the more useful the respondent sees the innovation, the more likely he/she is to participate in the implementation as a change agent (BE facilitator), and the respondents are also more likely to assume change agency

when they do not consider TQM as sufficiently compatible and observable. The results suggest that hypotheses H1a and c are partially supported, whereas H1b and d are rejected (in fact there is a significant effect to the opposite direction).

The second hypothesis (H2) stated that individual characteristics have an effect on the perceived TQM characteristics and individual organizational members' change agent behavior. More focus was laid on the position in the organization and tenure which led to the following hypotheses: H2a stated that a higher-status position in the organization has a positive effect on perceived TQM characteristics and the individual organizational members' change agent behavior, and H2b claimed that tenure has a negative effect on perceived TQM characteristics and the individual organizational members' change agent behavior.

According to the linear regression analysis reported in Table 9, a formal position had no significant effects on the perceptions of the usefulness and compatibility and observability of TQM. The role did not affect how the innovation effects were perceived either. The only individual characteristic with a statistically significant effect was tenure: there were positive coefficients for tenure groups 2–5 years and 6–10 years. As the reference group was those with a tenure of more than 10 years and the innovation characteristics were measured on a reversed scale, this result implies that those who had been working in the company for more than 10 years considered TQM as more compatible and observable than those with a tenure of 2–10 years. Those with more than ten years of employment also see TQM as more useful than those with tenures between six and ten years. According to the results, those responsible for quality/BE are more likely to act as change agents than others. Thus, H2a is supported in that formal position is related to the individual organizational members' change agent behavior. H2b received no support, however. The effect of tenure on change agency was not significant, and the effect on perceived innovation characteristics was not negative, but instead non-linear: the perceptions of TQM were most positive in the tenure groups 0–2 and more than 10 years.

Table 9: Results of the linear regression analysis.

Dependent variable	Usefulness		Comp. & obs.		Effectiveness	
Model fit						
R Square	.296		.369		.532	
F	24.819**		34.099**		43.278**	
Standardized regression coefficients						
Independent variable	beta	t value	beta	t value	beta	t value

Tenure 0-2 years	-.040	-1.016	-.014	-.366	-.034	-1.000
Tenure 2-5 years	.056	1.393	.101**	2.648	-.004	-.105
Tenure 6-10 years	.079*	2.007	.134**	3.552	.007	.202
Position - Head of Unit	-.023	-.558	-.039	-1.002	-.036	-1.015
Position - Quality/BE responsibility	-.099*	-2.421	-.077*	-1.969	.024	.656
Empowering leadership	.279**	6.721	.480**	12.166	.045	1.092
Formalization	.192**	4.845	.211**	5.578	.005	.147
Interconnectedness	.343**	8.437	.191**	4.930	.195**	5.163
Usefulness					.605**	12.294
Compatibility & Observability					-.017	-.330
Change agent role					-.047	-1.323

* p < .05, **p < .01

The third hypothesis (H3) stated that organizational characteristics have an effect on perceived TQM characteristics and on the individual organizational members' change agent behavior. This hypothesis was subdivided into four hypotheses describing organizational characteristics more precisely: H3a stated that leadership has a positive effect on perceived TQM characteristics and on the individual organizational members' change agent behavior, H3b claimed that centralization has a negative effect on perceived TQM characteristics and on the individual organizational members' change agent behavior, H3c suggested that formalization has a positive effect on perceived TQM characteristics and on the individual organizational members' change agent behavior, and finally the H3d proposed that interconnectedness has a positive effect on perceived TQM characteristics and on the individual organizational members' change agent behavior. All of the organizational characteristics had a statistically significant effect on the TQM characteristics (see Table 9), meaning that if the organization had empowering leadership (including both leadership and decentralization) and was interconnected but formal in nature, the respondent considered the innovation more useful and compatible and observable. The likelihood of becoming a change agent was higher in less formalized organizational units (see Table 8), but neither empowering leadership nor interconnectedness explained the change agent behavior. Accordingly, H3a, b, and d were partially supported. As for H3c, the expected result that TQM was perceived in a more positive way in more formalized organizational structures was established, but surprisingly change agency was more likely in less formalized structures.

The fourth hypothesis (H4) predicted that change agents perceive the effects of TQM more positively than other adopters. This hypothesis was not supported, because the perceived usefulness

of the innovation and interconnectedness of the organizational unit were the only independent variables with significant and positive effects on the perceived effectiveness of TQM.

4.3 Diffusion within organizational units – TQM implementation

The empirical data for this research question was obtained on the organizational unit level from two different sources: (1) the longitudinal data of the continual improvement process (TQM model) was collected from the Case Company's internal databases, and (2) a survey of the organizational characteristics and structures was conducted within the units of the Case Company.

4.3.1 Data and measures

The collected Case Company archival data included the size and home country of each unit, the first year when the unit had participated in the continual improvement process, and the continual improvement process self-assessment scores from each year of participation. The number of the units included in the analysis was 163 and the longitudinal data was collected from years 1995–2006. In order to control for the differences in TQM implementation across different functional types, the units were also grouped and coded based on their location in the value chain (Jantunen et al., 2007). The following four groups were formed: (1) manufacturing units, (2) mechanical process units, (3) sales and marketing units and (4) company-wide and other units.

The survey was sent to all the units that had participated in the continuous improvement process during the years 2005–2006. These 84 units represented about 50% of the company's units. In order to avoid any response biases, several informants from each unit were chosen to be used. The survey was targeted to unit heads, those responsible for quality and business excellence, and other management level personnel (see Chapter 3.3 Data collection). The number of responses per unit varied from 1 to 21. For the unit level analysis, individual responses were aggregated by taking an average of the responses received from each unit (e.g. Sorensen, 2002).

In the survey, the measures of the organizational characteristics (see Chapter 4.2) consisted of 13 items altogether, which were based on the studies conducted by Subramanian and Nilakanta (1996), Brandyberry (2003) and Nguyen et al. (2003). A principal component analysis was conducted and the Varimax-rotated factor loadings for each variable and the Cronbach's alphas of the summated scales were analyzed. As a result of the analysis (see Appendix 6), three components with

eigenvalues greater than one emerged, explaining 55.8% of the total variance. Eight items describing leadership and decentralization loaded on the first component, and the component was named as *empowering leadership* (Cronbach's alpha .852). The three items of formalization loaded on the second component (Cronbach's alpha .529), and the two last items of interconnectedness loaded on the third component (Cronbach's alpha .513). The reliability coefficients for the latter two scales were below the generally accepted guidelines, and this is likely to attenuate the true effects of formalization and interconnectedness on the adoption and implementation of TQM (Cohen et al., 2003). The size of the unit was measured based on the number of employees.

The environmental characteristics measure was based on the country the unit was located. The units represented altogether 34 different countries. In order to clarify and get environmental and cultural aspects more visible, the countries were grouped and coded into six categories. The categories were Finland, Sweden, other Europe, USA, Asia and the rest of the world. In addition to these six categories, the company-wide and divisional & business area units formed their own group as it was not possible to determine a single home country for these operations. Of these seven groups Finland was used as a base country since it was the location of the first self-assessments. From the functional groupings, manufacturing was the reference group.

The timing of the adoption was measured based on the data collected from the Case Company. The timing of the adoption was defined to be the first year the unit in question participated in the continual improvement process. The depth of the implementation was measured by analyzing the self-assessment scores. The measures applied were initial level, trend and consistency. The initial level of the scores was measured at the year of adoption, whereas trend and consistency captured the direction and regularity of the subsequent development of the scores. The trend and consistency measures were derived separately for each unit by running a linear time series regression model, where the dependent variable was annual score and independent variable was time. The regression coefficient for the time variable was subsequently used as a measure of trend, and the R square as a measure of consistency for each unit in the cross-sectional analyses. A similar measurement approach has been used by Sorensen (2002).

The criteria used in self-assessment scorings was based on the national or international quality award criteria, such as the Finnish Quality Award, the European Quality Award or the American Malcolm Baldrige Quality Award. The scores could also be based on the Case Company's own Business Excellence criteria. The content of all of these criteria is almost the same, and they include

the same kind of categories, such as leadership, strategy and planning, customer focus, information and analysis, human resources and the results part. Whatever the used criteria, the percentages out of the maximum scores available were calculated in order to enable a comparison between the different criteria and scores.

4.3.2 Results

Altogether 163 units were included in the analysis. As the units were grouped according to the value chain, the first group (manufacturing) included 90 units, the second group (mechanical) included 12 units, the third group (sales and marketing) included 30 units and the fourth group (company-wide and other) included 31 units. The seven groups of the different countries and continents were formed in the following way: group 1 (company-wide and divisional & business area units) included 36 units, group 2 (Finland) included 43 units, group 3 (Sweden) included 14 units, group 4 (other Europe) included 44 units, group 5 (USA) included 23 units, group 6 (Asia) included 8 units and group 7 (other world) included 4 units.

Both Table 10 and Figure 10 present the diffusion of self-assessments across the units within the global organization. The pioneering units started in 1995, and 50% of the units had adopted the model by the year 2000.

Table 10: The timing of the adoption, number of adopting units and cumulative percentage per year.

Div	Starting year																					
	1995		1996		1997		1998		1999		2000		2001		2002		2003		2004		2005	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
A	6	6.7	17	25.6	4	30.0	5	35.6	7	43.3	9	53.3	28	84.4	10	95.6	2	97.8	1	98.9	1	100.0
B	2	16.7	1	25.0	0	25.0	5	66.7	2	83.3	0	83.3	0	83.3	0	83.3	1	91.7	1	100.0	0	100.0
C	0	0.0	1	3.3	1	6.7	3	16.7	0	16.7	6	36.7	13	80.0	6	100.0	0	100.0	0	100.0	0	100.0
D	1	3.2	3	12.9	2	19.4	1	22.6	1	25.8	3	35.5	12	74.2	7	96.8	1	100.0	0	100.0	0	100.0
All	9	5.5	22	19.0	7	23.3	14	31.9	10	38.0	18	49.1	53	81.6	23	95.7	4	98.2	2	99.4	1	100.0

Divisions: A=Manufacturing, B=Mechanical, C=Sales and marketing, D=Company-wide and others

Figure 10 illustrates the data.

