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Diffusion of Organisational Innovations: Quality Management in Sweden

ABSTRACT

Two recent developments in innovation research constitute the basis of the broader research area of which this paper is part: the increasing interest in organisational innovations (OI) and the conceptualisation of innovation systems (IS). In Alänge and Lundgren (2000), a theoretical framework for studying the diffusion of OI is developed. The main purpose of this paper is to apply the framework in an empirical setting to an investigation of the development and diffusion over time of quality management (QM) in Sweden. It has been recognised that there is a lack of empirical research and knowledge on QM in national contexts; thus, the attempt to do so in this paper may be an interesting contribution in itself. A second objective of this paper is to address the issue of how the dynamic aspects of innovation and diffusion may be captured and represented when using a system perspective. Few current versions of the IS approach are able to analyse the mechanisms of change and evolution and depicting the dynamic properties of the system. The main conclusion is that the framework is well suited as a structuring frame of reference for use when empirically addressing cases of OI diffusion, thereby contributing to the overall research aim of obtaining a better understanding of the OI diffusion phenomenon.

Keywords: organisational innovations, diffusion, innovation system, quality management, Sweden, system dynamics

INTRODUCTION

» *In this section, the background and purpose of the study is presented, and the structure of the paper is outlined.*

Two recent developments in innovation research constitute the basis of the broader research area of which this paper is part: the increasing interest in organisational innovations (OI) and the conceptualisation of innovation systems (IS). In Alänge and Lundgren (2000), a theoretical framework for studying the diffusion of organisational innovations (OI) is developed. In addition to its basic roots in the national innovation system (NIS) approach (primarily as theorised by Lundvall 1992), the framework is inspired by the technological system (TS) approach (Carlsson 1997) and by approaches originating from outside the economics sphere, e.g. from the fields of organisational analysis in sociology (e.g. Powell and DiMaggio 1991, Guillén 1994 and Abrahamson 1996) and diffusion studies (e.g. Rogers 1995 and Jarnehammar 1995).

The purpose of this paper is to apply the framework in an empirical setting. This is accomplished through an investigation of the development over time of the quality management (QM) area in Sweden.

The QM area was chosen for several reasons. First, it is an area in which the authors have extensive previous practical and theoretical experience, from which this empirical study may benefit.¹ Second, the complex nature of the QM type of OI has a direct bearing on the components of the framework in Alänge and Lundgren (2000). It has also been argued that the significant issues when studying the diffusion of QM paradigms and practices seem to be representative of significant issues relating to studies of other OI (Kostova 1998). In addition, QM is an area of recognised strategic importance, but Kroslid (1999) argues that there still is a considerable lack of empirical research in and knowledge of QM in national contexts.² There have, so far, been relatively few stories told of this kind; thus, this very attempt may be an interesting contribution in itself, both to academia, i.e. researchers of innovation and technological change in general and QM in particular, as well as to practising managers, QM consultants and policy makers.

An IS may differ substantially over time and its dynamic properties are among its most important attributes (Carlsson et al. 1999). However, as recognised e.g. by Grønning (1998) and Alänge and Lundgren (2000), many current versions of the IS approach have apparently failed to describe and analyse the mechanisms of change and evolution, i.e. the system

¹ The question of how is elaborated upon in somewhat more detail in the next section.

² Kroslid adds, however, a somewhat increased degree of interest in efforts to map such developments has been noticeable (see e.g. Hasselbladh and Lundgren 2000, forthcoming) during the last few years.

dynamics. Accordingly, the question of how the dynamics of the innovation diffusion process may be captured and represented in the system approach is an important research issue raised in this paper.

The paper is organised as follows. After this short introduction, some reflections on the methodology used in the empirical investigation are presented, followed by a summary version of the theoretical framework in Alänge and Lundgren (2000). Subsequently, the question is raised of how the dynamic properties of the framework may be represented, followed by a portrayal of the main historical developments within the global QM field. Based on interviews and secondary data, the development of the QM area in Sweden over time is then described and discussed. Developments outside Sweden and their influence on the Swedish case are referred to, after which the Swedish QM case is analysed through the framework lens, and an attempt is made to illustrate the dynamics of the development. The final section contains the conclusions, as well as some ideas for further research.

REFLECTIONS ON METHODOLOGY

» *In this section, some reflections on the research methodology applied in this paper are presented, and the data sources described.*

The research perspective in this paper resembles Kimberly's (1987) biographical perspective (or method, as it is also called) in many ways. In its original form, the biographical method starts out from the perspective of a focal firm. In this study, the object of study may be regarded as an organisational field (see e.g. DiMaggio and Powell 1983 and Powell and DiMaggio 1991), built around an OI.

Bäckström (1999), similarly, used the biographical perspective in a study of the development of the work organisational paradigms in Sweden over three decades. According to him, the biographical perspective attempts to bridge the gap between, on the one hand, the interest in structural and institutional systems in organisational theory and, on the other hand, the focus on people and behaviour in the organisational behaviour field. This is done by exploring the interplay between people, the structures and the systems they build, including and the issue of how this interplay develops over time. In applying this perspective, an attempt is made to link the rational action perspective with the institutional perspectives, in which the context determines organisational behaviour and actors play a minor role.

The method consists of three main steps (Bäckström 1999). In the first step, a chronology of incidents is constructed, using interviews and documentation. In the second step, the biography is developed through in-depth interviews of the key individuals identified in the

previous step. Scrutinising the critical incidents and processes and historical developments revealed in the first step in more detail is a central aspect of this step. In the third step, the study is complemented by information gathered from documents and other written sources.³

In this study, we aim at mapping the interconnected, critical events and processes that have been of importance for the development of the QM field in Sweden, including an investigation of key individuals, key organisations and key institutions that have influenced this development.

The authors have extensive practical and theoretical experience of the QM area, from which the empirical investigation in this study has benefited in several ways. For example, we were able to build this study on insights and conclusions resulting from previous studies (e.g. Alänge 1994, Jarnehammar 1995). We also made use of data from interviews conducted earlier (from the late 1980s until present) as well as of gathered historical documentation (e.g. articles and newsletters), in new ways. Furthermore, the investigation benefited from our connection to an extensive network of influential people in the QM field, which was helpful in the identification of appropriate interviewees.

The interviewees were chosen with regard to their knowledge of the Swedish quality field and their estimated ability to describe the QM area in Sweden from various angles, both in terms of communicating a holistic overview and of providing us as researchers with insightful, anecdotal details. Many of the interviewees had been involved in the Swedish quality development area during most of its modern history and many have also played different roles over time in the Swedish system. Interviews have been conducted with academics, quality managers, consultants, as well as representatives of technology broker institutes and quality associations. The interviewees are presented in Table 1.

Since the focus has been on mapping the major national pattern, we might have left out important events and processes occurring within more limited geographical areas or within companies or groups of companies.⁴ We do not claim that these developments are less important, but rather that our aim has been to provide a picture from the national system perspective.

Supplemented with our earlier experience of the QM field and the use of additional historical documentation, it is our opinion that the interviews have provided us with a good image of the major pattern of Swedish QM development.

³ In this study, the method may have been more iterative and may not have been used as gradually as described above, but all ingredients of the biographical method have been included. Furthermore, the method is complemented with an analysis and interpretation that builds on the particular framework described above.

⁴ There may also be a certain bias introduced by selecting persons that have been deeply involved in promoting or implementing QM and by excluding persons with a more general management background or employees at other organisational levels who were affected by the introduction of QM to their organisations.

Interviewee	Date	Role(s)
Persson, Jan-Christer	July 2, 1998	CEO, IVF, Göteborg Previously manager, Volvo
Larsson, Dan	August 25, 1998	Quality manager, IVF, Göteborg
Bramberger, Christer	August 25, 1998	Manager, IVF, Göteborg
Lindwall, Peter	September 7, 1999	TQM program manager, Champs, Göteborg
Gustafsson, Sten-Olof	September 15, 1999	Chalmers, Göteborg Previously manager, Volvo
Olgerman, Urban	September 20, 1999	Quality manager, Volvo, Göteborg
Bergman, Bo	September 20, 1999	Professor, Linköping and Göteborg; Previously Saab, statistics and production quality
Chocron, René	September 22, 1999	Manager, SIQ, Göteborg Previously researcher, IVF, process analyst, Ericsson, quality manager, Hasselblad
Andersson, Ulf	September 30, 1999	Manager, Swedepower (Vattenfall), Stockholm Previously Chairman of SFK and EOQC
Sandholm, Lennart	September 30, 1999	Founder of consulting firm (Sandholm Associates), adjunct professor, Royal Institute of Technology, Stockholm Previously quality manager, Electrolux
Hasselbladh, Hans	September 30, 1999	Researcher, Göteborg and Stockholm
Ögren, Sture	October 1, 1999	Corporate quality director, Electrolux, Chairman of EFQM, Stockholm Previously corporate quality director, Ericsson
Reftmark, Sven-Olov	October 1, 1999	Consultant, Stockholm Previously CEO at Philips, Norrköping, Quality Director Philips, Stockholm
Stjernberg, Torbjörn	October 5, 1999	Professor, Göteborg and Stockholm
Jönson, Kerstin	October 11, 1999	Consultant, PriceWaterhouseCoopers, Göteborg Previously researcher, IVF, internal consultant, Atlas Copco
Jernberg, Björn	October 12, 1999	Manager, SIQ, Göteborg
Brynielsson, Lars	April 8, 2000	Manager, SAS International, Stockholm Previously quality manager, SAS

Table 1 – Interviewees.

THE FRAMEWORK

» *In this section the cornerstones of the framework developed in Alänge and Lundgren (2000) are briefly recapitulated.*

In Alänge and Lundgren (2000), a theoretical framework for studying the diffusion of OI is developed. In addition to its basic roots in the NIS approach (primarily as theorised by Lundvall 1992), the framework is inspired by the TS approach (Carlsson 1997) and by approaches originating from outside the economics sphere, within the sociological field (e.g. Powell and DiMaggio 1991, Guillén 1994 and Abrahamson 1996).

In accordance with the biographical perspective, in which the rational action perspective is linked to the institutional perspectives, the viewpoint that the diffusion of OI is affected by the mutual interdependence between the actors' intentions and the institutional setting that frames their actions is a component of the framework.

Firms (ranging from large multinational corporations to small local enterprises), universities, collective research institutes and other innovation brokers (e.g. management consultants), the government and other regulatory bodies, financial institutes (e.g. banks and venture capitalists), media (e.g. the business press) and individuals, e.g. enthusiasts (“champions”) within organisations or key individuals moving between organisations and levels in the system, thus playing different roles over time, are important examples of actors.

Relationships between actors at the system level may vary. We may differentiate between direct market links (i.e. the link between a consultant and a client organisation searching for a solution) and indirect links, which may be very important knowledge exchange mechanisms in the case of OI diffusion. Among the more indirect links, we may take especial interest in the establishment of various types of networks of individuals and organisations, both as a factor promoting certain ideas and as a factor restricting the use of others. One may differentiate between formal and informal networks. A member association is one example of a formal network; another is the learning network formed by a group of small companies having few resources with which to scan the world for new ideas, aiming instead at learning from each other, often under the auspices of an innovation broker organisation, e.g. a collective research institute. The ties that link managers of different organisations (or employees at other organisational levels) are an example of a more informal type of network. Within these networks, certain ideas may grow strong and be transformed into collective beliefs of what constitutes good, legitimate management and organisational solutions.

If the actors are viewed as players in a game, institutions may be seen as the rules of the game (North 1990). Institutions may be formal, e.g. various regulations and laws, or more informal (or soft), e.g. norms, cultural values and peoples’ underlying assumptions. The specific characteristics of OI – including difficulties in defining, assessing and pricing them due to the tacit nature of the knowledge bases involved – makes it especially important to include the capabilities, incentives and perceptions of those involved in the diffusion process in the framework. Borrowing from sociology, we argue in favour of taking the cognitive aspects of institutions into account more, as a complement to the predominantly normative and regulative aspects of contemporary IS approaches. Since rules may not always be interpreted or followed identically by all actors, institutions may be interpreted as “rules in use”. In other words, in order to obtain a better understanding of the dynamics of the innovation process and the diffusion of OI, a great deal may be gained by differentiating and clarifying the relationships between institutional rules and the actual behaviour of people or organisations.⁵ Figure 1 is a schematic outline of selected actors and institutions that may affect the diffusion of OI in a national system.

⁵ In analogy with Argyris and Schön (1996), “espoused theories” vs. “theories in use”.

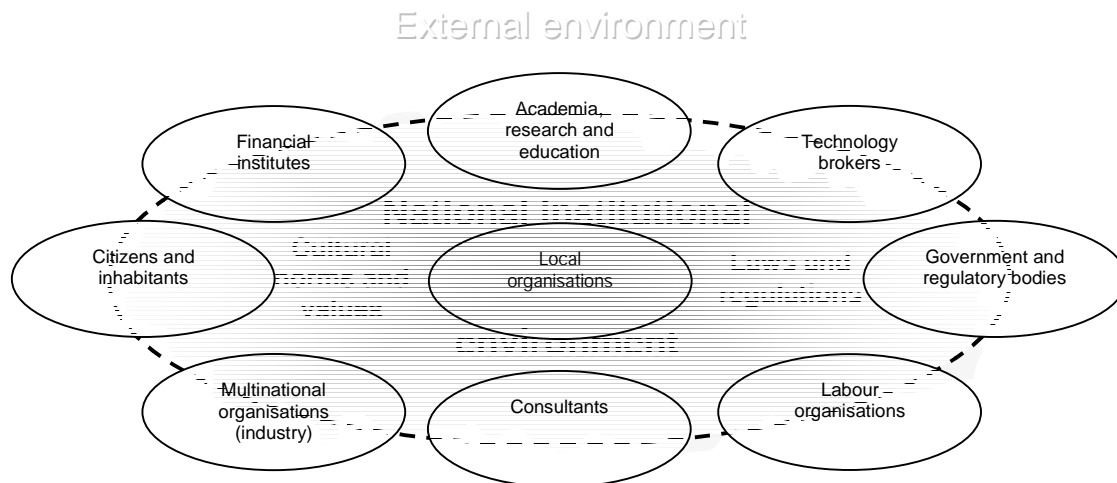


Figure 1 – Framework illustration 1: A schematic outline of selected actors and institutions (from Alänge and Lundgren 2000).