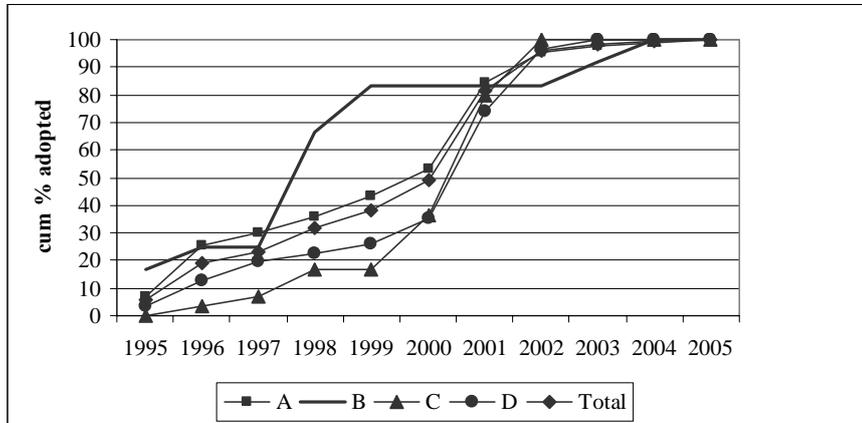


Figure 10: The timing of the adoption by divisions.

The scores given varied significantly during the implementation years. The scorings are presented in Table 11. They are measured as a percentage of the maximum possible scores. The mean value was at the lowest in 2001–2002. At this time there were many new units which started the adoption of the TQM model. Figure 11 also presents the descriptive information.

Table 11: Descriptive information of the self-assessment scores during the years 1995–2006.

Year	Frequency	Scores, % (min.)	Scores, % (max.)	Scores, % (mean)
1995	9	34.7	57.7	49.7
1996	31	28.5	63.6	47.8
1997	32	31.4	61.7	47.9
1998	45	27.4	64.1	47.4
1999	36	18.9	61.6	47.5
2000	54	23.2	63.1	45.1
2001	114	13.5	60.1	37.9
2002	122	18.0	65.8	42.0
2003	121	21.0	70.0	44.2
2004	82	21.6	79.9	46.7
2005	55	13.9	72.3	50.5
2006	37	26.9	71.7	51.0

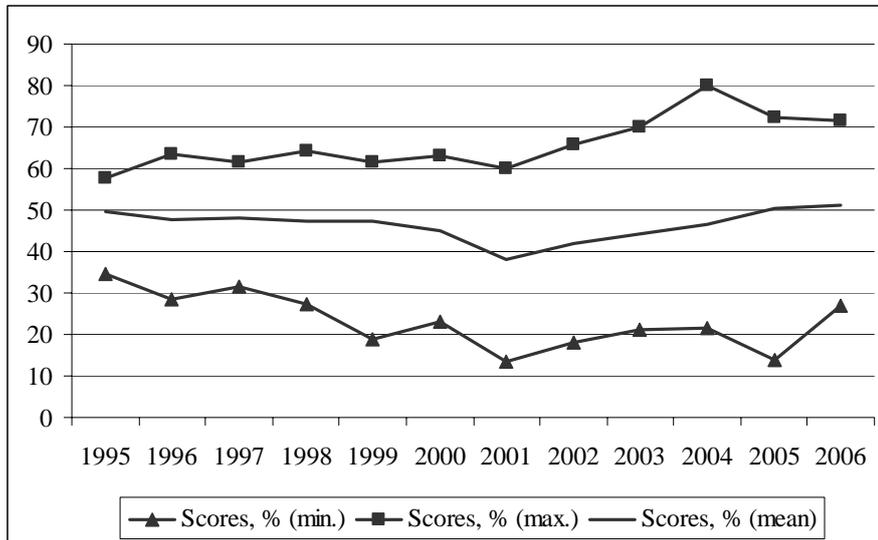


Figure 11: Descriptive information of the self-assessment scores.

Table 12 shows the descriptive statistics of the key variables. The average number of employees in the units was 303, but it varied considerably: from 3 employees up to over 7,000 employees in the case of a larger product area. According to the mean values calculated, from the organizational characteristics the empowering leadership was the dominating characteristic.

Table 12: Descriptive statistics of the key variables.

Variable	Mean	Std.dev.	Min	Max
Empowering leadership	2.35	.25	1.63	3.44
Formalization	3.26	.27	2.27	4.00
Interconnectedness	2.73	.32	1.00	3.58
Number of employees (2006)	303	693	3	7113
Time of adoption	2000	2.38	1995	2005
Initial SA score	36.78	10.61	14.00	68.00
Latest year of SA	2004	2.06	1997	2006
Latest SA score	46.55	10.37	22.00	80.00
Consistency (R square)	.565	.356	.001	.990
Trend (regression coefficient)	3.48	4.20	-6.85	23.13

The scores at the time of the adoption varied from 14% to 68% of the maximum possible scores, and the latest scores varied from 22% to 80%. The development of the self-assessment scores over

time was on average rather consistent, as the mean of the R squares from the unit-specific time series regressions indicates. The typical annual change in the self-assessment scores was about 3.5 percentage points, but there was significant variation across the units: while some units had been able to increase their scores by 23% each year, some had experienced annual declines of nearly 7%.

The hypotheses were tested by means of linear regression analyses, where the dependent variables included the timing of the adoption and four variables measuring the depth of the implementation (initial self-assessment score, latest self-assessment score, consistency of the development of the scores and the trend of the scores). The independent variables included empowering leadership, formalization, interconnectedness, location and size of the unit. The position/function in the linear regression model was also controlled for in the value chain. The timing of the adoption and initial scores were also used as independent variables when modeling the subsequent development of the scores. The resulting models were all significant at the .01 level, and the R squares were relatively high, varying from .39 for consistency to .50 for timing of the adoption. Table 13 presents the results.

Table 13: Results of the linear regression analysis.

Dependent variable	Time of adoption	Initial SA score	Latest SA score	Consistency	Trend
Model fit					
R Square	.504***	.491***	.464***	.388***	.490***
F ratio	7.809	6.812	5.658	3.553	6.280
Standardized regression coefficients					
Mechanical function ^a	.025	.024	.071	.101	.075
Sales&mktnng function ^a	-.155	-.094	-.002	.144	.061
Company-wide function ^a	.217**	-.289***	-.054	-.007	-.035
Empow. leadership	.135*	-.102	-.136	-.133	-.047
Formalization	.212**	-.236***	-.223**	-.237**	-.064
Interconnectedness	.012	.041	-.013	-.012	.053
Number of employees	.019	-.050	-.147*	-.043	-.067
Cross-national unit ^b	-.002	.010	-.089	-.188	-.078
Sweden ^b	.424***	-.132	.251**	.062	.077
Other Europe ^b	.734***	-.261**	.150	-.012	-.010
USA ^b	.434***	-.304***	-.047	-.063	-.057
Asia ^b	.382***	-.233**	.053	.009	.108
Other World ^b	.335***	-.197**	.064	-.087	.298***
Time of adoption	n.a.	-.222**	-.100	.232*	.148
Initial SA score	n.a.	n.a.	.442***	-.411***	-.436***

^adummy variable, manufacturing function as reference group, ^bdummy variable, Finland as reference group, *p<.10, **p<.05, ***p<.01

The fifth hypothesis (H5) predicted that organizational characteristics have an effect on the timing of the adoption and on the depth of the implementation. H5a suggested that leadership should enhance early adoption and deep implementation. However, none of the regression coefficients for empowering leadership were significant at the 5% level. There was a positive effect on the timing of the adoption, which was significant at the .10% level implying that units with a more empowering leadership have adopted earlier, and thus H5a received very little support. H5b suggested that size has a positive effect on the timing of the adoption and on the depth of the implementation. The size of the unit did not have significant effects either; therefore H5b also fails to receive any support from the data.

H5c stated that centralization and formalization have a positive effect on the timing of the adoption and on the depth of the implementation. Formalization had a statistically significant positive coefficient (.212) on the timing of the adoption, implying that more formalized units have started to implement TQM earlier than their less formalized counterparts. Formalization had negative effects on the scores received both from the first session (-.236) and from the last session (-.223). This result means that the more formalized a unit is, the higher the self-assessment scores are. Formalization was also related to consistency (-.237), implying that more formalized units have a more consistent development tendency. The trend of the scores was the only variable not explained by formalization, so it can be concluded that H5c is supported. H5d suggested that interconnectedness has a positive effect on the timing of the adoption and on the depth of the implementation. Interconnectedness was not a significant predictor in any of the models, thus H5d is not supported.

The sixth hypothesis (H6) proposed that the higher the cultural distance from the innovation center, the later the timing of the adoption. The positive and significant effects of the location dummy variables indicated that all the locations except cross-national units had on average started their TQM applications later than the units located in Finland. Other Europe was the slowest adopter, but the coefficients for Sweden, USA, Asia, and other world were about the same. As Sweden was culturally very close to Finland as opposed to Asia, a smaller positive coefficient for Sweden than for Asia would have been expected. Thus the results do not support H6.

The seventh hypothesis (H7) stated that the timing of the adoption had an effect on the depth of the implementation. The starting year had a significant negative effect on the initial scores (-.222), implying that the pioneering units have received better scores at their first self-assessments than the

units that later started to apply TQM. The pioneering units may have been the most interested and innovative ones, and perhaps these units were already well aware of quality thinking. The timing of the adoption was positively related to the consistency and trend of the scores, but only the effect on consistency was significant at the 10% level. Thus H7 is partially supported, as later adopters seem to achieve somewhat more consistent and speedy implementation.

As for the control variables, company-wide functions adopted TQM significantly later than manufacturing units, and also had lower initial scores. The mechanical or sales units did not differ significantly from the manufacturing units in terms of adoption timing or implementation. The lower the initial self-assessment scores, the more consistent the development has been (-.411), and the faster the increase in the scores over time (-.436). The initial scores were highest in Finland and Sweden, and lowest in the USA and in other Europe. The current scores in Swedish units were higher than in the Finnish ones. The location dummies had no significant effect on the consistency, but the increase in the scores over time has been the quickest in other world units.

4.4 Effectiveness of TQM

The used empirical data is both longitudinal and cross-sectional in nature (panel data). As the Case Company has been implementing the management tool in question (TQM, i.e. continual improvement process) for many years all around the company, the rich and historical data enabled the analysis of the effectiveness of the tool.

4.4.1 Data and measures

The data related to the TQM model included years 1995–2006, and it was collected from the Case Company. The self-assessment scores were collected from the continual improvement process material from the files of the Case Company. The scores were based on the national or international quality award criteria, such as the Finnish Quality Award Criteria, the European Quality Award Criteria (EFQM) or the American Malcolm Baldrige National Quality Award Criteria (MB), or then the scores were based on the Case Company's own business excellence criteria. The content of all of these criteria is almost the same, and they include the same kind of categories. Whatever the used criteria, the percentages out of the maximum scores available were calculated to enable the comparison between the different criteria and scores. In this analysis the used scores do not include the results category; only the received scores of the operational categories are included.

The measures of the experience of the management tool and its implementation were both based on the TQM model scores. The TQM experience was measured with the timing of the adoption. Timing of the adoption means the starting year, namely, the year when the unit in question utilized the TQM model for the first time. The implementation of the management tool was measured with the results of the operational scores from the TQM model for each year.

The performance measures consisted of three objective metrics used in the Case Company. (1) Profitability was measured with return on capital employed (ROCE%), and the data were available from years 1998–2006. Wisner and Eakins (1994) and Jacob et al. (2004) also utilized financial performance measures in their studies when assessing the performance measures of Malcolm Baldrige Award winners. (2) Productivity was measured with two different kinds of productivity data, depending on the nature of the unit. Manufacturing productivity data was used when it was a question about a production and/or manufacturing unit, and sales productivity data was used with sales units. Manufacturing productivity was measured as produced tons per person and sales productivity correspondingly as sold tons per person. Manufacturing productivity data was available from years 1999–2006 and sales productivity from years 2000–2006. Gunasekaran et al. (1998) highlighted the productivity issues when presenting a framework for developing a TQM system with a target of improving quality and productivity. (3) The third measure was customer satisfaction, which Sun (1999) has also used in earlier studies. Customer satisfaction was measured in this study with the data received from the Case Company's customer satisfaction measurement system that has been used in the company since 1996 until this day. The question pertained to "Overall satisfaction with the unit" and it was measured with the mean value calculated on the Likert scale 1–5 (1 = very dissatisfied and 5 = very satisfied). The customer satisfaction measurement system was changed in 2004 so that the "Overall satisfaction with the unit" question was not included in the system; because of this the results from years 2004–2006 used here are calculated as mean values from available questions in the system. Those questions cover "Product quality", "Delivery performance", "Technical customer satisfaction" and "Satisfaction with sales". Also, during 2004–2006 only upper organizational level results or division level results were measured in the company (not the separate unit levels); therefore the division level results representing the units belonging to each division is used here. Table 14 below includes descriptive data of the above-mentioned objective measures.

Customer satisfaction has increased from the mean value 3.69 (year 1999) to 4.10 (year 2006) measured with overall satisfaction with the company. Profitability was measured with ROCE%, which varied greatly during the research period. Manufacturing productivity has increased when comparing the mean value of the year 1999 with 2006, but during the years there is a lot of variability. Sales productivity on the contrary has increased more constantly measured with mean value during the research period. The adoption rate of the management tool was at its highest during the years 2001–2003. This is because just before this period, the Case Company merged with another company and with the merger the size of the company was doubled. This increase in the number of the units within the company was also visible when measured with activity in implementing the management tool. The mean value of the scores slightly increased being 53.43 of the maximum 100 in 2006. However, the scores were at their lowest during the same time period when the number of the units increased significantly. Table 14 presents the descriptive analysis of the objective data.

Table 14: Descriptive analysis of the objective data.

		1999	2000	2001	2002	2003	2004	2005	2006
Cs	N	37	41	41	43	44	46	46	46
Cs	Mean	3.69	3.73	3.96	4.06	4.03	4.12	4.06	4.10
Cs	s.d.	.27	.31	.18	.19	.19	.08	.09	.08
Roce	N	39	58	60	64	64	65	69	66
Roce	Mean	14.64	20.01	15.06	11.62	5.09	6.23	1.32	8.92
Roce	s.d.	10.90	18.83	17.15	14.58	11.51	13.55	11.58	11.46
Prod	N	18	43	36	46	46	48	50	48
Prod	Mean	758.27	1087.98	1154.08	1050.36	1066.98	1234.70	1088.31	1211.15
Prod	s.d.	238.57	711.60	704.69	698.91	657.06	790.13	631.22	694.32
Sold	N		26	32	32	32	32	30	30
Sold	Mean		12677.09	11616.32	12357.48	12593.51	13434.00	13076.27	16526.03
Sold	s.d.		8173.41	7432.26	8727.69	9858.93	7866.63	6123.38	9483.68
SA	N	37	55	115	126	122	83	57	37
SA	Mean	50.88	47.57	40.75	44.33	47.42	49.68	53.28	53.43
SA	s.d.	8.10	11.52	11.76	9.99	9.64	8.07	10.42	9.68
Time	N	62	80	133	156	160	162	163	163
Time	Mean	2.10	2.40	2.05	2.60	3.51	4.45	5.42	6.42
Time	s.d.	1.35	1.76	2.16	2.27	2.31	2.35	2.38	2.38

Cs=customer satisfaction, ROCE=return on capital employed, Prod=produced tons per person, Sold=sold tons per person, SA=self-assessment, Time=time of the adoption

4.4.2 Results

The effect of TQM on performance was analyzed by a linear regression analysis for panel data. The panel data consisted of eight years of annual time series from up to 163 cross-sections (i.e. organizational units). The panel was unbalanced, as there were some missing observations. The analyses were conducted with the Intercooled Stata 8.0 software. The four dependent variables – customer satisfaction, profitability, manufacturing productivity, and sales productivity – were analyzed separately, and several different model specifications and estimation methods were tested for each of them. As all the dependent variables exhibited some trend over time, year dummies were included as independent variables in all the models along with the hypothesized independents (the length of TQM experience and self-assessment scores of the previous year). The Hausman (1978) specification test was performed to assess whether the fixed or random effects model would be more appropriate (Wooldridge, 2006). Autocorrelation and heteroskedasticity tests were also conducted and robust estimation methods were used when necessary. All the models had heteroskedasticity in error terms across organizational units, and thus feasible GLS estimation was selected instead of OLS in cases where the Hausman test implied a random effect model. Customer satisfaction had no autocorrelation in errors, and thus it was estimated with least squares including cross-sectional dummies and robust standard errors, which yields the same estimates as the fixed effect model. The results are shown in Tables 15 and 16.

Table 15: Model fitting information.

	Customer satisfaction	ROCE	Prod.tons/person	Sold tons/person
N of observations	202	229	155	101
N of units	42	49	37	28
Obs per unit avg	4.81	4.67	4.19	3.61
Heteroskedasticity	Yes	Yes	Yes	Yes
Autocorrelation	No	AR(1)=.50	AR(1)=.77	AR(1)=.83
Estimation method	LSDV with robust s.e.	FGLS	FGLS	FGLS
Model significance	F ratio	Wald chi ²	Wald chi ²	Wald chi ²
Value (d.f.)	11.15 (8,152)	124.50 (8)	55.87 (8)	41.16 (7)
p	.000	.000	.000	.000

Fit statistic	R ²	Log likelihood	Log likelihood	Log likelihood
Value	.62	-807.83	-1014.06	-883.98

The number of organizational units with at least two years of data varied from 28 to 49. The productivity values had fewer observations due to their applicability to only certain types of units. The sales productivity values also started one year later than the other dependent variables. The number of years per unit varied from two to eight with an average of about four or five years of data. All the models were statistically significant at the 1% level.

Table 16: Estimated model coefficients.

	Customer satisfaction			ROCE			Produced tons/person			Sold tons/person		
	Coeff	s.e.	p	Coeff.	s.e.	p	Coeff.	s.e.	p	Coeff.	s.e.	p
SA_lag	-.00	.00	.184	.33	.07	.000	2.49	2.39	.298	29.72	22.99	.196
TQM Time	.04	.01	.000	-.52	.29	.077	103.15	18.03	.000	689.73	211.2	.001
Yr2000	-.13	.06	.049	12.69	2.12	.000	448.15	102.73	.000	n.a.	n.a.	n.a.
Yr2001	.04	.04	.308	6.11	2.08	.003	289.19	94.88	.002	896.07	941.87	.341
Yr2002	.10	.04	.029	2.20	1.74	.206	260.76	80.39	.001	-21.72	841.43	.979
Yr2003	.06	.04	.149	-3.10	1.55	.046	189.10	66.35	.004	-1094.45	730.64	.134
Yr2004	.11	.03	.000	-2.55	1.34	.057	175.11	54.02	.001	-783.79	678.19	.248
Yr2005	.03	.03	.356	-4.12	.85	.000	85.57	41.10	.040	-1931.90	652.50	.003
Constant	3.93	.11	.000	-6.19	3.71	.095	136.79	139.39	.326	8980.90	1394.08	.000

The results for customer satisfaction are shown in the first columns of Table 16. The coefficient of the self-assessment scores in the previous year is negative, but not significant. The time of applying TQM has a positive and significant effect, implying that despite some overall annual variation in customer satisfaction, those units that have started to apply TQM earlier have a higher level of customer satisfaction than their less experienced counterparts.

The results for profitability (ROCE%) have a very clear overall downward trend over the years. Taking this into account, the length of TQM experience still seems to have a marginally significant negative effect, whereas the self-assessment scores are significantly and positively related to ROCE%. This implies that the longer a unit has applied TQM, the poorer its profitability; but those units that have succeeded better in implementing TQM are clearly more profitable.

The productivity results are basically the same in terms of manufacturing and sales productivity: the longer the experience of TQM, the better the productivity. The coefficients for self-assessment scores are also positive, but the effects are not statistically significant.

The eighth hypothesis H8 maintaining that the timing of the adoption of TQM has a positive effect on performance was supported for customer satisfaction and productivity measures, but rejected for profitability. The ninth hypothesis H9 presenting that the depth of TQM implementation has a positive effect on performance was supported for profitability but not for customer satisfaction or productivity.