OI may be conceptualised as solutions aiming at solving perceived organisational problems (or opportunities). The perception of an emerging crisis (or opportunity) is a common reason for managers and organisations to engage in search activities for OI. These perceptions may emanate both from within the intra-organisational structure or from external pressures, such as intensified international competition among organisations in a certain industry, or be due to competition or collaboration between countries. The innovation and diffusion process of OI may be regarded as the institutionally embedded dynamic exchange of organisational knowledge, between organisations in need of solutions to organisational problems and opportunities, and suppliers of certain solutions. That is, any effort to understand the diffusion of OI needs to take into account both the special workings of the supply side, i.e. the behaviour of providers of organisational solutions, and of the demand side, i.e. the behaviour of managers and organisations that are eager to find solutions to perceived organisational problems. In addition, and perhaps most importantly, the complex exchange mechanisms that bring supply and demand together must be analysed, e.g. the complex social process that repeatedly redefines collective conceptions, among managers, organisations and government, of a rational and legitimate management solution.⁶ A schematic picture of this dynamic is shown in Figure 2.

⁶ Other factors that affect knowledge exchange at various system levels may be the transfer of tacit knowledge through unilateral movements of skilled personnel between organisations, the presence of MNCs in the system, intensified international competition and collaboration between companies and nations, governmental programs of national recovery including the establishment of state-initiated research and training institutes and technology broker organisations, the continuous packaging of organisational solutions, conferences and media, the relative power and influence of different professions in each country (including the relative strength of labour market

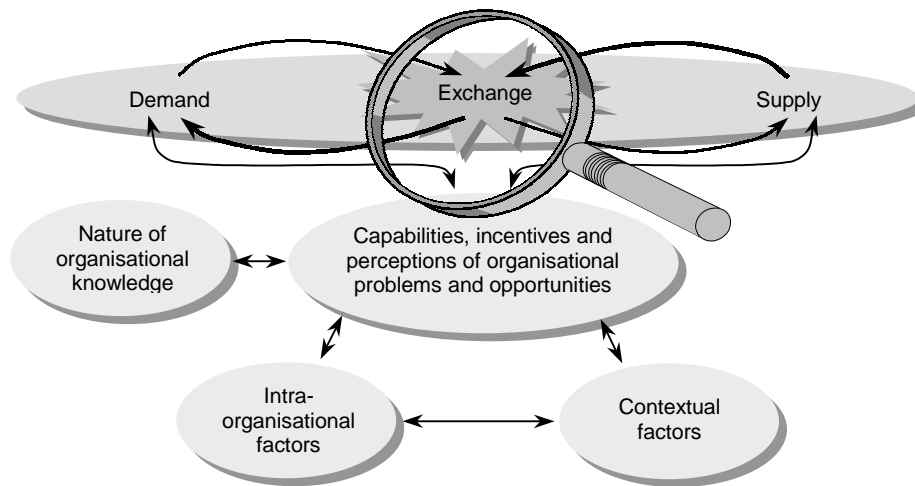


Figure 2 – Framework illustration 2: Towards an understanding of the dynamic exchange mechanisms involved in the diffusion of OI (from Alänge and Lundgren 2000).

IN SEARCH OF A PERSPECTIVE TO REPRESENT SYSTEM DYNAMICS

» *In this section, the issue of how the dynamic properties of the framework may be captured and represented is elaborated upon.*

Developing the framework described in Alänge and Lundgren (2000,) indicated the importance of capturing the dynamic aspects of an IS. Accordingly, the issue of how the dynamic aspects of innovation and diffusion may be captured and represented when using a system perspective is a second topic discussed in that paper and elaborated upon in this section.

As recognised by Grønning (1998) and as indicated in (Alänge and Lundgren 2000), few current versions of the IS approach are able to provide a picture of the dynamic properties of the system. A quick review of existing studies shows that few, if any, manage to present dynamics in a truly dynamic way. Typically, the illustrations are only able to provide “frozen” static pictures from one specific point in time, i.e. they do not provide a process perspective.

Presenting the story in stages, including a number of “frozen” illustrations from a limited number of time periods, might be one step towards a more dynamic description. For example, Rostow (1960) used a number of theoretically pre-defined, linear stages to illustrate the maturation of a country, In his study of the development of digital image technology in

associations), or the cultural distance between the adopting organisation and the OI to be implemented, to mention just a few.

Sweden between 1965 and 1989, Lundgren (1991) theoretically defined three stages in the emergence and evolution of a new industrial network; genesis – identification,⁷ coalescence – legitimisation⁸ and dissemination – adaptation,⁹ each dominant in different periods of time. He provides three static “snapshot” pictures of the image processing network in Sweden from three different points in time, 1975, 1983 and 1989. This is a way of economising the presentation, since only theoretically motivated stages are depicted. However, one disadvantage is that we are only confronted with frozen pictures, which fail to convey a description of events in the intervals, i.e. the approach fails to provide a genuinely process-oriented description. Lundgren’s three stages were complemented by a written process description, however, in which details were provided on what happened over time, on who was involved and on factors influencing the process.¹⁰

These stages might also be empirically generated, beginning with a description of a process in words, which can, after analysis, provide the foundation for the identification of relevant stages, which may then be depicted in images. One example of this is a study by Bångens (1998), who analysed the development of a number of companies in a network perspective.

A recent study by Rickne (2000), of the development of the biotechnology industry in Sweden and in two states in the United States, uses a network approach to describe major organisations (firms and universities) and the links between them. In addition, supplementary maps of specific areas have been developed, showing the specific major links that have led to the development of new technology-based firms (NTBF) over time. Here, the links have been assigned a time dimension; a link between two firms might have been in existence only during the year of formation, or been useful during a longer period of time. In a study of the major innovations in Sweden between 1945-1980, Alänge et al. (1994) used a similar method of illustrating links. However, they differentiated between personal and company network links. In an attempt to capture the dynamics of the development process, a timeline was used to pinpoint events most critical to development.¹¹

⁷ Genesis/identification is characterised by the independent initiation of several different research and development projects and the origination of the new technological system.

⁸ When the actors start to interact with one another, forming an emerging network, eventually coalescing into a close-knit community of complementary and competing organisations, the coalescence/legitimation process becomes the dominant one.

⁹ Dissemination/adaptation refers to the extension of the network, e.g. through connections with the networks of suppliers and users. It may include adaptations of the technology to specific user needs and exploitations of complementary investments outside the close community of organisations in the initial network.

¹⁰ Another, similar, method might consist of starting with “snapshots” along a timeline, from which the researcher could explore the changes in the picture over time. The shorter the period between the snapshot pictures, the more the story acquires a process character. However, in order to achieve a sufficient degree of detail, a considerable number of pictures may be required, which may lead to resource problems; furthermore, the reader would still not know what was happening between the snapshots.

¹¹ Frequently, essential contacts belonged to the personal network sphere, although the personal and company networks sometimes overlapped. At times, contacts could be of a “weak-tie” character (in the terminology of Granovetter 1973), i.e. contacts occurring only once, but providing some absolutely critical element, such as a link

One reason that many studies fail to capture and visualise the true dynamics of system development in a process perspective may be that contemporary static (and non-interactive) media, e.g. print media (text, pictures and diagrams), may limit the possibilities of communicating complex historical data. This is especially so since such data can often be viewed from different angles and at many levels of detail. Kullberg (1995) points out at least three problems in visualising historical information using current methods of presenting a timeline. First, the difficulty of presenting multi-dimensional information as a two-dimensional visual structure,¹² Second, the difficulty of providing an overview of historical data and simultaneously allowing access to different levels of detail¹³ and third, the difficulty of communicating the historical context in which events occur. Kullberg contends that the communication of multi-dimensional historical information may be improved by re-inventing the static, two-dimensional timeline as a dynamic, three-dimensional “timespace” in a virtual environment. We agree that the understanding of complex phenomena, such as the diffusion of OI and the evolution of QM, may be improved through the use of a timespace concept. However, the development of interactive, three-dimensional computer software is clearly beyond the scope of this paper.

Frankelius (1999) adopts an intermediate approach in an effort to develop a visual language with which to describe business processes over time. His view is based on four cornerstones: the business itself, the context, the relationship between the business and the context, and the time aspect. There is an explicit focus on events and dynamically linked processes over time, which he attempts to illustrate in two- and three- dimensional timespaces using conventional, static, two-dimensional printed media.

In Frankelius’s view, the event concept refers to an “activity condensation”. An event may be related to a certain process and may be communicated graphically through markings (spheres) along a timeline or in a timespace (see Figure 3). Spheres marked with a key symbol indicate that the particular event is especially important, i.e. a so-called critical incident. A critical incident occurs when something especially important, interesting or unusual happens with regard to the specific phenomenon or object of study. In his approach, there is also the possibility of changing one’s viewpoint from a process mode to a “map mode” by cutting across processes at certain points in time (see Figure 3). This mode resembles the above-

to a new knowledge source or a key idea needed to remove a barrier in the development process or infrequent contacts renewed, for example, every second or third year, but providing knowledge essential to the development of a certain invention.

¹² According to Kullberg, this is especially problematic in a rigid two-dimensional timeline of which time is one dimension. Typographical elements representing historical events are arranged along the time axis. This often results in crowding and confusion that obscures the visual structure of the information.

¹³ This problem is often addressed in two-dimensional, static media by providing several timelines at different levels, leaving the reader with the difficult task of putting together events from different timelines into a cohesive historical understanding. Another common solution is to create a timeline with a high level of detail that may expand to fill several pages.

mentioned frozen snapshot pictures by Rostow (1960) and Lundgren (1991), but the focus is on the process mode and on dynamic process evolution over time.

Focusing on critical processes rather than merely on events is important. In the same way as we can focus simultaneously on details and their contexts when looking at a map in an atlas, we may also be interested in the context when looking at a timeline. Adopting the Kullberg's terminology (1995), we would not only be interested in the "whats" and "whens" of each event, but also in relationships to other events and to the historical and institutional context in which the events occur. Thus, we would also seek to explore the "whys" and "hows" of the events, in a true process perspective. This is part of the dynamics that both Frankelius (1999) and we attempt to illustrate.

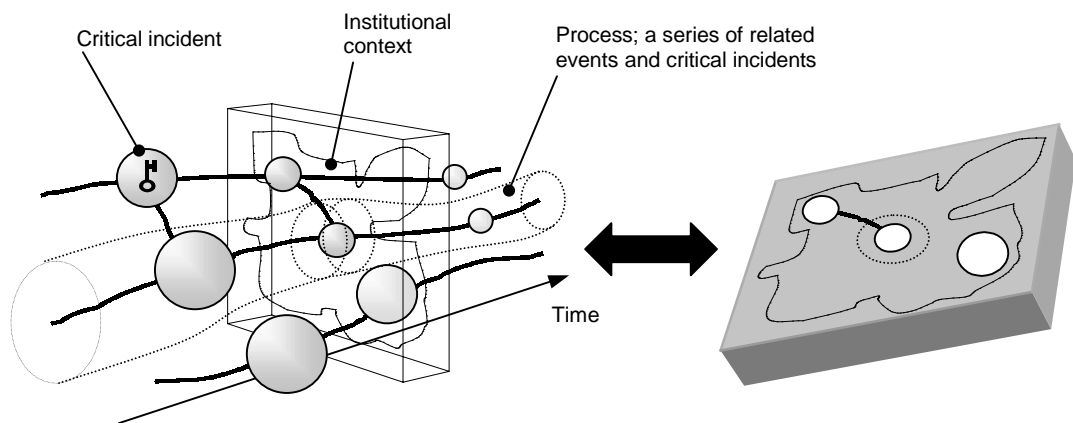


Figure 3 – *Dynamic combination of a system perspective and processes over time: graphic visualisation of events and links in business processes over time (left) and static “snapshot” picture at a specific point in time (right) (adopted from Frankelius 1999).*

In an effort to develop a dynamic description of the historical development of QM in particular (and of the diffusion of OI in general) the authors of this paper borrow from the process perspective developed by Frankelius (1999). This is merged with the framework cornerstones (outlined in Alänge and Lundgren 2000) and a historical description of the development of QM within and outside Sweden. A simple illustration of the principles of this merger is presented in Figure 4.¹⁴

¹⁴ In the actual analysis of the development of the Swedish QM, as presented in this paper, the dynamic development over time has been presented in a two-dimensional process perspective (Figure 6), supplemented with static cross-perspective maps of the structure of the innovation system at three different points in time. The time periods have been empirically generated in order to illustrate three qualitatively different structures of the Swedish QM system (see Figures 7, 8 and 9).

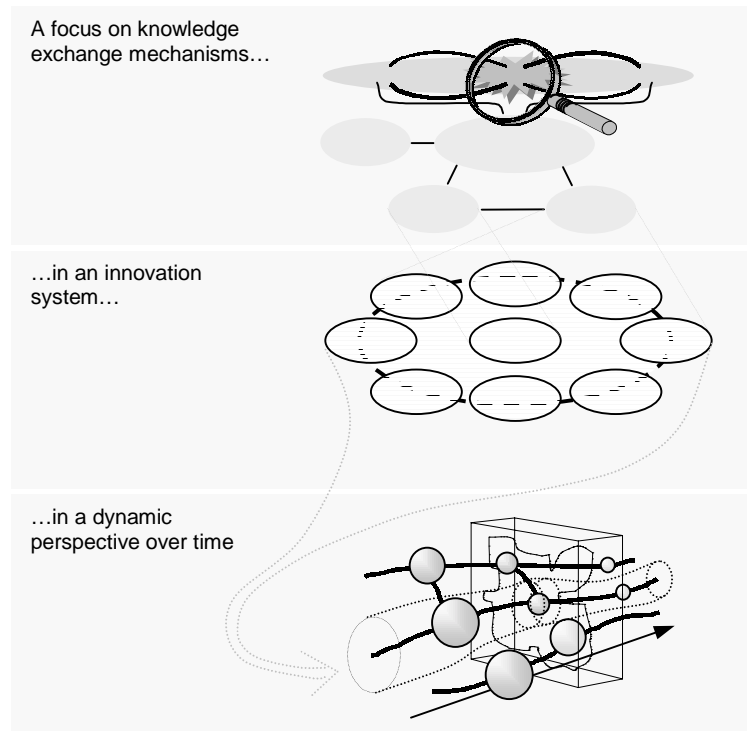


Figure 4 – A merger between the cornerstones of the framework (as outlined in Alänge and Lundgren 2000) and the idea of illustrating a dynamic process perspective over time (adapted from Frankelius 1999).

QUALITY MANAGEMENT

- » *In this section, the area of QM is introduced. The major part of the section is devoted to a summary of the historical development of QM outside Sweden, which is considered useful as a background for understanding development within Sweden, discussed in a subsequent section.*

During the latest decade or two, there has been increasing global interest in quality (even if one may notice a somewhat decreased degree of interest among industrial corporations during the latest few years). But the endeavour towards better quality is, of course, nothing new. As long as there have been customers and producers and some kind of competitive market conditions in existence, quality has been a prerequisite for the survival for any producer of goods or services, since business has always basically been a question of creating satisfied customers. Nonetheless, the prevailing views and methods associated with quality have varied considerably over time and space (Sandholm 1996).

Three geographical areas have been substantially influential in the development of QM: the United States, Japan and Europe (Krüger 1999). We will examine the Swedish case in the subsequent section. In order to understand the development of QM and its current status in Sweden, one must go back to its roots, which are primarily found outside Sweden.

Efforts to work systematically with quality began long ago. Today's concept of quality – and the management aspect of quality in particular – have been developed during the entire 20th century.¹⁵ At the end of the 19th century and during the first two decades of the 20th century, factory shop departments grew larger and products became more complex. As a response to this, companies started to develop mass assembly lines (Krüger 1999). The car manufacturing and telephone industries started to develop. At the same time, American managers adopted the ideas of Frederick W. Taylor on *scientific management* (also referred to as 'taylorism'), according to which the planning of work should be separated from its execution. As indicated above, in the early days of the industrial era, factory workers were regarded as skilled craftsmen. According to Taylor, however, workers did not have enough training to judge how their own work should be done. Taylor's view was a break with the traditional European craftsmanship view and America moved away from its former tendency to adopt European practices (Krüger 1999). The key strategic production issues were detailed work prescriptions and quality inspections. Taylor's methods led to higher productivity levels,

¹⁵ Before the 19th century, there was no real strategy for production and quality anywhere in the world. Skilled craftsmen produced goods item by item and there was a direct relationship between the producer and the customer. During the 19th century, as industrialisation grew stronger, factories were developed and change occurred in the direction of mass production. Traditional craftsmanship principles were still used extensively in production,

but they had a negative impact on quality in the long run. To overcome the quality problem, independent quality inspection departments were set up, in which specialists served as full-time inspectors. The specialists paid great attention to the defining of tasks and the study of unit times. An employee was paid according to his actual performance. In addition, a bonus system could be used for every unit produced that surpassed the required amount. A penalty system was also introduced in order to avoid defective products. However, the workers were not equipped with accurate means of adjusting their own work process and the responsibility for defects was always a controversial issue. In short, Taylorism enhanced quantity at the cost of quality. This development soon resulted in the common view that quality was the responsibility of certain specialists. During World War I, this need eventually led to the establishment of a new type of employee, the quality inspector. In the twenties and thirties, entire quality inspection departments became common among companies and corporations. At the end of the production process (a sequence of events in which different production departments carried out their specific pre-defined tasks), the inspection department sorted out the bad products from the good ones, which could be delivered and sold. As a consequence, American products acquired a reputation for good quality and the American economy grew fast.

During the years between the two world wars, mass production methods were refined. It became apparent that variations in a production process could be described by statistical methods. In 1924, the father of modern statistical quality control, Walter A. Shewhart, proposed the use of what later came to be known as statistical control charts for controlling production variables of a product (Shewhart 1931).

During World War II, there was, of course, a new boom in mass-production, at the same time as experienced workers became a scarce resource. This made it necessary to make the quality control efforts more effective, leading to an extensive introduction of statistical methods. The US military began to train their suppliers in Shewhart's statistical quality control methods. The application of statistical methods to the mass production of military equipment during World War II was a major means of boosting productivity at sufficient levels of quality.

However, after the war, it was the producers' market, and competitive pressure on high quality was low. One effect of this was that the successful application of statistical methods in military industry was only transferred to civilian production to a very limited extent in the United States. In the 1950s, consumption increased and products became more and more complex. There was an intensified focus on productivity issues and the "strategy" in the West seemed to be that it was possible to sell everything. At the same time, the risk of production

however. In 1900, Peugeot was the biggest car manufacturer in the world with an annual production of 2,000 cars, all of which were made with traditional craftsmanship production methods (SIQ web 2000).

problems increased and interest in production process reliability automatically grew, not least in the electronics and space industries, primarily in the fields of product development and design.

Towards the end of the 1960s, companies placed greater emphasis on quality assurance, i.e. on ensuring that the desired level of quality was actually achieved and maintained. Especially within the American military industry, various quality assurance standards were developed to make sure that the suppliers met the requirements. Quality problems in production were generally still primarily regarded as being entirely dependent on the standard of goods delivered by the suppliers. In line with this viewpoint, the use of quality assurance standards spread outside the military sector. Thus, the main strategic issue in Western industry was quality assurance and special quality control departments were developed in many companies.

Slowly, step by step, Japanese companies started to win market shares and, during the 1960s, a moderate increase in interest in the total quality control area became noticeable. In the late 1960s and during the 1970s, total quality control as a field of knowledge began to reach Western companies. Companies slowly began to realise that their quality efforts must encompass all functions, not only product development and production control. However, despite the development of new quality methods, the 1960s and the early 1970s may be regarded as a “dormant phase” in the Western world (Sandholm 1996). Times were great and competition was not strong enough to spur further QM thinking.

A tayloristic approach is fine as long as it is applied identically by all competitors. However, if a competitor can design and produce similar products at the same or an even higher level of quality, but at lower cost, the tayloristic approach would lose its appeal. This started to happen in the 1970s. Competition from Japan emerged as a serious threat in many industries, a fact that was eventually realised at the national level in some Western countries. Towards the end of the 1970s, Japanese competition intensified powerfully. Japanese products penetrated Western markets, whereas the demand for Western products decreased. One weakness of the tayloristic approach was the assumption that workers and their supervisors (or foremen) lacked the competence to plan their own work processes. The workers’ technological education had expanded considerably since the early days of the tayloristic methods, representing an enormous potential of knowledge and creativity. Japanese management had realised this. The Japanese strategy was to listen carefully to the voice of the customer, to continuously improve the production processes and to involve every employee, from top management to shop floor level, in quality work. Having begun from quite a withdrawn position, the Japanese left the West behind them in the QM development area during the 1980s. However, as will be further discussed below, the road towards Japanese excellence of quality was rather bumpy, at least in the beginning.

After World War II, the Japanese economy was in ruins. Japanese industry had been destroyed and industrial production had only reached about 10 percent of pre-war levels. There was a general lack of and thus an enormous demand, which must somehow be met, for consumer products. Additionally, Japan was extremely poor in natural resources (such as iron or wood), albeit not lacking in human resources. The recovery of the Japanese economy must be built on production and export of superior products. The industry had to switch from military to civilian production and an industrial policy was designed to rebuild the economy and create a stable society (Krüger 1999). For this purpose, the Japanese Standards Association (JSA) and the Japanese Union of Scientists and Engineers (JUSE) were founded, in 1945 and 1946, respectively. Since then, these two organisations have played a fundamental role in the education and diffusion of quality methods and philosophies in Japan (Park Dahlgaard 2000).

Remarkably quickly, as early as in the beginning of the 1950s, the Japanese economy was up and running and production boomed. However, now the customers had many products to choose from and this changed their requirements. The quality of Japanese products was not considered to be good enough, forcing producers to improve their quality levels (Bergman and Klefsjö 1995, Krüger 1999).

At approximately the same time, in 1949, the Ministry of International Trade and Industry (MITI) was established in order to adjust imperfections of the market and to give advice to industry. Since Japan had no natural resources, quality was recognised as a vital issue. A nation-wide campaign was initiated, in which the visits of the two American quality gurus W. Edwards Deming and Joseph Juran are especially noteworthy.¹⁶

In 1950, Deming was invited to Japan by Ichiro Ishikawa, the president of JUSE, to give lectures to a large group of Japanese company leaders.¹⁷ He emphasised that the leaders had to assume major personal responsibility for the work related to organisational change. He also emphasised the necessity of using statistical process control methods in order to enhance product quality (Bergman and Klefsjö 1995, Krüger 1999, Macdonald 1999).¹⁸ The year after, in 1951, Deming visited Japan again; the establishment of the prestigious Deming Prize for quality control in Japan was one outcome of this second visit. This prize is still awarded to organisations that have been particularly successful in their quality work.

Nevertheless, the Japanese quality movement still faced problems after Deming's lectures. Statistical methods were over-emphasised and top management did not show much

¹⁶ At the same time, Dr Kaoru Ishikawa, the son of JUSE president Ichiro Ishikawa, started to teach all foremen simple statistical methods to be used in the change process. This was the basis of the subsequent development of the seven management tools (which took place during the 1970s). Ishikawa also suggested the introduction of quality circles (Bergman and Klefsjö 1995).

¹⁷ According to Macdonald (1999), he met with the presidents of 21 leading Japanese companies, including Sony, Mitsubishi, Nissan and Toyota, all of which are world giants today.

interest in quality issues. To overcome this, Joseph Juran was invited to lecture on his management perspective on quality in 1954. At that time, he was already well known among quality-oriented managers through his book *Quality Control Handbook* (Juran 1951). Juran's view was that quality control should be regarded as the responsibility of top management rather than something to be carried out by a special post-production inspection department (Bergman and Klefsjö 1995, Krüger 1999).¹⁹ Gradually, Japanese firms shifted from an inspection-oriented approach (i.e. statistical quality control) to a total quality control approach (i.e. quality control that emphasised prevention and employee involvement).

Furthermore, extensive training-within-industry programs (TWI) and group-dynamic experiments were introduced in the early post-war period. In this context, the achievements of America's proconsul General Douglas MacArthur must not be forgotten. He introduced the Japanese to TWI, which contributed to awakening the Japanese interest in Western management practices (Macdonald 1999).

It would be a mistake to believe that the Japanese adopted the messages of these gurus immediately. The Japanese listened carefully, but they learned to adapt the practices and techniques to suit Japanese culture. The Japanese were so successful in their endeavours that they developed a whole new approach to QM, which was known in Japan as TQC (Total Quality Control). However, because of the confusion arising during attempts to communicate this to foreigners using a more limited definition of TQC²⁰, Kaoru Ishikawa suggested the use of the concept "company wide quality control" (CWQC),²¹ in which the need for participation of management and all employees was recognised.²²

As early as 1956, courses on quality were broadcast on Japanese radio. Partly as a result of American influence (but also as a major departure from the traditional American model), the quality control circle movement emerged in Japan. The Matsushita corporation started the first quality control circle in 1962 (Guillén 1994, Krüger 1999).^{23 24 25} The same year, the concept of quality function deployment (QFD) was developed at Mitsubishi's shipyard site in Kobe (Martínez-Lorente et al. 1998).

¹⁸ Deming had been a student of and worked together with Shewhart and he was influenced by Shewhart's statistical view on production issues.

¹⁹ Juran's contributions were recognised in 1981 when he was awarded the prestigious Order of the Sacred Treasure by Emperor Hirohito.

²⁰ The concept TQC (total quality control) was first presented in 1951 by Armand Feigenbaum, formerly quality director of General Electric. By adding the word "total", Feigenbaum wanted to emphasise that quality was not only the responsibility of the quality department, but also of other parts of the organisation. However, Feigenbaum still considered quality to be a matter primarily for the quality specialists, and not an issue that was the responsibility of everyone at the corporation.

²¹ The concept CWQC was introduced in 1969.

²² Interview with JUSE president Noguchi in 1987.

²³ Matsushita included a strong production management component; other companies used the circles to boost morale.

²⁴ Alänge (1994) discusses the implementation of QC in Sweden.

²⁵ The idea of quality circles appeared in the first issue of the Japanese journal "Quality Control for the Foreman" (Garvin 1987).

Another important contribution to the development of the Japanese quality movement was made by Taiichi Ohno. He developed the well-known production system at Toyota (known as lean production) and the concepts of kanban and just-in-time (JIT) (Bergman and Klefsjö 1995). After the oil crisis in 1973, the JIT system was adopted by a large number of Japanese firms (Martínez-Lorente et al. 1998).²⁶

The oil crises of 1973 and 1979 increased the use of quality circles in Japan. According to Park Dahlgaard (2000), the crises helped enhance the “quality” of QM in Japan.²⁷

Since the mid-1970s when corporations around the world became more internationally oriented and the world economy more global with deteriorating trade barriers, Western markets experienced increasing Japanese competition, especially in consumer electronics, automobiles and machinery. As an initial response, Western companies concentrated on technical innovations, relying on the computer revolution considered to be the cure for their quality problems (Krüger 1999).²⁸

However, computers were not the final solution. Market analyses showed the superiority of Japanese products and revealed that the Japanese threat persisted. When the impact of the Japanese quality practices became known, Western managers rushed to Japan, looking for the “magic potion” that had changed Japan from being a provider of bad quality products to the highest quality supplier in the world in less than 30 years (Macdonald 1999), and thus, the Japanese began to export their QM practices (Park Dahlgaard 2000).