4.5 Summary of the results

Research question 1 was explorative in nature, and it presented the innovation decision process from the perspective of an administrative innovation. The innovation decision steps leading to adoption and furthermore to implementation within an organization were presented. The implementation of an administrative innovation was studied in the context of the strategic management system TQM. As the administrative innovation implementation process requires a particular approach and elements, the roles of the change agents and opinion leaders were presented as the drivers of the dynamic implementation progress. The main target of the study was to shed light on the dynamics of how the administrative innovation itself metamorphoses during the adoption process. For this purpose an industrial, multinational Case Company was studied, which enabled wide and multitudinal data utilization with the analysis of archives from over ten years, interviews and a survey. Based on the results, the study contributed to the theory of innovation diffusion by identifying the following requirements for the successful implementation of an administrative innovation: (1) top management involvement, especially in the early stages of adoption, (2) powerful change driven by internal change agents and network effects, (3) effective tools for implementing innovation, and (4) critical testing and restructuring and reinventing of the innovation. In this case, as the end result of the successful implementation, the administrative innovation has spread and become a powerful management system.

Research question 2 examined the total quality management model as an administrative innovation in the organization from the viewpoint of an individual. Especially the viewpoint of a leader or a change agent was examined in a situation where the innovation (TQM) was already in use in the organization. A particular focus was on issues explaining what supports the individual's change

agent role and voluntariness to facilitate the implementation of the innovation in other units. The individual and organizational characteristics were studied for this purpose as well as their effects on the perceptions of TQM and its perceived effects. As a result the organizational and innovation characteristics that support the change agent role were identified and the factors explaining change management in organizations from the individual perspective were defined with the help of a semi-structured survey.

Research question 3 aimed at studying the adoption and implementation of TQM in a global organization and viewed TQM as a mature administrative innovation. For the analysis the organizational characteristics, namely, the size of the adopting unit, different organizational structures, geographical location, and position in the value chain were studied as well as their effect on the adoption and especially on the depth of the implementation. The special focus was on studying the depth of the implementation; also the role of the timing of the adoption was included. The timing of the adoption was measured with the starting year, and the depth of the implementation included measures, like level, trend and consistency. The analyses were based on a rich dataset consisting of (i) longitudinal, archived Case Company data of the TQM model and (ii) a survey of the organizational structures within various units. As a result, the used measures, level, trend and consistency, together described the depth and success of the implementation. The organizational and environment characteristics did have varying effects on the depth of implementing an organizational innovation.

Research question 4 concentrated on studying the consequences of the innovation implementation, which was approached through the introduction of the continual improvement process (the TQM model). The effectiveness the management tool had on the performance was measured with experience of the TQM model (measured with timing of the adoption of the TQM model) and successful implementation of the model (measured with results of the operational self-assessment scores). Objective performance measures included data on profitability, productivity and customer satisfaction, which were all longitudinal in nature. The results indicated that TQM does have an effect on all three types of performance measures. A summary of the results is presented below in Table 17.

Table 17: Summary of the research questions, hypotheses and results.

Res. quest.	Hypothesis	Independent variable	Dependent variable		Results
RQ2	H1	Perceived TQM characteristics have an effect on the individual organizational members' change agent behavior.			
	H1a	Relative advantage	Change agency (+) ^{*)}		Positive effect
	H1b	Compatibility	Change agency (+)		Negative effect
	H1c	Complexity	Change agency (-)		Positive effect
	H1d	Observability	Change agency (+)		Negative effect
	H2	Individual characteristics have an effect on perceived TQM characteristics and the individual organizational members' change agent behavior.			
	H2a	Position in organization	Perceived innovation characteristics (+)	Relative advantage (rel.adv.+compl.-> usefulness)	No effect
				Compatibility (comp.+ obs.)	No effect
				Complexity (rel.adv.+compl.-> usefulness)	No effect
				Observability (comp.+obs.)	No effect
			Change agency (+)		Positive effect
	H2b	Tenure	Perceived innovation characteristics (-)	Relative advantage (rel.adv.+compl.-> usefulness)	No effect
				Compatibility (comp.+ obs.)	Positive effect
				Complexity (rel.adv.+compl.-> usefulness)	No effect
				Observability (comp.+obs.)	Positive effect
			Change agency (-)		No effect
	H3	Organizational characteristics have an effect on perceived TQM characteristics and on the individual organizational members' change agent behavior.			
	H3a	Leadership	Perceived innovation characteristics (+)	Relative advantage (rel.adv.+compl.-> usefulness)	Positive effect
				Compatibility (comp.+ obs.)	Positive effect
				Complexity (rel.adv.+compl.-> usefulness)	Positive effect
				Observability (comp.+obs.)	Positive effect
			Change agency (+)		No effect
	H3b	Centralization	Perceived innovation characteristics (-)	Relative advantage (rel.adv.+compl.-> usefulness)	Positive effect
				Compatibility (comp.+ obs.)	Positive effect
				Complexity (rel.adv.+compl.-> usefulness)	Positive effect
				Observability (comp.+obs.)	Positive effect
			Change agency (-)		No effect
	H3c	Formalization	Perceived innovation characteristics (+)	Relative advantage (rel.adv.+compl.-> usefulness)	Positive effect
				Compatibility (comp.+ obs.)	Positive effect
				Complexity (rel.adv.+compl.-> usefulness)	Positive effect
				Observability (comp.+obs.)	Positive effect
			Change agency (+)		Positive effect
	H3d	Interconnectedness	Perceived innovation characteristics (+)	Relative advantage (rel.adv.+compl.-> usefulness)	Positive effect
				Compatibility (comp.+ obs.)	Positive effect
				Complexity (rel.adv.+compl.-> usefulness)	Positive effect
				Observability (comp.+obs.)	Positive effect
			Change agency (+)		No effect

	H4	Change agents perceive the effects of TQM more positively than other adopters.			
	H4	Change agency	Effectiveness of TQM (+)		No effect
RQ3	H5	Organizational characteristics have an effect on the timing of the adoption and on the depth of the implementation.			
	H5a	Leadership (leaders.+centr. ->emp.leadersh.)	Timing of the adoption (+)		Slightly positive effect
			Depth of the implementation (+)	Initial scores	No effect
				Latest scores	No effect
				Consistency	No effect
				Trend	No effect
	H5b	Size	Timing of the adoption (+)		No effect
			Depth of the implementation (+)	Initial scores	No effect
				Latest scores	No effect
				Consistency	No effect
				Trend	No effect
	H5c	Centralization (leaders.+centr. ->emp.leadersh.)	Timing of the adoption (+)		No effect
			Depth of the implementation (+)	Initial scores	No effect
				Latest scores	No effect
				Consistency	No effect
				Trend	No effect
		Formalization	Timing of the adoption (+)		Positive effect
			Depth of the implementation (+)	Initial scores	Negative effect
				Latest scores	Negative effect
				Consistency	Positive effect
				Trend	No effect
	H5d	Interconnectedness	Timing of the adoption (+)		No effect
			Depth of the implementation (+)	Initial scores	No effect
				Latest scores	No effect
				Consistency	No effect
				Trend	No effect
	H6	Cultural distance from the innovation center has a negative effect on the timing of the adoption.			
	H6	Environment characteristics	Timing of the adoption (-)		No effect
	H7	The timing of the adoption has a negative effect on the depth of the implementation.			
	H7	Timing of the innovation adoption	Depth of the implementation (-)	Initial scores	Negative effect
				Latest scores	No effect
				Consistency	Slightly positive effect
				Trend	No effect
RQ4	H8	The timing of the adoption of TQM has a positive effect on performance.			
	H8	Timing of the adoption	Effectiveness on performance (+)	Profitability	Marginally significant negative effect
				Productivity	Positive effect
				Customer satisfaction	Positive effect

	H9	The depth of TQM implementation has a positive effect on performance.			
	H9	Depth of the implementation	Effectiveness on performance (+)	Profitability	Positive effect
				Productivity	No effect
				Customer satisfaction	No effect

RQ2: What factors explain individuals' perceptions of TQM and change agent behavior?

RQ3: How to measure the diffusion of administrative innovation within an organization and what are the determinants of the diffusion?

RQ4: What are the effects of TQM on productivity, profitability and customer satisfaction?

*) Hypothesized effect in brackets

5 DISCUSSION AND CONCLUSIONS

The procedure that follows after the organization makes the innovation decision defines the success of the following steps and the final implementation. In this study the elements supporting the dynamic development of the innovation were defined within the organization. These elements explain change management in organizations, and they comprise not only organizational and individual factors, but also environmental ones. Especially, as it was a case of administrative innovation, the individual perspective was emphasized and particularly the role of the change agents and opinion leaders. The depth of the implementation measured the success of the implementation process, and attention was also paid to the effect that the timing of the adoption had on the depth of the implementation. The consequences and the effectiveness of the administrative innovation on performance measures were furthermore examined, and these measures were based on objective data.

In the empirical part, this study utilized data from a global industrial Case Company that started systematical adoption of the TQM model in the mid 1980s. During the years, the innovation (the TQM model) has diffused and today covers the whole company. The innovation itself has also changed and evolved to being part of strategic management today. The conducted survey, the in-depth interviews, archival material and data concerning the administrative innovation, including the objective performance measures on profitability, productivity and customer satisfaction, enabled extensive and versatile analyses. The global organization and longitudinal data provided a fruitful foundation for studying the whole implementation process as such, since the earlier innovation diffusion studies have mainly concentrated on studying the innovation adoption across organizations. This Case Company suited well the purpose of this study, which was to examine the implementation process within the organization starting from the adoption decision and continuing until the consequences.

5.1 Conclusions from research questions

This study and the presented four research questions have concentrated on studying administrative innovation, its adoption, organizational implementation and diffusion. *The main objective of this study was to create new knowledge on the diffusion and effectiveness of administrative innovation in a global organization.* This main objective was achieved by providing answers to four specific research questions.

5.1.1 Top management involvement is a prerequisite

This research question (How TQM was adopted and fostered in a large global company?) was complemented with three other questions: 1) How does an organization proceed to implement TQM after it has decided to invest resources in it? 2) What are the phases and what factors explain the diffusion process? 3) What is needed for the dynamic development of TQM within an organization?

This part of the study concentrated on exploring the adoption and implementation of an administrative innovation, total quality management (TQM), and its diffusion within an organization. Since there was not much research covering this field, this part described the innovation decision leading to adoption and implementation. The promoting issues were clarified and as it was a question of the adoption and implementation of an administrative innovation, its special features were defined. For this purpose extensive historical data was utilized from years 1985–2006 from a large, global company that operates in the process industry. This data included innovation specific data, archived material, interviews and a survey. The main objective was to shed light on the dynamics of how an administrative innovation itself develops and metamorphoses during the adoption process and becomes a strategic management system.