The visits to Japan were expensive, so there was little time for in-depth research, but the Western managers found at least one thing that could satisfy their need for a quick solution to all their problems: the quality circle. In the late 1970s, quality circles began to be widely introduced.²⁹ (Martínez-Lorente et al. 1998).

In 1980 the American television network NBC broadcast the documentary “If Japan can... why can't we?” (Reftmark interview 1999, Martínez-Lorente et al. 1998, Macdonald 1999). After this, the promotion of the Japanese approach to management continued and during the 1980s, Western companies intensified their adoption of the more holistic Japanese approach towards production and QM. Slowly, quality became an important issue for top management in the West as well, and more and more companies used quality systems in production as the main strategic issue (far from all of them, however, realised what it really takes to be successful). Many business press articles and books were written (Martínez-

²⁶ The JIT system was not adopted by European and American firms until the early 1980s (Martínez-Lorente et al. 1998).

²⁷ Japan's economy, which was very dependent on oil, was extremely vulnerable to energy crises. Thanks to deliberate quality efforts, most companies came out of the crises in good condition. The quality circle work led to increased energy saving in manufacturing and the creation of energy-saving products.

²⁸ E.g. through detection of defects and a reduction of process variations via computer-controlled inspection.

²⁹ The first quality circle program was launched at Lockheed in 1974. In the United Kingdom, Rolls-Royce introduced the concept in 1979 (Martínez-Lorente et al. 1998). Some years later, the relative failure of the quality circles in the West became apparent (Macdonald 1999).

Lorente, et al. 1998).³⁰ An important initial contribution that helped to start the total quality wave in the West was the book *Quality is Free* by Philip Crosby (Crosby 1979).³¹ Crosby was followed by Deming and Juran, both of which had been important in the early days of the Japanese quality movement; e.g. the first edition of Deming’s best seller “Out of the Crisis” was published in 1986 (Deming 1986). Previously, before the Japanese threat emerged, Western managers had not been ready for their message, but under competitive pressure they jumped on the bandwagon unquestioningly (Macdonald 1999) and Crosby, Deming and Juran all became gurus in the West as well. During the second half of the 1980s, the total quality concept was diffused throughout Western industry. The modern total quality management (TQM) movement was born.³²

In short, the main flows of QM paradigms have been as follows. First, there was the break with traditional European craftsmanship practices in the United States during the early years of the 20th century and the subsequent diffusion of scientific management and statistical control practices throughout American and Western industry. After World War II, the Western ideas of statistical control were spread to Japan. The Japanese adapted the ideas to their particular circumstances and understanding and developed their own approach to QM. When the success of the Japanese development became evident to Western managers, the diffusion of QM ideas reversed directions. Japanese philosophies and practices were spread to the West, often reaching the United States first (see Figure 5).

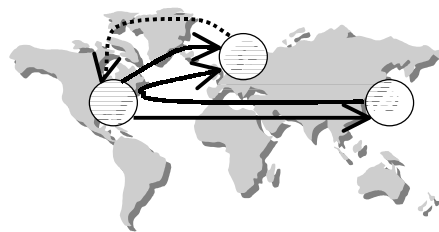


Figure 5 – Main global flows of quality management ideas.

One of the consequences of the threat from Japan was that NIST, a federal organisation in the United States, launched a high-profile nation-wide quality campaign, designed to encourage American companies to engage in quality and productivity improving activities. In

³⁰ E.g. in 1983, a paper on the difference between Japanese and American firms (and the superiority of the former) was written by David Garvin and published in the Harvard Business School journal. The same year, Taguchi’s experiment-concept design was presented in another paper in the same journal (Martínez-Lorente et al. 1998).

³¹ During the 1960s, while working at the Martin Company (that made Pershing missiles for the American army), Philip Crosby created the zero defects concept. (Bergman and Klefsjö 1995).

³² The term TQM was introduced by the Trade and Industry Department of Margaret Thatcher’s government in 1983, when it launched a national quality campaign (Macdonald 1999).

1987 this development led to the establishment of the Malcolm Baldrige National Quality Improvement Act and the Malcolm Baldrige National Quality Award (MBNQA) (Reftmark interview 1999). In a similar vein, 14 leading Western European companies (of which the Swedish company Electrolux was one) established the European Foundation for Quality Management (EFQM) in 1988 and the European Quality award in 1992 (Ögren interview 1999).

However, many organisations have failed to introduce QM principles. The Western companies that started to work with quality issues in the early phase (e.g. 3M) did not have the advantage, or as it evolved, the disadvantage, of having access to the prescribed solutions of the gurus. These Western pioneers actually took the same evolutionary route as did the Japanese in developing their own approach to quality. At this point, the TQM movement entered another phase, that of the “followers”, and thousands of companies spent huge amounts of money on QM programs, but these companies just followed the previously formulated precepts in the area (Macdonald 1999). In retrospect, few companies were able to realise the full potential provided by the TQM concept. Today, interest in TQM issues is declining in industry.³³ This will be further elaborated upon in the description of Swedish development of QM, in the next section.

QUALITY MANAGEMENT IN SWEDEN

» *This section describes the modern post-war history of QM development in Sweden in the guise of a chronological merger of the personal stories told by the interviewees. In addition, the story is embellished with insights resulting from earlier research efforts in the same direction (literature and interviews).*

The 1950s and 1960s: the quality inspection era. Sweden was neutral in World War II, leaving the production capacity of Swedish industry more or less intact. After the war, there was a tremendous demand for consumer goods, especially on the European continent, which created a good post-war start for Swedish industry. There is reason to believe that Swedish products were already quite well known internationally long before the war. Because of the limited size of the home market, many Swedish companies went multinational at an early stage. Swedish quality was soon widely recognised and the “Made in Sweden” label was

³³Disappointment in TQM has led to other generations of management fads, such as business process engineering (BPR).

established in the 1950s.³⁴ As a means to maintain a high production level and an acceptable quality level, the quality inspection paradigm, inherited from before the war, was reinforced during the years after the war (Bergman et al. 1999, Bergman interview 1999). In 1952, the quality inspection movement took a step further with the establishment of the Swedish Society of Inspection Engineers – Kontrollingenjörernas Förening (KIF), which was created as "an idealistic society for individuals working with tasks related to quality inspection or for those that otherwise have experience in or an interest in this field".³⁵

According to Gustavsson (interview 1999), Volvo was an expansionistic company during the 1960s with ambitions of growing marketwise as well as in terms of personnel. These ambitions, in combination with a huge personnel turnover of around 50-70%, made end-of-line inspections necessary in order to maintain an acceptable level of product quality. In the long run, however, end-of-line inspections were very costly, due to waste of material and time, necessitating more attention being devoted to methods of controlling the production process (e.g. statistical quality control), i.e. adjusting product quality during production.

As illustrated by the fact that KIF changed its name to the Swedish Society for Quality Control – Sveriges Kvalitetstekniska Förening (SKTF in 1966, a somewhat more holistic approach to quality control began to reach parts of Swedish industry in the 1960s (Bergman et al. 1999).³⁶ However, development towards a total approach to quality was slow in Sweden (Sandholm interview 1999). Despite the large EOQC (European Organisation for Quality Control) conference that was held in Stockholm in June 1966, in which a whole session was devoted solely to Japanese quality principles, Swedish industrial leaders were not yet ready for such a message, especially as industrial production was still very high (Sandholm interview 1999).³⁷

The 1970s: time for the socio-technical movement, quality assurance standards and quality control. Towards the end of the 1960s, the socio-technical movement was launched

³⁴ The strength of Sweden's international reputation for quality can, of course be questioned and regarded as part of a national Swedish myth. There were internationally recognised high-quality products, such as the Swedish safety match, SKF's ball-bearings (SKF was the earliest true global Swedish player, and also, through its trading agency function, helped bring other Swedish companies onto the international scene) and Swedish steel, but if Swedish products were generally known as high quality probably depended on which international market they were aimed for.

³⁵ Kvalitets-nytt, No. 2, June 1992 (translation by the authors).

³⁶ In 1961, Feigenbaum's total quality control concept (TQC) and Juran's Handbook (the 2nd edition) were introduced in Sweden.

³⁷ According to Sandholm (interview 1999), this was a historic conference. It was the first time that Japanese quality principles were discussed outside Japan. Along with Juran and Feigenbaum, Ishikawa and other Japanese experts participated. However, despite it being held in Sweden, the conference initially had very little impact on Swedish industry on a national level, perhaps because there were few top management participants. Instead, congruent with the strong tradition of quality inspection in Sweden, most participants were quality control engineers and managers from manufacturing corporations. It may also be argued that the translation into Swedish of the English word "control" has a rather inspection-like connotation, which may have strengthened the quality inspection tradition in Sweden long after the introduction of more holistic approaches (Bergman et al. 1999). At the end of the 1960s, one of the first books on quality control was published in Swedish, in which an attempt was made to explain that the inspection-like connotation of the English word control might be a mistake. However, the inspection paradigm was still dominant (Sandholm interview 1999).

in Sweden by the employers' and employees' associations together³⁸, a timely response to demands for industrial democracy and higher quality of working life and part of a nation-wide effort to attract labour and improve the effectiveness of Swedish industry (including a desire to reduce labour turnover, which was regarded as alarmingly high). The autonomous group (Stjernberg and Philips 1993) was one of the movement's key concepts. During the early 1970s, the socio-technical movement grew in Sweden, resulting in the enhancement of shop-floor autonomy and increased variety in assigned tasks. The socio-technical movement attained world-wide recognition but still it was rather unique to Sweden. The Volvo factories in Uddevalla and Kalmar may be the two most well known examples of a socio-technical design (see e.g. Womack et al. 1990). Two laws, related to work life, followed the socio-technical movement. In 1973, the law stipulating employees' representation in companies' boards of directors was passed, and Medbestämmandelagen (MBL), a co-determination law (law 1976:580) which may be seen as a national instrument for the empowerment of employees (Stjernberg interview 1999) was passed three years later.³⁹ The socio-technical trend thus directly influenced the institutional setting in Sweden. In a longer perspective, it may also have affected the Swedish perception of what constitutes a good working environment. This is, for example, reflected in a study from 1980 on the relationship between national values and organisational culture (Hofstede 1980), in which Swedish firms are characterised by a very low power distance index. Empowerment is an important ingredient of modern QM and in that sense, the socio-technical movement may have spurred the diffusion of QM in the years to come.

During the 1970s, companies in primarily three industrial branches – the nuclear industry, the offshore industry and the aviation industry – started to apply the international quality assurance standards used by their international business partners (Chocron interview 1999). A breakthrough came with the construction of the Ringhals nuclear plant on the Swedish west coast; it was built completely according to international quality assurance standards and quality control requirements. Soon, international standards were adopted internally by Vattenfall and ASEA Atom, suppliers of nuclear power plants, and by companies in the offshore and aviation industries (Andersson interview 1999, Bergman et al. 1999). Similarly, the automobile industry began to place quality demands on their suppliers (Jönson interview 1999). In the mid-1970s, the American market became more and more central to Volvo and quality assurance became important. If accidents occurred because of

³⁸ Swedish development was partly inspired by development in Norway, where the theories formulated by Eric Trist and his colleagues at the Tavistock institute (in collaboration with Einar Thorsrud) became the basis for a national working life reform program during the 1960s. Another step in the same direction was taken with the project "Bättre arbetsmiljö" ("Better working environment"), initiated in 1968 by Stefan Agurén at Svenska Arbetsgivareföreningen (SAF), i.e. the employers' association (Stjernberg interview 1999).

³⁹ This development was significant a couple of years later in the era before the establishment of the National Committee for Swedish Quality.

bad product quality, the American judicial system put customers in a strong position to sue Volvo and other car manufacturers. If it could be proved that an accident had occurred because of bad product quality, the judicial process could be very expensive for the car companies (Gustavsson interview 1999). Not all efforts were successful, however. As early as around 1970, Per-Åke Sörensson, quality manager at Volvo, invited Feigenbaum to lecture on his total quality control (TQC) concept. Feigenbaum and his consultancy firm were hired to design a systematic quality system for Volvo, inspired by the work at General Electric. However, the projects that followed failed (Jönson interview 1999), leading to total quality development progressing rather slowly at Volvo during the 1970s (Olgerman interview 1999).⁴⁰

Other important contributions in the 1970s. Lennart Sandholm has played an important role throughout much of modern QM development in Sweden.⁴¹ In 1970, Sandholm started as a management consultant at IKO, where he specialised in quality issues, and by so doing became the first real quality consultant in Sweden. In 1971, he started to feel that he did not really fit the consultant role, “where things are just sold regardless of the specific characteristics of each case”. He believed there was a major need for education and, parallel to his work at the consulting firm, he started to give courses, which gradually began to take more and more time. Olle Björklund became his partner and, in 1971, they started Sweden’s first QM training and consulting firm, Björklund and Sandholm (Sandholm interview 1999). In the mid 1980s, Olle Björklund left the company for Alfa-Laval (to start a quality consultant operation within Alfa-Laval) and the name Björklund & Sandholm was changed to Sandholm Associates, a quality consultant company that is still in operation.⁴²

Another important organisation that began to work with more comprehensive quality approaches and with applied research on quality issues at an early stage was the industrial research and technology broker organisation IVF (Institutet för verkstadsteknisk forskning), established in 1964.⁴³ IVF is a collective research institute funded by equal contributions from

⁴⁰ According to Jönson (interview 1999), Sörensson was frustrated and moved to Volkswagen instead.

⁴¹ Sandholm started to work at the development laboratory at ElectroHelios (later to become a part of Electrolux) in 1958; he became quality control manager, a member of the American Association for Quality Control ASQC) and a member of Mekanförbundet in 1961. A few years later, in 1965, he received a scholarship from the Swedish-American Society, which allowed him to go to the United States to study quality. A conference was held in Rotterdam that year, arranged by the European Organisation for Quality Control (EOQC). At this conference, Sandholm met with Joseph Juran and told him that he was going to go to the United States later the same year. According to Sandholm, this was the beginning of a long, mutually beneficial friendship. In the United States, he studied for seven months, mainly at Rutgers University, but also found time for some 40 company visits. During his stay in the US, he was exposed first hand to the new total approach to quality control. He wrote a report and an article for Mekanförbundet’s magazine (which was connected to the collective research institute IVF), and tried to implement these new ideas at Electrolux (and at IVF). However, it was not easy to gain acceptance for the new ideas in the beginning (Sandholm interview 1999).

⁴² In 1987, Sandholm & Associates was bought by a larger firm of management consultants called M-gruppen. However, Sandholm & Associates became an independent unit again in 1990.

⁴³ The purpose of IVF is to scan the world for new and useful technology, bring it back to Sweden and apply and modify it to suit Swedish needs (commonly carried out as a joint project with a major corporation) and finally to

industry (represented by Mekanförbundet of which, among others, Lennart Sandholm was member) and the government.

In the late 1960s, Lennart Sandholm participated in introducing a more holistic view of quality at IVF. Research on quality at IVF took off in 1971, when Kerstin Jönson started her career in this field at IVF (Sandholm, Jönson, Persson interviews 1999). A pilot study, "ADB in quality work", was conducted in 1971 by Kerstin Jönson and Peter Sandell. Then, in 1972, IVF made the decision to fund quality research with a modern industrial total quality perspective, which led to a few projects. As a result, process management and prevention began to be discussed at IVF. Elsewhere in Swedish industry, the discourse was still geared towards quality control and production inspection. Initially, however, this new group was facing resistance from technicians within IVF because they did not regard research on quality as genuine real research. Nevertheless, in 1973, IVF started the Futurum project, one of the first applied research projects putting the customer in focus. Several large companies supported the project. Later, in 1976, following the Futurum project, an initiative was taken to start a joint Nordic project, with participants from Norway, Sweden, Denmark and Finland (Jönson interview 1999). One year later, IVF and the Nordic colleagues came up with a suggestion for a common Nordic quality control and assurance principles standard; however, this idea ended up on the shelf. Approximately at the same time, work on similar issues had started at higher international levels, and preparations for what was to become the first version of the ISO 9000 standard ten years later were initiated. Even if it was difficult to foresee the great future impact of the ISO 9000 standard at this time, it was considered useless to continue the Nordic project (Jönson and Chocron interviews 1999). Instead, Kerstin Jönson and others continued work on the standard at the international level.⁴⁴

The 1980s: towards a total approach. Towards the end of the 1970s, Western companies began to observe signs of increasing Japanese competition. Gradually, productivity decreased, as did market shares. As stated previously, many companies initially believed that an increased use of computers was the antidote and a solution to all kinds of quality problems but Japanese competition grew even more intense. The years around 1980 were a mental turning point among many Western managers and the interest in quality issues in general, and Japanese QM philosophies in particular, increased among Swedish and other Western company leaders (Sandholm interview 1999, Jönson interview 1999). From having

diffuse the technology to small and medium sized firms. In total there are 22 collective research institutes, most of these focused on a narrow technical discipline.

⁴⁴ In 1987, ten years after the attempts at IVF to establish a joint Nordic quality standard, the ISO standard was established (Chocron interview 1999). As early as in 1988, Sweden quickly becomes one of the first countries to adopt the ISO standard as a national standard (Bergman et al. 1999). Perhaps the rather inspection-like connotation of the Swedish translation of the English word control influenced the early adoption of the ISO standard in Sweden (Bergman et al. 1999).

been a subject regarded as of interest only to certain devoted specialists, quality became a priority among top management as well.

From the early 1980s on, many representatives of Swedish industry and research associations, such as IVF, made a large number of visits to Japan (and to the United States, which was one step ahead of Europe and Sweden in the area of Japanese-inspired total quality philosophy) (Jönson, Ögren and others, interviews 1999). Some of these visits are briefly discussed in the next part of this section, beginning with industry.

Visits to Japan and the United States and quality development programs in Swedish industry. During the early phase of the TQM era, Swedish development was led by the large, multinational companies, especially through visits to the United States and Japan and the internal quality development programs they eventually led to (e.g. the Q84 initiative at Electrolux, the Ericsson Quality (EQ) program and ABB's T50 program).⁴⁵ The Ericsson and ABB cases are discussed in more detail below.

Ericsson. The initiative to start a quality project at Ericsson was taken by the CEO, Björn Svedberg, who made major contributions to changing corporate culture in favour of quality work.⁴⁶ Svedberg arranged internal seminars on quality requirements burdened by a number of quality gaps. At the time, Ericsson already had a production quality manager, but Svedberg wanted Ericsson to adopt a stronger customer focus on quality, so he appointed a second quality manager, C-G Larsson; Sture Ögren became his assistant (Ögren interview 1999). In 1982, Larsson and Ögren travelled to the United States, where they visited IBM, AT&T, GE, and DEC, among others. As expressed by Ögren (interview 1999), the “doors were open”, just as they were during a visit a couple of years earlier to Japan.⁴⁷ The knowledge gathered during the trips to Japan and USA eventually became the basis of the Ericsson Quality (EQ) program at Ericsson (Ögren interview 1999, Chocron interview 1999).

In November 1982, a working group was created to scrutinise quality-related issues more closely. Somewhat later, in March of the following year, a special working group consisting of representatives of all corporate areas began to plan the company's activities in a holistic

⁴⁵ Around 1984, some large Swedish export companies started to work with quality from a more holistic perspective than previously. The Ericsson Quality program (EQ) started in 1983/84, was inspired by Crosby's theses and General Electric's quality approach, and proceeded for three years. According to Ögren (interview 1999), it was “not successful in all respects, but we had laid the foundation for coming quality initiatives”. The same year, Anders Scharp initiated the so-called Q84 project at Electrolux (Sandholm interview 1999). Top management at Volvo considered it more important to systematically listen to the voice of the customers and engage in benchmarking activities (Persson interview 1998). Furthermore, a few years later, in the late 1980s and early 1990s, ABB started an initiative that led to the T50 program.

⁴⁶ The motivation to focus on quality came both from his international contacts and as a response to internal quality problems (Svedberg interview 1995).

⁴⁷ Ögren remembers this as the beginning of a new era even if no one in America really spoke about TQM yet, as they did in Japan when he was there in 1979 (Ögren interview 1999). In 1979, Sture Ögren and a couple of his colleagues at Ericsson visited Japan, and they were stunned by the broad Japanese approach to quality. They visited, among other companies, Hitachi, NEC, Fujitsu and Toshiba and learned that companies that worked according to a total quality approach and those that did not were regarded quite differently in Japan (Ögren interview 1999).

perspective. They planned to introduce an educational program aimed at reaching all 78,000 employees, in order to enhance quality consciousness at all levels. It soon became clear that the general opinion among the employees supported an intensified focus on quality. It was also apparent that top management involvement was a key success factor. Therefore, Ericsson's top leaders were gathered for a working seminar in June, 1983. This involvement and commitment on the part of top-level management communicated that quality was a priority (The National Committee for Swedish Quality 1987).

The continued development of total quality at Ericsson may be viewed as a process in three steps (Ögren interview 1999, Bergman et al. 1999). The first phase, referred to as Ericsson Quality (the EQ program), the initiation of which is described above, was launched in 1983 as a three-year project focusing on customer-defined quality (especially related to internal customers).⁴⁸ The result of the pioneering EQ program was that 22,000 Ericsson employees were trained in basic quality issues; however, the view that the EQ program was a headquarters initiative with minor impact persisted at many Ericsson units.⁴⁹ Towards the end of the three-year EQ period, there was a need to consolidate gains and to keep a lower profile before possibly starting again. Partly as a result of this, the Ericsson Quality Institute (EQI) was started in 1987. This was an internal, semi-commercial, quality school for Ericsson people (Ögren interview 1999). During the second phase, Ericsson gradually focused more clearly on developing routines and standards for quality control. In 1989, Ericsson decided to work towards third party certification according to ISO 9000. The largest company in the Ericsson corporation, Ericsson Telecom (led by Jan Stenberg), took the lead in this work, and qualified for certification towards the end of 1990. The third phase, aimed at turning Ericsson into a TQM company, was headed by Jan Stenberg from the absolute top management level⁵⁰, who initiated a TQM-inspired personal follow-up with the top leaders of all Ericsson units.⁵¹ A quality survey conducted in 1991, consisting of five questions related to business-oriented quality improvement was another tool with impact. The survey led to a better understanding of how different units in the corporation handled quality issues. The third phase, thus, was focused on improving total performance. During this phase, several Ericsson units made efforts to improve according to the TQM method of management, but these efforts were by no means totally uniform across the corporation; rather, there was a considerable freedom of choice concerning actions and method at the subunit level. One result of these efforts at

⁴⁸ Although pioneering the focus on quality through the EQ program, the massive requirements for a TQM program were not fully understood when the program started (Svedberg interview 1995). In the video initiating the EQ program, CEO Svedberg comments that he believes that the project will run for a few months. In the English version of the video, made a few months later, the time mentioned has been prolonged to around a year.

⁴⁹ Earlier interview data from Ericsson units.

⁵⁰ Jan Stenberg was then part of the three-man central leadership team at Ericsson headquarters, with Lars Ramqvist as CEO.

⁵¹ Interview with Jan Stenberg in 1992 and 1995. Jan Stenberg later became CEO of SAS and has attempted to implement his TQM ideas in the new organisation as well.

different levels and in different units of the corporation, was that Ericsson Data AB, as the first Ericsson unit, was awarded the USK prize in 1994 (the first service company to do so).

ABB. In 1989, Percy Barnevik, CEO of the recently merged ABB, took the initiative to explore if TQM might be a productive road to follow for the company's further development. He saw to it that representatives of Motorola, the first winner of the American MBNQA award, were hired as consultants to ascertain if TQM might suit ABB's decentralised organisation, which was composed of many small companies, as well as it suited the centralised structure of Motorola. The consultants produced a report in which it was stated that TQM could indeed work at ABB. Barnevik then assembled his top managers and after a late night meeting, they came up with a new strategy for ABB focusing on three central concepts: shorter lead times, decentralisation and competence development (Hamberg 2000, Boman 1992, EFS 1988). The Swedish part of ABB, which was managed by Bert-Olof Svanholm, used this three-concept strategy as a starting point for its TQM effort, the ABB T50 project. This project, initially focusing on cutting all lead times by half in three years, gradually grew into a full-fledged TQM program, and ABB can be regarded as one of the pioneering Swedish corporate organisations in the area of TQM development. The efforts led to ABB Atom AB receiving the USK award in 1994⁵² and ABB Coiltech AB in 1997.

Visits abroad by representatives of research institutes and universities. As indicated before, it was not only the large export companies that visited Japan and the United States; research institutes such as IVF and some representatives of the universities did so as well.

IVF. In 1979, Kerstin Jönson and Beata Forsberg, her colleague at IVF, were assigned by Tage Hallén to travel around the United States for a month to "search for the latest within QM". Since they could claim that they were sponsored both by the Swedish government and by industry, they were successful in obtaining insights into quality developments within many companies. They visited Lockheed, IBM, the automobile industry, and AT&T, among others. Their observations were compiled in a report which met with a tremendous reception among Swedish companies (Jönson interview 1999). A few years later, in the early 1980s, Kerstin Jönson made another journey, this time to Japan, where she could make use of her contacts involved in the ongoing work on an international quality standard. Professor Kume was one of these contacts; he told her that she "would be given a special tour", in contrast to the standard JUSE tour, arranged for many foreign businessmen who wanted to see the "Japanese miracle", in which they were sent to certain predetermined places where they were not always able to make the observations that would have benefited them the most. (Jönson interview 1999).

⁵² Of course, Asea Atom's early efforts in developing quality standards and nuclear energy quality contributed to the work for which the award was presented as well.

In 1983, Kerstin Jönson and her colleagues at IVF visited the United States a second time; the focus of this visit was on product development and product quality. A white paper had been published in the U.S. in which the Japanese threat was recognised, as a result of which a committee had been formed to investigate this threat in more depth, led by the CEO of Hewlett Packard. Kerstin Jönson wanted IVF to publish material on this issue, which it did, but according to many technicians at IVF, quality was still not really technology and thus was a low-ranked research issue. It is noteworthy that IVF published in Swedish, which could have been an advantage, since it was still somewhat difficult to convince people to read foreign literature (even in English) especially at small companies.