In this case, the conducted interviews and archival material revealed that customer requirements were the main driving force for the adoption decision. During the interviews, the informants described that customers requested ISO standards and quality improvement activities. It was the customers who first stressed the importance of continual improvement issues. At the beginning, the role of the managers was vital for the adoption decision. The examination of the longitudinal material emphasized especially the role of the top managers who showed total commitment by making a conscious investment in quality when allocating resources to establish a quality management organization: for example, a Board member was appointed responsible for TQM to guarantee the linkage with the top management, a VP TQM was appointed and a TQM steering group was assigned to ensure the progress and development, and moreover a TQM facilitator network was established to guarantee knowledge sharing between units during the implementation process.

The results also proved that after the decision to adopt the innovation had been made, as it was a question about an administrative innovation, active change agents and opinion leaders were needed to support the innovation adoption decision and further implementation. One of the important

factors influencing TQM adoption was that, already in a very early phase, the development of total quality thinking was not driven by outside consultants but by the change agents within the company, as was stated in an interview:

“It was important in the beginning that there were no consultants involved, we succeeded in gathering our own specialists.” (Informant 2, see Appendix 2)

The aim was to develop their own TQM model. Committed employees took a major role in the implementation process. Other key people who supported the process in the beginning were the active Board members and especially the one responsible for quality issues. Because all the development issues had to be accepted by the Board, they were all the time in touch with quality thinking. The total quality management steering group together with the Vice President of total quality management have been the real change agents when they put effort into developing the model and fostering first the adoption and later the implementation process. In correspondence with Berranger et al. (2001) and Caldwell (2003), the change agents may really have an important role in implementing the innovation as was the case in this company. Trained quality facilitators, who voluntarily carried out self-assessments in other units, also played an important role later in spreading the information around. Today this group is called quality facilitator network and there are around one hundred participants.

The importance of network ties has been emphasized for example by Westphal et al. (1997) and Rogers (2003). The number of change agents and opinion leaders has increased during the implementation years from only a few key agents who were interested in quality development to a wide quality network currently. One significant thing in activating the latecomers to adopt TQM has been the influence of the peers and the received good examples. As soon as the benefits of the pioneering units became visible, it was also easier for others to start the process. In the innovation diffusion literature, Rogers (2003) emphasizes the influence of near peers as the most important motivator in the adoption. Especially during the initiation stage (Rogers, 1995) of implementation, the role of the change agents was important because the positive impacts were not yet evident. At that time only the pioneering units had started the TQM model adoption, and participation in the continuous improvement practices was voluntary and spontaneous.

When modeling an innovation diffusion framework for TQM implementation, Ahire and Ravichandran (2001) emphasize the importance of top management commitment. The adoption of

innovation in this case also received criticism and change resistance, as was put forward in the following statements:

"People thought it was kind of mumbo-jumbo, people thought that quality people made quality, people in the production unit thought that quality issues were OK with ISO in place, it was hard to make people understand that there was more to production than just the absolute quality of the product." (Informant 4, see Appendix 2)

"I remember people's reaction being like 'you do whatever you want to, it sounds nice, it's just another -ism.'" (Informant 4, see Appendix 2)

After the adoption and already in the early phases of implementation it became evident, that in the case of administrative innovation, the results of the innovation were not as concrete and not as visible as what they would have been with, for instance, a technical innovation. Were there then any concrete actions to get results and also to make the whole process more visible?

The introduction of the self-assessment criteria and internal quality award competition were the concrete actions that were done in order to get the innovation and its results more visible. The TQM model brought the consequences of the innovation onto a concrete level to the large audience, which in turn assisted the adoption and speeded up the diffusion (Nelson et al., 2004). In the beginning of the adoption process, the work done with quality tools and their promotion was also significant. As the success and the consequences of the innovation were not easy to see in the early phases of adoption, the development of criteria for assessing the effects of TQM was important for further diffusion of the quality management system. After developing the self-assessment model criteria and establishing internal quality competition, the consequences of the TQM model became more visible and concrete to the entire organization.

Later, developing of tailored, own quality criteria replaced the common, national criteria and this enabled company-specific data and information collection. By creating own criteria, it was possible to connect the perceived effects with the organization's strategic decisions and management actions. For example, Westerman et al. (2006) have suggested that organizations should take into account the strategic context and capabilities when adopting innovations. The restructuring (Rogers, 1995) of the innovation continued with generating customized self-assessments for teams and smaller parts of the organization. This increased knowledge of the innovation enabled measuring the

success and results closer to the action. The knowledge of the innovation expanded as soon as the measuring methods developed.

Then, along with the diffusion, the organization learned and gained more information and feedback from the innovation implementation from the earlier adopting units. Positive comments and feedback from pilots and sharing of best practices and, all in all, all positive information supported the implementation. The most sceptical units and units that did not see participation necessary at the beginning started to get interested step by step. Today, after implementing the self-assessment process for over ten years, the Case Company has experienced significant organizational changes and the innovation has also adapted itself into the changes and new situations. The systematic development of the innovation has also made it easier for units to take part in it and start the adoption.

The company's own change agents developed the model and, based on the results, another thing supporting the adoption and implementation of the innovation was that the development work was done with own people, with own change agents, and no consultants were used. This meant that the employees were committed, and this commitment must have been genuine, because no outside direction could not have ensured as active participation. The results proved that if there is the right spirit in place, people can accomplish anything – and finally get things done *t o g e t h e r*. The research setting was fruitful and the rich dataset based on the systematic quality work from many years also made it possible to study the ultimate consequences of the innovation implementation within a global organization. As the end result, quality thinking transformed in the Case Company from very embryonic ideas into a global strategic management system. The findings highlighted the role of internal change agents. The results of this research question also opened up the dynamics of the adoption process and illustrated how the adopted administrative innovation was transformed during the different phases.

When looking at Case Company's background and business environment in the mid-1980s when systematic quality thinking began within the company, quality standards and quality improvement activities were the dominating areas within the quality field. Still, the Case Company wanted to start to develop something deeper than what the quality standards offered. One step leading to another, the total quality management organization and a total quality management steering group were established to guarantee the progress. The self-assessment procedure was piloted and launched based on successful experiences. The network of voluntary quality facilitators was formed to help in

the implementation process. And soon, most of the units within the Case Company joined in to carry out self-assessments annually and, thus, took part in the internal quality competition.

The adoption of the administrative innovation, TQM, has changed the case organization more than could have been imagined in the very beginning of the adoption process. Hence, the utmost consequences of implementing the innovation within the organization were difficult to see before the adoption decision. A recent survey sent to the heads of the units/divisions, other managers and quality responsables demonstrates how these respondents see the role and effectiveness of the current TQM model. Some open comments from the survey emphasize that TQM supports communicating the company's strategic ends within the firm, as one respondent commented:

"A way to motivate all the people in our unit and a way to learn the corporate and unit-specific strategic goals."

In sum, the results contribute to the theory of innovation diffusion by identifying the following prerequisites for the successful implementation of administrative innovation. First, the top management involvement is a prerequisite especially in the early stages of adoption; second, a powerful change driven by internal change agents and network effects is needed; third, effective tools for implementing innovation foster the diffusion; and fourth, critical testing, restructuring and reinventing support the implementation.

Today the innovation is at the center of strategic management and part of the daily business within the Case Company.

5.1.2 Formalization affects on the change agent behavior

Because the earlier innovation studies have mainly concentrated on the organizational rather than the individual point of view when studying the innovation diffusion process, this research question (What factors explain individuals' perceptions of TQM and change agent behavior?) concentrated on the individual perspective in this respect with the help of the following sub-questions: 1) What kind of organizational and individual characteristics have an effect on the perceptions of TQM? 2) What kind of organizational, individual and innovation characteristics have an effect on change agent behavior? 3) Does the change agent behavior have an effect on the perceived effectiveness of the innovation?

In order to find answers to the presented questions, the implementation process was explained with the focus on change agency, especially that of a leader or a change agent. The TQM model was studied in a situation in which the innovation was already in use in the organization. The individual and organizational characteristics with an effect on the perceived innovation characteristics and change agent behavior were identified. Individual characteristics included the position in the organization and tenure, and organizational characteristics included centralization, formalization, interconnectedness and leadership.

A survey was conducted concentrating on the innovation (in the survey the TQM model was called Business Excellence, BE model), leadership culture, and organizational and environmental characteristics. Respondents covered all the units that had participated in using the innovation during 2005–2006. According to the results in the case of the administrative innovation, two of Rogers' (2003) innovation characteristics "merged": relative advantage was seen along the same dimension as complexity. This means that if the innovation was complex in nature, it affected how advantageous it was seen, and the more complex it was perceived, the less advantageous it was seen. Once individuals learn to understand and use the complex innovation, they might be more willing to assume change agency than in the case of more simple innovations. Compatibility and observability were also combined into a single dimension. One explanation for this might be that the studied innovation was administrative and thus organizational by nature. The observability of TQM to the members of the organization correlated positively with their perception of its compatibility, because the TQM philosophy and practice includes making processes observable. Moreover, decentralized decision-making and top management support for TQM merged into a single dimension in the factor analysis. This could be, at least partly, explained by the managerial position of most of the respondents or by the notion that TQM involves a lot of practices applying decentralized decision-making (e.g. teamwork, self-assessment).

The findings of this study make several theoretical contributions. As already mentioned, the factors explaining change management in organizations from the individual perspective were identified as well as organizational and innovation characteristics that support the change agent role. The results also suggest that there are differences in how change agents perceive TQM as compared to those who do not voluntarily assume this role. Perceived relative advantage and simplicity (renamed as usefulness) had an expected positive effect on the individuals' willingness to take the change agent role, but the effect of compatibility and observability was negative, contrary to the hypothesis. One

reason for this unexpected result may be that the hypothesis was derived from the innovation adoption theory, where the main dependent variable is the individual's willingness to adopt the innovation at a given time. This result implies that the factors driving adoption are different from those driving change agency. The interest for becoming a change agent seems to require that the innovation is perceived as potentially useful, but as "uncompleted business" in the sense that it is not yet observable or compatible enough.

Two individual characteristics were significantly related to the perceptions of TQM and change agent behavior: first, those working as quality responsible are naturally more likely to assume a change agent role than those working in other managerial positions. Secondly, those with a tenure between two and ten years perceived the compatibility and observability of TQM as lower than those who are at very early or late stages in their careers. This finding implies that the relationship between the tenure and innovation-related attitudes or behavior is non-linear, and is in line with Young et al. (2001) who found no significant linear association between tenure and TQM.