Chalmers University of Technology. Around 1980, Chalmers arranged trips to Japan with participants from Swedish and Norwegian industry, designed as learning endeavours, in which pairs of participants were responsible for documenting the main insights from each visit to Japanese firms. It is, however, amazing to read these reports in retrospect and to note to what a limited extent the participants could put what they observed into a TQC perspective. However, there were exceptions, which clearly indicated that some of the participants learned what others did not manage to. Other input that reached the university world from Japan during these years was primarily linked to new Japanese ways of managing production, e.g. kanban and JIT. Among the professors that frequently visited Swedish universities was Professor Yamashina. The Chalmers adjunct professor and consultant Lars Södahl also took the initiative to invite Shigeo Shingo to Sweden in 1982 and Södahl translated his book about poka-yoke and SMED-systems.⁵³ A television program with Shingo commenting potential improvements in a Swedish production unit he had visited, made quite an impression. In 1987, representatives of Chalmers (Sverker Alänge) and the Business School at Göteborg University (Johnny Lindström) visited Japan, the result of which was that basic quality teaching at the undergraduate level was changed in the direction of TQC. In 1989, Professor Shoji Shiba was invited to Sweden by Chalmers University of Technology and the Business School. He introduced a systematic approach to the seven management tools in his two workshops with Swedish industry, one result of which was the introduction of the Shiba approach to using tools systematically both in the university teaching program and at the Ericsson Quality Institute (which Shiba also granted the right to translate and use his material internally). Shiba also participated in a meeting with representatives of the National Committee for Quality (see next section) and, based on Japanese and Hungarian experiences, he presented his views on how a national quality organisation and movement should be constructed. At the initiative of Chalmers and the Göteborg University Business School, a

⁵³ Shingo is the inventor of the SMED (Single-Minute Exchange of Die) system and the poka-yoke (mistake proofing) system, and a key developer of the Toyota Production System (together with Ohono) (Shingo 1982, 1984 and 1985).

working group was also established to lay the foundation of a national research program on quality.⁵⁴

Discussion of the results of the visits. The study visits to Japanese firms yielded varied results, for which many reasons have been presented. It has been suggested that Japanese industry is extremely secretive. A British researcher claims that the visits were rather expensive and that the visitors, eager to find a “magic potion”, did not spend enough time examining in detail what was behind the Japanese success (Macdonald 1999). This explanation may not be the whole truth, however; the visitors’ mindset and their ability to ask questions may also have been significant. In Japan, we were frequently told that the main reason for the visitors not learning anything was that many of them came with their own assumptions, did not listen to what the Japanese said, and went home and reported what they had already assumed before visiting Japan.⁵⁵ The difficulty in changing mindset is also reflected in the reports written by representatives of Swedish industry who visited Japan in the early 1980s at the initiative of Chalmers University of Technology. The experience from Volvo Gent also supports the idea that not asking the right questions is one main reason for not getting answers. According to DeWulff (interview 1996), the Volvo representatives’ visits became extremely productive only when the Volvo people learned that their Japanese hosts answered almost all questions, but only when asked (which can be compared to a Western European who tells a long story based only on a first vague question).

Whatever the reason may be, Swedish industry initially adopted parts of the Japanese QM techniques, regardless of their original context. The tremendous diffusion of quality circles and their sudden decline is a well-known example of this, and in Sweden the quality circle movement reached its peak in 1984. A major reason for the decline was that the QC in itself was regarded as a solution to quality problems and an understanding of the “total” in TQM was missing.⁵⁶ It was not until the second half of the 1980s that a more holistic view of total quality began to take root in the industry and other sectors in Sweden, e.g. through the achievements of the National Committee for Swedish Quality and the Swedish Institute for Quality. These organisations and the process resulting in quality becoming an issue on the national agenda are further discussed in the following.

The National Committee for Swedish Quality. The endeavours at establishing a comprehensive national focus on quality consciousness in Sweden grew from several parallel directions (The National Committee for Swedish Quality 1986).

⁵⁴ This work was a collaborative effort with participants from industry (e.g. Volvo and Ericsson) and the large universities (Chalmers, Göteborg Business School, Linköping University and Luleå University). In addition, all other universities in Sweden were asked to write their own comments to the proposal presented to the Government and NUTEK.

⁵⁵ Interviews in Japan in 1987 and 1989.

⁵⁶ Alänge (1994).

In April 1982, three labour market actors – LO, SAF and PTK – signed a development agreement based on the MBL law from the mid-1970s, stating that it was important to develop the effectiveness, profitability and competitiveness of Swedish industry in order to stimulate the labour market and workplace development and that this goal required the continuous development of all levels in industry. Furthermore, it was declared that the skills and experiences of all employees were important sources of knowledge in order to strengthen the competitiveness of the companies. With the aim of dealing with these issues (together with the labour market parties), "Rådet för utvecklingsfrågor" (Council on Development Issues) was established and quality soon became a central issue.

At about the same time, the Ministry of Public Administration (Civildepartementet) had initiated a renewal of the public sector and an intensified focus on quality was regarded as an important mechanism with which one could achieve the goals in this case as well.

At the beginning of 1984, SKTF turned to the Ministry of Industry in an effort to point out the increased importance of quality issues in Swedish industry and the fact that there might be a lot to learn from the development at companies that had started up internal quality programs.

A working team was set up with representatives of the Ministry of Industry, STU (Styrelsen för teknisk utveckling), SIND (Statens industriverk), IVA (Ingenjörsvetenskapsakademien), IVF (Institutet för verkstadsteknisk forskning) and SKTF (Sveriges kvalitetstekniska förening). The group started to map the level of quality consciousness and interest in quality-related issues in Swedish industry.

At about the same time, IVA conducted a number of pilot studies on quality.⁵⁷ The results unanimously supported the idea that quality was of utmost importance for Swedish competitiveness, especially since it had been demonstrated that not only Japan, but also other industrially successful nations had invested a lot of resources with the aim of enhancing quality levels.

During the early 1980s, it became more and more evident that Sweden's competitiveness at the national level had deteriorated and that the market shares of Swedish companies had diminished alarmingly in relation to other OECD countries. In order to find causes and solutions to the problems, the Minister of Industry, Thage G. Pettersson, took the initiative to gather representatives for industry, industrial associations and labour unions at a meeting of the Ministry of Industry's industrial policy council in May, 1985. It was agreed that quality was an important problem area and that powerful measures were needed to enhance quality consciousness in Sweden. This was the background to the national quality campaign that

⁵⁷ Among other studies, IVA had conducted a pilot study, on behalf of the Ministry of Industry, on the possibilities of initiating a nation-wide quality campaign. The results were presented in a report ("Kvalitet för ökad

shortly thereafter was manifested through the establishment of the National Committee for Swedish Quality.⁵⁸

The National Committee was established in November, 1986 following an initiative by the labour market actors (SAF, LO and PTK), together with the Ministries of Industry and of Public Administration. The committee included representatives of the government, the labour market, industry and the public sector (Andersson, Jönson, Reftmark interviews 1999). The National Committee was behind the nation-wide quality campaign “Svensk kvalitet – rätt sätt” (“Swedish quality – the right way”). The committee was led by a steering group⁵⁹ and by a secretariat with Bengt Norström as elected secretary-general. A few work teams, e.g. a team for issues relating to principle⁶⁰, an information team⁶¹, a team for educational issues⁶², a team for the public sector⁶³ and a team working with standardisation issues⁶⁴ answered to the secretariat. HRH Prince Bertil was elected honorary chairman.⁶⁵

Investigations of the status of QM education. In February 1982, after nine years as CEO at the Philips factories in Norrköping, Sven-Olov Reftmark left Norrköping and started a new career at Philips’ headquarters in Stockholm. In Norrköping, he had worked intensively with quality issues. There was a strong consensus in the company concerning the importance of adopting a total quality approach. According to Reftmark (interview 1999), every top management meeting started with bringing up quality issues and almost every single contribution in the internal television broadcasts put quality at the centre, i.e. there was a similar pattern at every level in the company.

As part of the duties of his new position, he was to stay in contact with important technical and scientific institutions in Sweden. This led to his 1984 election to PBT (“Planeringsberedningen för teknik och naturvetenskapliga ämnen”), a collaboration unit between UHÄ (the national office of university education) and the government. Here, Reftmark soon recognised that one subject was not being discussed, i.e. the quality issue, including TQM. Since Reftmark believed that an improved quality consciousness was vital to

konkurrenskraft”, IVA report no. 288-1985) and clearly indicated that an intensified quality focus was welcome in industry as well as in the public sector.

⁵⁸ In a statement in SFK’s member journal Kvalitets-nytt (No. 1 May 1987), Norström argued that the main reason for the establishment of the National Committee was an effort to strengthen Sweden’s already strong position concerning quality, rather than a reaction to a bad national quality status. The overall aim of the quality campaign was to “enhance the common welfare level of the country”.

⁵⁹ Members of the steering group were Carl Fredriksson (Ministry of Industry), Sören Häggroth (Ministry of Public Administration), Jan Peder Norstedt (SAF), Göran Karlsson (LO), Stig Ahlin (TCO) and Göran Witlock (SAF) (Kvalitets-nytt, No 1, May 1987).

⁶⁰ Led by Kerstin Jönson.

⁶¹ Led by Lars Thalén.

⁶² Led by Sven-Olov Reftmark.

⁶³ Led by Sören Häggroth.

⁶⁴ Led by Bertil Lindkvist.

⁶⁵ The that the national quality movement got another push forward in 1986 when the second EOQC conference was held in Sweden, twenty years after the first event is perhaps also noteworthy. After having been convinced that the conference really could advance modern quality thinking in Sweden, the Ministry of Industry provided it with financial support.

many companies' survival, not only in Sweden but all over Europe, he began to bring up the subject during the PBT meetings.

The year after, in 1985, Reftmark left the Philips corporation and started his own consultancy firm. In 1986, he was commissioned by the Ministry of Industry to investigate the standard of research and education within the quality field in Sweden and to suggest measures that could quickly meet the increased demands related to reformed education on quality issues. In the course of the investigation, he collaborated with authorities in the education sector and with the National Committee.

The investigation was completed in October 1986 and the report was presented to the Ministry of Industry. It stated that "intense discussions with industry had indicated the necessity of establishing a quick and powerful knowledge development within the quality field in order to make the Swedish industry more competitive" (Reftmark interview 1999, translation by the authors). Concerning measures to be taken, Reftmark suggested, as a first step, the establishment of a professor's chair at Chalmers University of Technology in Göteborg and another at the School of Business Administration at the University of Göteborg. As a second step, he suggested that more resources be allocated to the existing quality professor at the university of Linköping, i.e. to Bo Bergman who was installed in 1983 as Sweden's first professor in the quality field, and that additional professorships be appointed at the universities of Stockholm, Lund and Luleå (Reftmark interview 1999).

In October 1986, Reftmark was also assigned by UHÄ to become "investigator of questions related to education and research within the field of quality" (Reftmark interview 1999). Sverker Fredriksson was project coordinator at UHÄ. This investigation was built on the one described above and on comments relating to it, but it was more comprehensive as it included more company visits and visits to universities than had previously been possible. The Royal Institute of Technology (KTH) in Stockholm, Chalmers University of Technology in Göteborg, the universities of Linköping, Lund and Luleå and the schools of business administration in Stockholm and at the University of Göteborg were included in the study. In March 1987, the results were presented in a report entitled "Kvalitetsstyrning – utbildning och forskning" ("Quality control – education and research") (UHÄ-rapport 1987:5), in which the statement was made that Swedish quality development mostly was on the level of international development (due to the international orientation of Swedish industry), but that the educational performance at the university level was inadequate. The need to educate people in quality issues was to some extent fulfilled by internal programs and consultants, but the role of the universities was rather obscure. The report contained a number of recommendations relating to potential improvements of this situation, and included the suggestion that at least one professor's chair on quality be appointed at each of the large universities and that every student at a Master's program in engineering or business

administration should take at least one basic course in quality control (Reftmark interview 1999).

The university of Luleå was quick in responding to the suggestions in Reftmark's investigation and established the second professor's chair in quality in 1994 (Bengt Klefsjö) and the QM pioneer and consultant Lennart Sandholm was appointed adjunct professor at the Royal Institute of Technology (KTH) in Stockholm,. At the University of Linköping, additional resources were given to the previously established QM department. Overall development at the schools of business administration was slow, however (Reftmark interview 1999, Bergman et al. 1999).

The report also stated that in order to realise the goals of the first step, as outlined in the previous investigation, companies in the Western Sweden region and the city of Göteborg had stepped in as guarantors with SEK 2,5 million, and STU and SIND with equal amounts, for competence development at Chalmers University of Technology and the School of Business Administration at the University of Göteborg. In accordance with the ideas presented in the governmental proposition on industrial policy and research (Proposition 1986/87:74),⁶⁶ the development of quality knowledge was to take place during three years, assuming that the Ministry of Education could guarantee continued financing of the two professorships. This came to be known as "Västsvenska kvalitetssatsningen", which was in progress between 1987 and 1992 (Reftmark interview 1999).

As a direct result of these efforts, Chalmers established a professor's chair in mathematical statistics with a focus on quality and reliability in 1991 (Holger Rootzén), but did not, the other hand, appoint a professor in QM until 1999 (Bo Bergman, who moved from his professor's chair in Linköping). However, undergraduate courses in TQM had been offered by the Department of Industrial Dynamics (formerly the department of Industrial Management and Economics), led by Sverker Alänge, beginning in the late 1980s and during the 1990s. Chalmers also participated actively in TQM education geared towards managers in industry, through the activities of the research based education institute Champs (Chalmers Advanced Management Programs).⁶⁷ which began offering educational programs focusing on TQM in 1992. These programs were started in response to the frustration evoked by the fact that so few leaders of Swedish industry seemed to fully grasp the meaning of TQM, although many concepts had become popular in industry at this time, e.g. benchmarking. Together with a reference group from industry, Champs designed two programs: TQMx with a focus on top executives (CEOs and company board members), and TQMp, which was directed towards middle management and people working with quality issues on a more operative level, i.e.

⁶⁶ The first of Reftmark's reports laid an important foundation to parts of this governmental proposition (Reftmark 1988).

⁶⁷ Champs was established in 1989 (Lindwall interview 1999).

functional leaders who reported to the top leaders. The programs were sequentially designed, with TQMx starting in the autumn of 1992⁶⁸ and TQMp directly afterwards, during the spring of 1993. Both programs were based on the idea that Swedish industry should learn from the leading companies in the world, and hence, important contributions came from the two first winners of the MBNQA, i.e. Motorola and the Xerox Corporation. The close co-operation with the leading Swedish TQM company ABB and its US subsidiary provided essential input as well. According to Peter Lindwall, one of the initiators of the TQM programs, Champs had the big advantage of having (which is still the case) one foot in academia and one in industry (Lindwall interview 1999).

In summary, development of QM teaching and QM research in Swedish universities, at least under the heading of TQM, was relatively slow. One QM branch, i.e. service quality, was an exception; Swedish (e.g. Richard Norman, Evert Gummesson and, later on, Bengt Edwardsson) and Nordic (Christian Grönroos in Finland) professors had taken the forefront in this area in the early 1980s.⁶⁹ Their research on what constitutes the customers' perceptions of quality and of the importance of service quality are important contributions, which have influenced not only their students and service companies, but also industrial firms that are increasingly dependent on the service component of their total product. In 1987, Evert Gummesson published what can be regarded as the first Swedish book on TQM,⁷⁰ but it was only published as an internal Ericsson paperback.⁷¹ In terms of service quality, Jan Carlzon's practical success at Linjeflyg and SAS in creating service quality through customer focus and less hierarchical structures is one of the most important contributions from a company. Based on these experiences, Carlzon published a book in 1985, "Riv pyramiderna", which is still the most important Swedish QM-related contribution to the international management literature.⁷²

Furthermore, at the two universities investing resources in professors' chairs in quality, Linköping and Luleå, a considerable number of engineers have obtained degrees with a quality focus. For example, Linköping has a program specialising in quality, to which 40 credits of 180 is devoted. In addition, a number of Ph.D.s have received their degrees, initially mostly within areas related to statistics and specific quality tools, but more recently with a wider TQM focus as well, including one thesis researching the relationship between

⁶⁸ In the first round there were around 20 participants, mainly from Volvo and Electrolux.

⁶⁹ E.g. Grönroos 1984, Normann 1984.

⁷⁰ Gummesson (1987).

⁷¹ Earlier books by Sandholm cannot be regarded as representative of the modern TQM school, as the focus was more narrow on cost of quality. The management-related books that Sandholm promoted were the books by Juran and his associates. Sandholm published his first TQM book in 1995 (Sandholm 1995). Bergman and Klefsjö, only used a first draft version of their coming book during these years, mainly focusing on reliability and statistics. Later, however, they added other sections on change and management, which resulted in the publication of a TQM inspired textbook in 1991 (Bergman and Klefsjö 1991) and a more developed edition, which was transformed into a more full-fledged TQM book in 1995.

⁷² Carlzon (1985), the English version with the title "Moments of Truth" was published in 1987.

ergonomics and quality⁷³ and another making comparisons of international quality development.⁷⁴

The 1990s: the Swedish Institute for Quality (SIQ). The National Committee was never expected to be more than a temporary organisation. Early in 1988, the National Committee gave Reftmark diffusely formulated task of coming up with some ideas of how a more institutionalised, permanent organisation for the promotion of quality development in Sweden might be structured (Chocron, Reftmark interviews 1999). It soon occurred to him that the best organisational form would be a collective research institute. In June 1988, an initial proposal was presented to the steering group of the National Committee, which approved of the idea, and Reftmark was commissioned to investigate the proposal in more detail. In September 1988, Reftmark presented the report "Förslag till organisation för svensk kvalitetsutveckling" (Reftmark 1988) and was given the task, together with Bengt Norström, secretary-general of the National Committee, of implementing the proposal (Reftmark interview 1999), which he did; in early 1989, the basic structure of the new organisation was complete.

An important point of departure was that the new organisation, which was to be launched in January, 1990, was to be independent and be rooted as deeply in Swedish society as the National Committee had succeeded in becoming during its short lifetime.

The most central aspect of the proposal for a new organisation was the establishment of a collective research institute, i.e. the Swedish Institute for Quality (SIQ), which was to be active in research and development, education and information, as well as conduct commissioned research and assist members of the supporting organisation ("Intressentföreningen" – see more below).

Furthermore, in order to make use of the knowledge, experience and willingness of certain individuals to work with quality-related issues in various sectors of society, the proposal mentioned the establishment of a special council for quality development ("Rådet för kvalitetsutveckling"), to which individuals that had distinguished themselves in the quality field could be elected.

The government and the supporting organisation were to provide funding in equal amounts. The members of the supporting organisation were to be recruited from different sectors of society and include representatives of public as well as private companies, employers' and employees' associations and organisations that had strong links to quality practice. Funding could also come from payments for commissions and courses arranged by the institute.

⁷³ Axelsson (2000).

⁷⁴ Kroslid (1999).

According to the principles above, The Swedish Institute for Quality (SIQ) was established in Göteborg in December 1990,⁷⁵ i.e. somewhat later than the original plan.^{76 77} Bengt Norström became the first CEO, but Johnny Lindström, an associate professor at the school of business administration at the University of Göteborg, soon took over.⁷⁸ Lindström had earlier played an important role in Västsvenska kvalitetsnsningen. A council for quality development was formed with Gunnar L Johansson of Volvo as first chairman.

The detailed activities of the new organisation were initially unclear. Soon, however, SIQ started work in four main programs: information, education, R&D and special tasks. An important task, within the realm of the latter program, was to develop a national quality award in Sweden, resembling the Malcolm Baldrige National Quality Award (MBNQA), that had been successfully established in the United States in 1987, and that was well-known to the founders of SIQ (Chocron, Jernberg interviews 1999, Kvalitets-nytt No. 4 November 1990).

The Swedish Quality Award (USK). During the summer of 1989, Sven-Olov Reftmark moved to Washington to become technical attaché at the Swedish embassy. He was interested in how quality issues were handled at the national level in the United States, e.g. via the MBNQA. Reftmark visited NIST, the federal organisation in the United States that was in charge of the award, and was inspired by what he saw.⁷⁹ Reftmark suggested that the award principles should be investigated in more detail, a suggestion that was approved by the National Committee. In the report, "Nationella kvalitetspriser i USA", written in January 1990, Reftmark stated that the establishment of an award, similar to the MBNQA, would contribute substantially to quality development in Sweden (Reftmark interview 1999). SIQ approved the suggestion to initiate a Swedish quality award and, in January 1991, a seminar was held on this subject at IVA with Dr Curt Reimann from NIST (Reftmark interview 1999).⁸⁰

⁷⁵ An interesting observation from the opening of SIQ was that the only speaker demonstrating a deeper understanding of the meaning of TQM was the representative of the city of Göteborg, Göran Johansson, who had probably developed this comprehension during the course of working at SKF, including a visit to Japan with the company board, and his own initiatives to make SKF a TQM company (observations made at the SIQ opening and interview data from SKF).

⁷⁶ In a statement in Kvalitets-nytt (No. 4 November 1990), Norström claims that SIQ was meant to be "the main force for quality development at the national level" and that, as opposed to the case when the National Committee was established, "Sweden's competitiveness is no longer in the front line".

⁷⁷ The question of where to locate the institute was open. Several cities were interested, but Göteborg, the proponents of which were led by Göran Johansson with substantial support from industry and the universities, was chosen.

⁷⁸ Norström has remained active within SIQ, but is not willing to move from Stockholm. His main task has been to work for SIQ from his Stockholm location.

⁷⁹ The work with MBNQA was led by Dr Curt Reimann at NIST (Reftmark interview 1999).

⁸⁰ The main reason for first studying American rather than European development, was simply that a European Quality Award had not yet been established. In 1989, the European Foundation for Quality Management (EFQM) was established at the initiative of Philips (Ögren interview 1999). The Swedish company Electrolux was one of the 14 first member companies. After a public referendum held in 1994, Sweden became a member of the European Union in January 1995. This may have spurred more intense co-operation among Swedish and European firms and a more European focus in Swedish quality initiatives.

The subsequent work aimed at establishing the national Swedish Quality Award got off to a quick start. A first pilot round was initiated with six participating companies (three manufacturing firms and three service firms). SIQ was assisted by IBM in Järfälla, a company that had previous experience of working with the MBNQA model. The initial plan was to launch the Swedish Quality Award (in Swedish, Utmärkelsen Svensk Kvalitet - USK) in 1993. However, the organisation committee was so inspired that it decided to launch the award in 1992, and the first award was presented to IBM Järfälla in March 1992. The year after, no winner was announced. According to Chocron (interview 1999), this was because the rest of industry had simply not yet reached an adequate level of performance. From 1994 on, however, the USK has been awarded every year, some years in two categories: one for small companies and one for large companies, i.e. less than or more than 200 employees, respectively. Even if the USK award has received relatively little recognition in the media, it has been an important contributing link to the diffusion of enhanced quality consciousness to Swedish organisations (especially to small companies that have limited resources and to organisations within the public sector that might not have been exposed to quality work otherwise). Today, the lion's share of SIQ's work is directed towards the public sector, e.g. through special conferences and educational programs (Jernberg interview 1999). The latest years of quality development in Sweden are briefly discussed below.

Gradually, the view that quality is the key success factor in business, both as a means to an effective organisation and to creating satisfied and delighted customers, was spread to other sectors of society. René Chocron (interview 1999) thinks that there has been a significant change in quality issues from a quite strong company focus to a better diffusion of ideas to smaller companies and, most recently, to the public sector (hospitals, schools, political bodies). Quality in the service and public sector has emerged as a special field, as may be illustrated by some USK award statistics (see Table 2 and 3 below).

All in all, an equal number of large and small companies have competed for the quality award throughout the years. There has been a somewhat declining trend for large companies and a rather strong upward trend for small companies to participate during most recent years. Similarly, there has been a fairly even distribution between goods producing and service producing companies over the years in this respect, although there has been a somewhat declining trend for goods producing companies and a rather strong upward trend for service producing companies during most recent years. As for the distribution between participating companies from the private sector and the public sector, respectively, the picture is somewhat different. Four times as many private as public companies have competed previously, but last year the number of private companies was just double that of public companies (see Table 2).

	1992	1993	1994	1995	1996	1997	1998	1999	Total
Large companies	5	6	6	5	6	7	8	5	48
Small companies	8	2	4	6	7	7	7	12	53
Goods producing sector	10	3	5	4	6	6	4	4	42
Service producing sector	3	5	5	7	7	8	11	13	59
Private sector	11	5	8	9	9	11	12	11	76
Public sector	2	3	2	2	4	3	3	6	25
Total	13	8	10	11	13	14	15	17	101

Table 2 – *The USK award: Number of competing organisations 1992-1999 (SIQ web 2000).*

At first, mainly divisions at large multinational companies received the award, but other types of organisations have won the USK award during most recent years, e.g. a health care unit in 1996, a small trading company in 1998 and a service sector company in 1999 (see Table 3).

Year	Award winner
1992	The manufacturing division at IBM Svenska AB
1993	No award winner
1994	LM Ericsson data AB and the energy/fuel division at ABB Atom AB
1995	The tele-cable division at Ericsson Cables AB
1996	The cardiology department at the University Hospital in Linköping and Volvo Aero Corporation
1997	ABB Coiltech AB
1998	Bulten Trading AB and Volvo Lastvagnar AB (i.e. Volvo Trucks)
1999	Agria Djurförsäkringar (i.e. an animal insurance company)

Table 3 – *The USK award: Award winners 1992-1999 (SIQ web 2000, Bergman et al. 1999).*

The relatively low number of companies participating in the annual award competition (101 in 8 years) only reflects the tip of the iceberg, however. Most organisations using the USK manual only use it as an internal development tool. In some corporations, there have been internal competitions and awards (e.g. Vattenfall and Telia) and there have been local awards in some sectors and geographical areas. The number of copies printed of the USK manual, around 20,000 per year, may provide a better picture of the actual number of organisations reached by the USK principles.

The parallel development of the quality audit movement. As mentioned earlier, the development of international standards for third party auditing was an important parallel activity to diffusion of TQM ideas (see e.g. the discussion of IVF). Based on U.S. military standards, and emerging as British standards in the mid 1980s, the ISO 9000 standards were introduced in 1987 as a result of international committee work. The ISO 9000 standard got off to a good start in Britain when Margaret Thatcher's government decided that a certificate was a requirement for selling to government organisations. This decision also started to influence exporting Swedish companies, especially since the certification requirement also had a strong

tendency to diffuse to other sectors of the British economy. However, initially fueled by a demand from the paper and pulp industry, later spreading to the automobile industry, the ISO 9000 certification process rapidly acquired a strong foothold within Swedish industry. This was further reinforced by the establishment of several third party auditing organisations, many with parent companies outside Sweden, as well as a growing number of firms of consultants focusing on assisting companies with the certification process. In October 1994, about 600 Swedish firms were certified and already in 1996, more than 1,800 firms were certified (Bonniers ISO-guide 1995 and 1997).⁸¹ The Swedish government played a role in this process as well, by funding consultant assistance to smaller firms. In addition, IVF provided instruction materials and worked on diffusing ISO 9000 practices within their primary customer group of small and medium-sized companies. Later, when the “Big Three” (General Motors, Ford and Chrysler) made the joint decision to demand certification according to a modified version of ISO 9000, the QS 9000 (see e.g. a study by Gustafsson and Jacobsson 1999), a new wave of third party auditing related quality began in Swedish industry. Parallel to these events, an international committee has been actively attempting to up-date the original ISO 9000, and the new version was recently introduced.

Further parallel developments. There are also other partially competing, but strongly overlapping, concepts and approaches which are regarded as threats to the “founding fathers” by some and welcomed as natural additions to the QM movement by others. In Japan, during the 1980s, Nakajima identified a weakness in the Japanese TQC approach, especially related to the availability of machines. He developed a more structured approach called Total Productive Maintenance (TPM) focused on involving and continuously upgrading workers to gradually be able to assume more responsibility for the functioning of the machinery, e.g. cleaning, inspection, lubrication, until they finally share responsibility for improvement and automation of processes.⁸² In some units of Swedish companies, the TPM approach has been a major factor in involving the workforce in improvement work, e.g. in the engine factory at Volvo Skövde. The TPM approach has also, to some extent, influenced the Volvo KLE team concept at Volvo Torslanda. The European TPM champion is Volvo Gent; however, the concept has only to a limited extent spread to other units at Volvo.⁸³ In Japan, companies using TPM mostly regard it as an integrated part of a TQM approach,⁸⁴ but this is an attitude that still not is widely accepted in Sweden, and TPM sometimes meets with resistance from true TQM believers. New tools are continuously being integrated into the TQM movement, as is the sometimes case in Japan, based on formal decisions by JUSE (as in the case of the 7

⁸¹ In October 1999, approximately 4,600 Swedish companies were certified (Bonniers ISO-guide 2000) and in June 2000, about 5,100 companies were certified (Lloyd’s Register, the office in Göteborg, telephone conversation in June 2000).