Formalization was the key organizational characteristic in the context of TQM implementation according to the results. Individuals are more likely to assume the change agent role when they work in an organization with a less formalized structure. On the other hand, TQM is perceived in a more positive way (i.e. more useful, compatible and observable) in organizational structures that are more formalized, interconnected, decentralized and supported by the top management. These results about the innovation characteristics are in line with those of Vincent et al. (2005) who found in their meta study that there was a positive relationship between formalization and innovativeness. However, less formalized organizational structures seem to promote change agency.

5.1.3 Organizational characteristics have an effect on the innovation adoption and implementation

When examining this research question (How to measure the diffusion of administrative innovation within an organization and what are the determinants of the diffusion?), the following supporting questions proved helpful: 1) What kind of organizational and environmental characteristics have an effect on the timing of the adoption and on the depth of implementing an administrative innovation in a global environment? 2) Can the depth of the administrative innovation (TQM) be measured? The TQM was modeled as a mature, administrative innovation. The longitudinal data was collected from a large, global company in order to get a rich enough dataset. The analysis concentrated on the

organizational and environmental characteristics, such as the size of the adopting unit, different organizational structures, geographical location, and position in the value chain and their affect on the adoption and especially on the depth of the implementation. The timing was measured utilizing the archived Case Company data. In addition to this Case Company data, a survey concentrating on the organization structures was conducted.

As a result, the organizational characteristics had varying effects on the timing of the adoption and on the depth of the implementation. First, formalization assisted the innovation implementation in organizations, whereas the interconnectedness and empowering leadership did not affect the adoption or the depth of the implementation. One reason for this might be the nature and type of the innovation studied, which was an administrative innovation consisting of quite a formal and strict procedure. It was supposed that the more formal the adopting unit is, the clearer the instructions will be and thus the easier the adoption and implementation. This result also supported the study of Ravichandran (2000a), where he listed the characteristics of an innovative organization, and one of the characteristics he found out was a mechanistic structure. The meta-analysis of the organizational innovation of Damanpour (1991) presents, however, that the association of the formalization with implementation is nonsignificant. Second, some weak support for the existence of the learning effect was received, which has been evident in cross-cultural diffusion research (Sundqvist et al., 2005). The late adopter units benefited from the experiences of earlier adopters, as they experienced more consistent improvement in their self-assessment scores over time. Third, TQM could be adopted equally in various parts of the value chain: the pioneering units were from the home country of the organization, but the geographical location had no other effect on the adoption or implementation. According to the results, the units that had started the TQM adoption later have had lower scores compared to those who have started earlier. Reasons for this might be that the units that had started earlier perceived themselves more quality oriented and have wanted to be at the forefront, do the pioneering work and be as an example for others. Another reason for the lower scores of the later comers could have been that the longer the continual improvement process has been available and in use, the more difficult it has been to get high scores.

The developed model for studying the depth of the implementation is usable, at least in the case of an administrative innovation. The used measures, namely, level, trend and consistency, together described the depth and success of the implementation.

This study contributed to the existing innovation literature, as the previous studies have mainly concentrated on the organizations' ability to adopt innovations and adoption processes, on the diffusion and adoption models, on the characteristics and elements which drive innovation diffusion or on the enablers and barriers to diffusion, ignoring the time aspect and the depth of the implementation. For studying the depth of the implementation, the organizational units' self-assessment scores were used as an indicator. The changes in the scores over time reflected the diffusion of TQM principles and practices within the unit. The available longitudinal data from over ten years enabled to study the subject from various points of views: the development of the trends, their consistency and the current level. The results indicated that the units that had started the adoption later had lower scores compared to those who had started earlier. There may be several reasons for this, but whatever the case is, it is good to remember, that the journey to excellence is a long one, perhaps a never-ending one, so it is natural that there are different development stages along the implementation (Yarrow et al., 2004). According to the results, the organizational characteristics also had varying effects on the timing of the adoption and on the depth of the implementation.

As a conclusion, the results of this research question presented how the organizational characteristics, such as the size of the adopting unit, different organizational structures, geographical location, and position in the value chain affected the timing of the adoption, and this study also helped in understanding what kind of organizational and environmental characteristics have an effect on the depth of implementing an administrative innovation in a global environment. It was also investigated whether the timing of the adoption affected the depth of the implementation. Thanks to the global industrial company where the current strategic management system has its origin in the TQM practices implemented initially in the late 1980s, the analysis was based on a rich dataset acquired by two means: (i) the longitudinal data of the strategic management practice based on TQM was collected from the archives of the Case Company, and (ii) a survey of the organizational structures within various units was also conducted in the Case Company.

5.1.4 Experience of TQM has an effect on performance measures

This research question (What are the effects of TQM on productivity, profitability and customer satisfaction?) concentrated on studying the consequences of an innovation implementation, innovation that is administrative in nature. The target was to study the effectiveness of total quality management implementation in a global organization, which had not received much attention in

past innovation diffusion research. The effect on performance was studied using the measures of experience and implementation of the continual improvement process (TQM model). The international Case Company provided a good environment for studying the performance measures. The used performance measures were the same ones the Case Company normally utilizes and thus it was possible to get the data from several years. This longitudinal dataset included three objective performance measures: 1) profitability, which was measured with return on capital employed (ROCE%), 2) productivity, which was measured with two kinds of data depending on the nature of the unit – manufacturing productivity was measured with produced tons per person and sales productivity was measured with sold tons per person – and 3) customer satisfaction, which was measured with overall satisfaction with the unit, measured with the mean value.

The results indicated that the TQM model had an effect on all three types of performance measures. However, there was variation in whether the effects came from the experience of TQM or its implementation. More precisely, according to the results, the experience with TQM affected the customer satisfaction results positively, meaning that the units that had started to apply TQM earlier had more satisfied customers than their less experienced counterparts. When measured with profitability, the longer the unit had applied TQM, the poorer its profitability was; but then on the other hand, the units that had succeeded better in implementing TQM were clearly more profitable. The productivity also increased as the experience of the TQM model increased. The results support, for example, the study of Sun (1999), where he found that all the TQM practices contributed to the increase of customer satisfaction and business performance to a certain extent; human resource development, quality strategy and quality leadership were at the top in terms of the contribution. An unexpected result was that the depth of the implementation did not have an effect on customer satisfaction or on the productivity, even though it did have a positive effect on profitability. The depth of the implementation measured the output that the organization achieves with the deployment of the TQM model, and the roots of the TQM stem from customer satisfaction. It is good to remember, however, that none of the measures can guarantee the improvement alone and there may also be other factors influencing the business environment.

Existing research was complemented as follows, the main contributions being: first, the performance measures of explainable factors were objective, including profitability (return on capital employed), manufacturing productivity (tons per person), sales productivity (sold tons per person) and customer satisfaction (customer satisfaction measurement model); second, TQM (the explaining factor) was examined both with experience (timing of the adoption) of the tool as well as

with the output that the organizational unit achieves with the deployment (depth of the implementation) of the model, namely, the self-assessment scores; and third, the longitudinal setting enabled to identify the evolvement of the effects that the TQM model had in the organization. With this study it was also possible to follow the impacts of the whole TQM model implementation process until its effects and the real bottom line results. Moreover, the Case Company with its international business environment provided a perfect ground for studying this research question.

5.2 Theoretical contribution

In sum, the findings of this study suggest the following:

- Especially, in the early phases of the adoption, the top management involvement is a prerequisite as well as the role of the active internal change agents. Effective tools for implementing the innovation support and foster the diffusion. In order the diffusion process to be successful, flexibility and restructuring of the innovation and/or the organization is needed.
- Studied perceived innovation, individual and organizational characteristics have various effects on the individual organizational members' change agent behavior, for example:
 - relative advantage affects positively on change agent behavior, whereas
 - compatibility and observability affect negatively on change agent behavior,
 - empowering leadership has no effects on change agent behavior, on the contrary to
 - formalization, which affects negatively on that behavior.
- Characteristics supporting the implementation of an innovation are different from the characteristics supporting the individual organizational members' change agent behavior, like:
 - less formalized organization supports the change agent behavior, and more formalized organization supports the depth of the implementation, then relative advantage affects positively on both the change agent behavior and implementation.
- Timing of the adoption (=experience) of the innovation affects positively on some of the performance measures, but not all of them, for example,
 - timing of the adoption affects positively on customer satisfaction measures but negatively on profitability.

- Depth of the implementation has an effect on performance measures: it affects positively on profitability.

The earlier innovation diffusion studies that have been done on the innovation adoption and diffusion in the organizational context (Kimberly and Evanisko, 1981; Damanpour et al., 1989; Subramanian and Nilakanta, 1996; Westphal et al., 1997; Damanpour and Gopalakrishnan, 1998; Ravichandran, 2000b; Ahire and Ravichandran, 2001) have mainly concentrated on explaining the variation in adoption and diffusion across organizations, rather than focusing on the diffusion processes within the organizations and especially how the innovation diffuses and extends during the years. The studies within the organization furthermore concentrate on the successful adoption decisions and models, not on studying from a wider perspective what actually happens between the innovation adoption decision and the implementation, and finally the consequences. This is also true in the TQM literature, since it has mainly concentrated on studying the TQM models and describing the critical and supporting factors rather than the whole implementation process starting from the innovation adoption decision and continuing until the consequences.

An interesting question was presented: what really happens within the total implementation and diffusion process? As a result, this study presents the innovation adoption and implementation processes, the diffusion along the years and finally the consequences within the organization. The effectiveness of the TQM model on the performance measures is also examined. The long enough time perspective enabled getting the necessary data for studying administrative innovation diffusion. The longitudinal data as such also supports the studying of the depth of the implementation of the administrative innovation, which had not received much past research either (Meyer and Goes, 1988; Koenig and Wigand, 2004). Consequently, in order to be able to study the depth perspective, the measure for effectiveness including the viewpoints of the depth, trend and consistency was developed. As an outcome, in studying the implementation process of an administrative innovation, special features came up, such as the long time span before the results and consequences become evident and the difficulty in measuring the benefits at the beginning. Other results based on the empirical case were the changes needed within the innovation as well as in the organization during the years. The findings also support the important role the change agents throughout the implementation, for example, in the beginning when the benefits of the implementation are not very easy to see.

As the previous innovation diffusion literature has mainly concentrated on the organizational point of view (few exceptions taking the internal or individual perspective, Kimberly and Evanisko, 1981; Lewis and Seibold, 1993), here the individual perspective was also studied based on the effects of the innovation, organizational and individual characteristics. Subsequently, it was presented how individuals in a global organization perceive administrative innovation and its effects and to what extent individuals are willing to act in a change agent role and what characteristics support that willingness. The role of the change agents is to communicate and facilitate the innovation and thus promote the implementation. In spite of their importance, the viewpoint of the change agents is not widely present in the available innovation diffusion literature; however, some of the few exceptions are Hartley et al. (1997), Saka (2003) and Massey and Williams (2006). As an output of this study, the empirical material made it possible to define the characteristics that support the change agent role. The used innovation characteristics included relative advantage, complexity, compatibility and observability; from these, the complexity of the innovation and the perceived benefits were interrelated, meaning that if the innovation is seen complex, it is also seen less advantageous. Compatibility and observability were in the same way interrelated. From the used organizational characteristics, leadership, centralization, formalization and interconnectedness were included. Based on the findings, the centralized system helps to institutionalize the administrative innovation and thus encourage involvement.

Individual characteristics also play an important role. Those who have been working for more than ten years consider TQM more compatible and observable than those with a tenure of 2–10 years. The empirical results also demonstrated that these key persons are able to push the innovation forward and support first the innovation adoption decision and later the implementation and diffusion processes. Consequently, a formal position in the organization has no significant effect on the perceptions of the usefulness and compatibility and observability. To the contrary, if the person sees the innovation not sufficiently compatible and observable, he or she is willing to act in the change agent role. This was also the case if the person perceived the innovation useful. When it comes to environmental characteristics, in this case the geographical locations of the units had no effects on the adoption or the implementation.

From the organization perspective, the empirical findings highlighted that, of the organizational characteristics, formalization assisted the innovation implementation in organizations. Based on the results, the innovation was perceived useful and compatible and observable, if the organization was interconnected, formal and had empowering leadership (which included both leadership and

decentralization). Especially, the quality/BE responsables perceived interconnectedness as the dominating and necessary organization characteristic. Unit heads tended to agree more with the practice of empowering leadership. Also, the more formal the adopting organization was, the easier the adoption was. To get an even deeper analysis, the model for measuring the depth of the implementation was developed. To form this model, the units' self-assessment scores during the implementation years were used as an indicator for the depth of TQM implementation. The findings of the organizational characteristics also proved that units with more empowering leadership had adopted the innovation earlier and more formalized units had started to implement the innovation earlier compared to their less formalized counterparts. Another concrete result was that the more formalized the unit was, the higher the self-assessment scores were; also, the more formalized units had more consistent development of the scores. When it comes to timing, it was positively related to the consistency and trend of the scores. To sum up the driving forces of the implementation, as shown by the results, formalization assists the innovation implementation and furthermore the level, trend and consistency describe together the depth and success of the implementation.

In order to know how effective and successful the innovation has been, the consequences of the implementation were examined. This viewpoint was interesting to study, as the benefits of implementing an innovation, the consequences, have not received much attention from earlier diffusion researchers (Rogers, 1995). The effectiveness of the implementation was measured with experience of the TQM model and with its implementation. The timing of the adoption (the starting year) measured the experience and the results of the operational scores the success of the implementation. The hard performance measures included profitability (ROCE), productivity (manufacturing productivity measured with tons per person and sales productivity measured with sold tons per person) and customer satisfaction (overall satisfaction with the unit, measured with mean value) data. According to the results, the experience affected the customer satisfaction results positively, meaning that the units that had started applying TQM earlier had more satisfied customers than their less experienced counterparts. On the other hand, when measured with profitability, the longer the unit had applied TQM, the poorer its profitability was. But the units that had succeeded better in implementing TQM were more profitable. These results indicate that the implemented TQM model does have an effect on the used performance measures.

5.3 Managerial implications

As a conclusion, this study explored the factors explaining change management in an organization from the individual and organizational points of view. The target of this study was an administrative innovation, TQM model. Based on the analysis and the results, the following managerial implications emerged: When the organization makes a decision to start adopting an administrative innovation, the key is the management involvement and especially the top management involvement. Top managers make the innovation adoption decision and after that show by their own example that this is what they want. Because it is a case of administrative innovation, the innovation decision may require organizational changes, restructuring of the organization or changes in resources, and this is one reason why the top management's total commitment is needed.

The study showed that there are other concrete implications for managers: the easier it is to see the advantages, the faster the implementation is; therefore, if a suitable measurement system for evaluating the effects of the innovation is missing, the role of the top managers and other change agents becomes emphasized. Moreover, as the administrative innovation is usually rather difficult to measure, facilitation is needed. The development of measures emerged to be one of the most essential areas that should be emphasized (Williams et al., 2004). An active network promotes the implementation as well, and especially positive news about the adoption from earlier adopters support the development.

All in all, the implementation of an administrative innovation can take years and all possible efforts are needed in order to achieve the benefits. As presented in the empirical part, the implementation of an administrative innovation has such extensive effects that it was perceived as a culture change within the organization. Based on the Case Company data, the organizational characteristics also affected the change agent behavior and the perceived effectiveness, with *empowering leadership*, *interconnectedness* and *formal structure* having the positive effect. According to the empirical results, individuals are willing to act as change agents if they themselves see the innovation useful. Individuals that have worked less than two years or more than ten years for the company are more willing to act as change agents. When asked how the organization members perceive the effects and power of the innovation, the received comments related to the systematic approach, competitiveness securing and participation.

Furthermore, the results indicated that *TQM does have an effect on the objective performance measures* used in this study. The experience (timing of the adoption) with the TQM model affected the customer satisfaction results positively, so the units that have started to apply TQM earlier had more satisfied customers than their less experienced counterparts. However, when measured with profitability, the longer a unit had applied TQM, the poorer its profitability was; but then on the other hand, the units that have succeeded better in implementing TQM are clearly more profitable. The success of the implementation was measured with results of the operational self-assessment scores. Moreover, productivity increased as the experience of the TQM model increased.

As the total quality management approach is first and foremost a team process, empowerment is needed in organizations (Scarnati and Scarnati, 2002). This is why the focus on employees is crucial for securing and improving organizational excellence (Hoogervorst et al., 2005). The element that must be kept in mind is that motivation and commitment drive the implementation and they can be achieved only by honestly supporting the participation and empowerment. Also, based on the empirical results the interconnectedness of the organization helps in finding the innovation effective.

Table 18: Summary of the main findings of the study.

Phase	Main findings
Early phases of the adoption	<ul style="list-style-type: none"> • In the early phases of the adoption managers need to act as facilitators and decision makers, but they need also support from other employees (change agents) as well, also measurement is very important. • Transparency and visibility of the results support learning from the best practices: good examples foster the adoption and implementation activity. • The innovation/change procedure must be flexible, there should be readiness to restructure or change the procedure if necessary.
Perceptions toward the model and activity to join in	<ul style="list-style-type: none"> • Empowering leadership is important element for unit heads for perceiving the model and processes useful whereas the interconnected organization is important for specialists (like quality experts). • The total working time in the company affects on how employees perceive the models as follows: <ul style="list-style-type: none"> ○ Employees with a tenure of less than 2 years or more than 10 years

	<p>perceive the models most positively.</p> <ul style="list-style-type: none"> ○ Those with a tenure of more than 10 years consider models compatible and observable and those with a tenure of over 10 years also see models more useful than those tenured between 6-10 years. <p>-> based on the results it seems that those with a tenure of more than 10 years are the most potential group of employees to support the new models.</p> <ul style="list-style-type: none"> ● Factors supporting the change agent activity are the usefulness of the model and less formalized organization structure.
Depth of the implementation	<ul style="list-style-type: none"> ● The early adoption doesn't always guarantee the successful implementation, as the later adopters seem to achieve more consistent and speedy implementation. ● Formal organization structure supports the implementation in many ways: <ul style="list-style-type: none"> ○ More formalized units have more consistent development. ○ More formalized units have succeeded better (higher scores). ○ More formalized units have started the adoption earlier.
The effects on performance	<ul style="list-style-type: none"> ● Those units that succeed better in implementation are more profitable, but the length of the implementation doesn't support the success (measured with profitability), on the contrary. ● Customer service is better and the customers more satisfied, the longer the implementation period is.

5.4 Limitations and future research

In studying the adoption and diffusion of an administrative innovation, this study utilized the total quality management (TQM) model. The focus was on studying the development of the self-assessment model and thus excluded examining other quality tools. The empirical part covered one Case Company. Even though the Case Company is a multinational industrial company operating all over the world, the generalization of the results to other types of organizations may be somewhat limited. The Case Company data and other archived material comprise several years with the research period being 1985–2006. The objective performance measures used in this study, namely,

profitability, productivity and customer satisfaction, are also affected by other external factors that were not possible to take into account in this study, such as reductions in the workforce, customer campaigns and structural changes within the organization. Since all the units represented the same industrial sector, the variety within the industry sector and business in general as well as the economic situation were manageable.

One of the targets of this study was to present the consequences of implementing TQM. In future it would be interesting to see corresponding results from studies on the consequences of some other administrative innovation and to compare them with the findings of this study. The validity of the results about formalization and interconnectedness may be limited by the low reliability of the measures. More research and discussion is also needed about the reliability of the self-assessment scores: namely, whether there is a connection between the self-assessment scores and the objective performance measures. Organizational characteristics as well as the innovation characteristics perceived by the individuals were measured cross-sectionally, but it is presumable that they also evolve over time; hence, they could also be studied longitudinally. In addition, a more in-depth analysis on the change agent role from both the individual and organizational aspects would be useful for organizations planning a similar adoption. Particularly interesting would be to see what kinds of effects, if any, the emotions and soft characteristics have on the role of change agency, namely, employee attitudes, job involvement, teamwork, career satisfaction and organizational commitment. For studying TQM from the view point of the personal characteristics, the change management could provide suitable and rich frame of reference.

The above aspects highlight that the leadership is in an important role today and the culture of supportive leadership should be even more encouraged in the future (McAdam and Henderson, 2004).

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BUSINESS EXCELLENCE INTERVIEW**Questions**

1. Short description & define your own role in the next steps:
 - a. Knowledge: Knowledge occurs when an individual learns of the innovation's existence and gains some understanding of how it functions.
 - b. Persuasion: Persuasion occurs when an individual forms a favourable or unfavourable attitude toward the innovation.
 - c. Decision: Decision occurs when an individual engages in activities that lead to a choice to adopt or reject the innovation.
 - d. Implementation: Implementation occurs when an individual puts an innovation into use
 - e. Confirmation: Confirmation occurs when an individual seeks reinforcement of an innovation-decision that had already been made, but the individual may reverse this previous decision if exposed to conflicting messages about the innovation
2. Why the continuous improvement/self-assessment process was chosen?
3. After the decision was made, how was it put forward?
4. What kinds of challenges were faced?
5. Is TQM/continuous improvement/self-assessment process everybody's tool?
6. Who should participate in the organization, what organization levels?
7. The role of the ISO 9000 certification in the development of the total quality management systems? (ISO as a route to TQM?)
8. Is Business Excellence model used as a strategic tool today?
9. Is our management utilizing the Business Excellence model in the best possible way at the moment?
10. What is the power of total quality management (three most important ones)?
11. How is the success of the total quality management measured?

12. Anything to improve?

Thank you!

APPENDIX 2

Data of the conducted interviews:

	Position in the case company during the innovation decision/adoption or the merger	Date of the interview	Duration of the interview
Informant 1	Board member	18 Nov. 2006	97 min 11 sec
Informant 2	Board member	18 Nov. 2006	97 min 11 sec
Informant 3	Manager	15 Sept. 2006	54 min 22 sec
Informant 4	Manager	18 Nov. 2006	97 min 11 sec
Informant 5	Manager	18 Nov. 2006	72 min 20 sec
Informant 6	Manager	18 Nov. 2006	97 min 11 sec
Informant 7	Manager	6 Nov. 2006	40 min 51 sec
Informant 8	Manager	24 Nov. 2006	90 min
Informant 9	Board member	18 Dec. 2006	65 min 16 sec

APPENDIX 3

BUSINESS EXCELLENCE SURVEY

Question	Your answer
Background questions	
a) Division/Corporate function I belong to	
b) The unit I report to	
c) My position in my organization *	Head of the Unit/Division Quality/BE responsible Other
d) I have worked as a Business Excellence Facilitator	
e) The area I work in	
f) I have been working for the Case Company	less than 2 years 2 to 5 years 6 to 10 years over 10 years
g) Last time I participated in a self- assessment session	in 2005 – 2006 before 2005 never participated
Continuous improvement process (Business Excellence), including unit's self-assessment and implementation of improvement projects	
1) I find the continuous improvement process as it is today useful for my unit.	Totally agree Agree Ok Disagree Totally disagree
2) The continuous improvement process is clear and easy to implement.	(same scale)
3) The continuous improvement process is successfully integrated with the existing management systems in my unit.	(same scale)
4) The continuous improvement process is compatible with the current situation in my unit.	(same scale)
5) The continuous improvement process is in line with strategic planning in my unit.	(same scale)
6) The continuous improvement process has a clear positive impact on business results.	(same scale)
7) I find continuous improvement process advantageous to my own work.	(same scale)
8) The defined areas prioritized in the self-assessment are well communicated and visible for everyone in my unit.	(same scale)
9) The defined areas for improvement are processed and finalized in my unit.	(same scale)
10) The content of the criteria used in self-assessments is understandable.	(same scale)
11) The content of the criteria used in self-assessments meets today's business needs.	(same scale)
Organizational characteristics	
12) Organizational structure is hierarchical in my unit.	(same scale)
13) Employees are encouraged to make independent decisions in my unit.	(same scale)
14) Actions in my unit are based on knowledge and freedom to make choices.	(same scale)
15) Rules and strict orders control our lives in my unit.	(same scale)
16) I can make my own decisions without checking with anybody else.	(same scale)
17) Interaction and cooperation are supported in my unit.	(same scale)
18) The continuous improvement process in my unit is implemented using strict and controlled instructions	(same scale)
19) In my opinion, the units are open in sharing their best practices.	(same scale)
20) I find the continuous improvement network (e.g. quality network/facilitator network) useful for sharing practices within Case Company.	(same scale)
Leadership culture	
21) The attitude towards change is positive in my unit	(same scale)
22) People are encouraged to participate in the continuous improvement work in my unit.	(same scale)
23) The head of our unit is committed to the continuous improvement process.	(same scale)
24) Leaders empower and motivate employees in my unit.	(same scale)
Environmental characteristics	
25) Using the continuous improvement process has improved our company image.	(same scale)
26) The Business Excellence model gives us competitive advantage compared to competitors.	(same scale)
Open comments	
27) How would you define the power and effectiveness of the continuous improvement process?	(same scale)
28) How would you improve the current Case Company's Excellence model?	(same scale)
29) Other comments for the future!	(same scale)
Thank you for your help!	

APPENDIX 4***COVER LETTER OF THE SURVEY***

(MESSAGE TO UNITS 8.12.2006)

Dear Recipient,

In *Case Company* we have done systematic quality management for over 15 years. At the moment most of our divisions and units are doing annual self-assessments and several other quality tools have been utilized to reach the success in business.

As part of the continuous development work I am writing my Doctoral Thesis about *Case Company's* Business Excellence Model for Corporate Business Excellence Team. The Thesis concentrates on the power and effectiveness of total quality management and especially on the self-assessment process and its implementation in the company. For this purpose I collect and analyse different kind of information related to Business Excellence and self-assessments (e.g. customer satisfaction data, self-assessment data, financial data, etc..).

Enclosed you'll find a survey concerning *Case Company's* Business Excellence Model. This survey is sent to all units which have done the self-assessment during 2005 – 2006, also to some additional interest groups. The target group includes Head of the Units, Directors and Managers and Business Excellence Coordinators.

All data will be confidentially handled and no unit-specific information will be revealed. The gathered data will be used for analysis together with other types of data and will not be published as such. The results will be also utilized by *Case Company's* management to further develop the Business Excellence model. This is why your answer is important.

You can access the survey on the link below. It shouldn't take more than about 10 minutes to fill it in. When answering the questions please reflect the current situation in your unit.

LINK

The survey link is open 8.12. – 18.12.2006. Thank you for your help!

APPENDIX 5

Referred archived material

	Material	Date
Memo1991a	TQM steering group meeting	09.06.1991
Memo1991b	TQM steering group meeting	19.06.1991
Memo1991c	TQM steering group meeting	09.10.1991
Memo1991d	TQM steering group meeting	25.11.1991
Memo1993a	TQM steering group meeting	17.02.1993
Memo1993b	TQM steering group meeting	07.05.1993
Memo1995a	TQM steering group meeting	22.03.1995
Memo1996a	TQM steering group meeting	15.04.1996
Memo1997a	TQM steering group meeting	22.09.1997
Memo1998a	TQM steering group meeting	18.09.1998
Training material 1989	ERC training material -folder	1989
Training material 1991	Total Quality training -material	1991
Training material 1992	Total Quality Management in Case Company -folder	1992
Training material 2007a	What is Business Excellence -material	2007
Training material 2007b	Business Excellence today -material	2007

ERC=expertise, responsibility and customer orientation

SURVEY ITEMS AND FACTOR SOLUTIONS

APPENDIX 6

BUSINESS EXCELLENCE SURVEY	Factor Loadings	
	1 ^{a)}	2 ^{b)}
Statements (scale: 1 = totally agree, 5 = totally disagree)		
The defined areas for improvement are processed and finalized in my unit.	.801	
The continuous improvement process is successfully integrated with the existing management systems in my unit.	.797	
The continuous improvement process is in line with strategic planning in my unit.	.721	
The continuous improvement process is compatible with the current situation in my unit.	.715	
The defined areas prioritized in the self-assessment are well communicated and visible for everyone in my unit.	.686	
The content of the criteria used in self-assessments meets today's business needs.		.812
I find continuous improvement process advantageous to my own work.		.709
The continuous improvement process has a clear positive impact on business results.		.691
The content of the criteria used in self-assessments is understandable.		.686
The continuous improvement process is clear and easy to implement.		.579
I find the continuous improvement process as it is today useful for my unit.		.561
Cumulative percent of the variance explained	50.7%	61.2%

1^{a)} Factor 1 is named "Compatibility & Observability", 5 items, alpha 0.852

2^{b)} Factor 2 is named "Usefulness", 6 items, alpha 0.848

BUSINESS EXCELLENCE SURVEY	Factor Loadings		
	1 ^{a)}	2 ^{b)}	3 ^{c)}
Statements (scale: 1 = totally agree, 5 = totally disagree)			
Actions in my unit are based on knowledge and freedom to make choices.	.768		
Employees are encouraged to make independent decisions in my unit.	.734		
Leaders empower and motivate employees in my unit.	.730		
Interaction and cooperation are supported in my unit.	.722		
People are encouraged to participate in the continuous improvement work in my unit.	.704		
The head of our unit is committed to the continuous improvement process.	.696		
The attitude towards change is positive in my unit.	.641		
I can make my own decisions without checking with anybody else.	.554		
Rules and strict orders control our lives in my unit		.799	
The continuous improvement process in my unit is implemented using strict and controlled instructions.		.718	
Organizational structure is hierarchical in my unit.		.585	
I find the continuous improvement network (e.g. quality network/facilitator network) useful for sharing practices within the Case Company.			.790
In my opinion, the units are open in sharing their best practices within the Case Company.			.687
Cumulative percent of the variance explained	33.4%	46.6%	55.8%

1^{a)} Factor 1 is named "Empowering Leadership", 8 items, alpha 0.852

2^{b)} Factor 2 is named "Formalization", 3 items, alpha 0.529

3^{c)} Factor 3 is named "Interconnectedness", 2 items, alpha 0.513

BUSINESS EXCELLENCE SURVEY	Factor Loadings
	1 ^{a)}
Statements	
The Business Excellence model gives us competitive advantage compared to our competitors. *)	.884
Using the continuous improvement process has improved our company image. *)	.844
How would you define the power and effectiveness of the continuous improvement process? **)	-.619
Cumulative percent of the variance explained	62.6%

1^{a)} Factor 1 is named "Effectiveness", 3 items, alpha 0.686

*) Used scale: 1 = totally agree, 5 = totally disagree

***) Used scale: -1 = negative comment, 0 = neutral/no comment, 1 = positive comment

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