⁸² Nakajima (interview 1987).

⁸³ DeWulff (interview 1996).

management tools), or sometimes through gradual introduction based on practical experience in combination with publicity. One such recent example is the introduction of the balanced scorecard, which has currently diffused both throughout industry and public organisations in Sweden. The balanced scorecard approach can be seen as a development or a variant of the previously widespread practise of policy deployment through the use of tree diagrams. Another approach, which became widely diffused in the mid-1990s, was the re-engineering approach to process improvement, the extremely widespread application of which, promoted by many firms of consultants, can be regarded as a management fad,⁸⁵ that arrived and disappeared, because it contradicted basic QM principles, i.e. the tried and true practise of including people in the improvement process.

New goals of the QM movement. While increasing interest within Swedish industry in TQM issues became apparent during the early 1990s, there has been a somewhat decreasing degree of interest in TQM within industry during recent years (Bergman interview 1999, Jernberg interview 1999). The new ISO 9000 has definitely been moving closer to TQM, but the QM movement itself is searching for its future destination. Concerning the competing Quality Award approaches, SIQ took the radical first step to allow Swedish companies to compete for the USK in 2000, based either on the Swedish criteria, the European Quality Award criteria or the Malcolm Baldrige National Quality Award criteria. The European Quality Award has made a move to include e.g. continuous learning in this year's version of their basic criteria. In Japan, there have been efforts to renew quality work, apparently without considerable impact either inside Japan or on the global community, including Sweden. Last year, in Sweden, SIQ initiated a research study on its future.⁸⁶ Some ideas in this report are more related to the present but others may provide some guidelines for the future. There is a focus on strategy work, value creation, competence, new organisational forms, information management, innovation, customer focus and the role of culture. The study concludes by presenting the following success factors for 2005: clear values, clear strategy and processes for strategy implementation, value-adding and optimal processes, carefully prepared co-operations/alliances, higher tempo, brave creativity, attractive employership, the creation of shareholder value and efficient technology for interactivity. But the QM movement is at a turning point, looking for new directions after having based development during the 1990s on principles and ideas transcribed in the U.S. in the mid-1980s; these were in turn based on Japanese practical experience supplemented with some additions rooted in U.S. experience.⁸⁷ These new ideas will probably have to include issues

⁸⁴ Yamashina (1995).

⁸⁵ Davenport et al. (1998).

⁸⁶ Jernberg and Tholin (1999).

⁸⁷ Such as benchmarking, formalised in the U.S. through Xerox, but practised in different, less formal ways in Japan for a very long time.

such as effectiveness, the importance of timing and the development of new forms of more virtual organisations, but these issues have not as yet been included in the QM agenda. However, the historical development of the QM movement indicates that it will surely continue to evolve through practical validation. The ideas of the founding fathers will still be referred to, but new and different demands and opportunities influencing industrial firms and other organisations will create new definitions of significant issues to for the running of an organisation.

ANALYSIS

- » *In this section, the empirical investigation of QM in Sweden is discussed and analysed, by an application of the cornerstones of the framework developed in Alänge and Lundgren (2000). Furthermore, as a central part of the analysis and in accordance with the discussion in an earlier section, an attempt is made to achieve a dynamic visual representation of the Swedish QM development over time.*

In this section, the development of QM in Sweden over time (as described in the previous section) is discussed and analysed, by an application of the framework developed in Alänge and Lundgren (2000) (as was briefly recapitulated in an earlier section in this paper).⁸⁸

In order to make way for a more dynamic assessment of innovation processes in an IS perspective in general and of the diffusion of OI in particular, we have attempted, as a central part of this analysis, to support and enrich the discussion of QM development in Sweden by the use of visual representations (in accordance with the discussion in an earlier section concerning how the dynamics of an IS may be portrayed).

Figure 6, which is the main illustration (henceforth referred to as the "system dynamics picture"), attempts to convey a holistic picture of the dynamics of QM system development in Sweden over time, focusing on major events and patterns of interaction and knowledge exchange between various actors, as well as the influence of institutional factors. Developments outside Sweden and their influence on the Swedish system are also accounted for.

The empirical data revealed that many types of actors, of the kinds included in the theoretical framework, have been involved in Swedish QM development in various ways over time. In the system dynamics picture, actors that have, in our opinion, been most important, are listed to the right, i.e. quality member associations, consultants, certification bodies, the public sector, industry, collective research institutes, academia and the government. Significant events, which will be further commented upon in the text, are marked as white spheres along process lines related to each type of actor.

⁸⁸ The mutual interdependence between the capabilities and intentions of the actors and the institutional setting that frames their perceptions and actions is a central feature of the proposed framework. In addition, it is important to recognise the complex knowledge exchange and learning mechanisms that affect (and are affected by) the relationships between actors (and between actors and institutions) and that bring the supply and demand side of OI together. Furthermore, it was stated that studies over time are needed and that one must keep the framework open, i.e. open to influences from external sources.

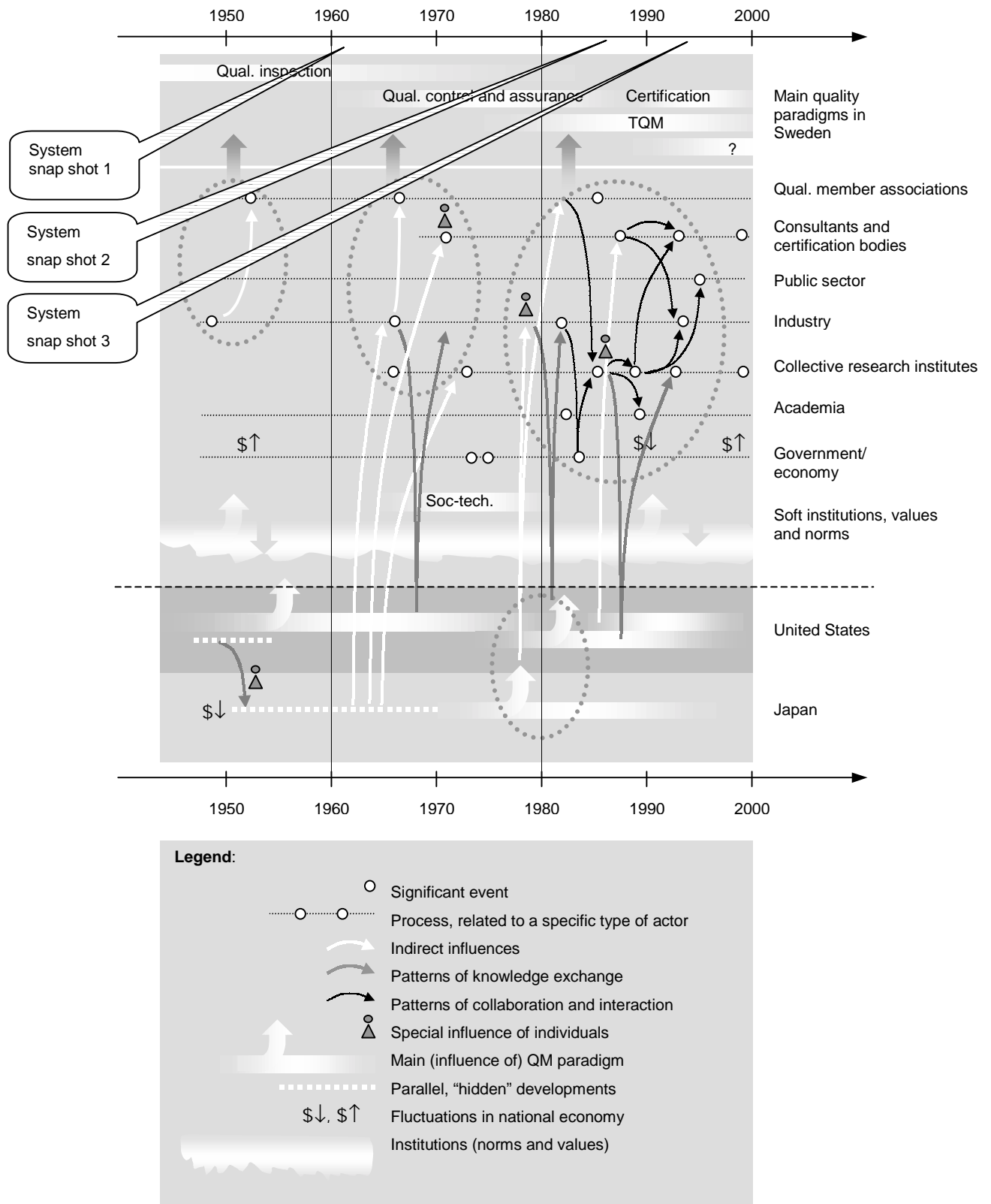


Figure 6 – A picture of system dynamics: An attempt to visualise a selection of important events and dynamic processes of interactive learning and knowledge diffusion in the Swedish QM development process. The attached legend explains the visual language used.

Major patterns of influence, knowledge exchange, collaboration and interaction are indicated by arrows. A white arrow refers to indirect influences. A grey arrow refers to the active search for information and gathering of new knowledge. A black arrow refers to direct interactions and influences among various actors at the system level in Sweden. At times, certain individuals have played important roles in these knowledge exchange processes, at the corporate as well the system level. In the system dynamics picture, this is marked by a special symbol (see the legend attached to Figure 6).

The framework in Alänge and Lundgren (2000) emphasises the inclusion of institutional factors in the analysis, especially stressing the importance of including cognitive aspects of soft, informal institutions as well. The overall influence of informal institutions, such as values and norms, is illustrated as a “cloud” in the system dynamics picture. The actors in the system act and interact under the influence of the institutional forces and the cloud of institutions is in turn affected by and may be gradually reshaped by the actions and interactions of the actors. This mutual relationship is illustrated by thick, shaded arrows. The institutional setting affects Swedish actors’ interpretations of and relations to the QM developments that take place both inside and outside Sweden.

Furthermore, the importance of taking possible influences of developments occurring outside the studied system into account in the framework was emphasised. QM development in Sweden has primarily been affected in various ways by such external influences throughout the years. At the bottom of Figure 6, the reader will find an interpretation of the main QM developments in the United States and Japan that have been very influential to Swedish QM development.

The following analysis is centred around actors and patterns of influence, knowledge exchange, collaboration and interaction, as well as institutional factors and influences from outside Sweden that have contributed to the major transformations of the Swedish QM system (represented by large, grey, dotted circles in the system dynamics picture). These transformations are mirrored in the sequence of main quality paradigms existing over time in Sweden (as illustrated at the top of Figure 6): quality inspection, quality control, and the parallel developments of quality system certification (e.g. ISO 9000) and TQM.

As a complement to the main illustration in Figure 6, three schematic snapshot pictures are provided, depicting interpretations of the formal structure of the Swedish QM arena at three specific points in time: the early 1960s (Figure 7), around 1986 (Figure 8), and the mid-1990s (Figure 9), respectively. The first snapshot was made just before the first change of paradigm (from quality inspections to quality control and assurance), the second one quite soon after the second change (from quality control and assurance to the parallel developments

of certification and TQM) and the third provides a picture of a more mature phase (when the parallel developments of certification and TQM had reached beyond the industrial sector).⁸⁹

Quality inspection. During the 1950s and early 1960s, there was no national QM system worth mentioning in Sweden. Sweden played a neutral role in World War II. The production capacity of Swedish industry was more or less intact and there was a tremendous demand to be met after the war. As a means to maintaining a high production level and an acceptable quality level, the quality inspection paradigm, inherited from before the war, was reinforced during the years after the war. In 1952, the quality inspection movement took a step further with the establishment of the Swedish Society for Inspection Engineers (KIF), a member association and formal network for quality engineers. Company managers' awareness of and interest in quality issues were low. For a long time, the view that quality was not an important strategic issue was reinforced among the informal managers' networks. Rather, quality was an issue that should be delegated to specialists. An interpretation of the "system" in the early 1960s is illustrated in Figure 7.

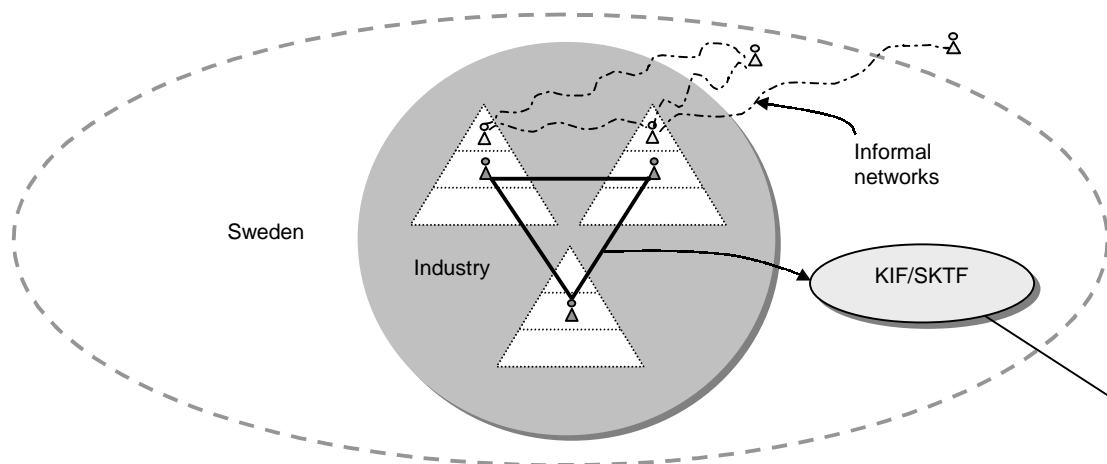


Figure 7 – System snapshot 1: Interpretation of the Swedish QM field in the early 1960s.

⁸⁹ The first snapshot picture would not have been very different if taken after the change of paradigm to quality control and assurance. The development towards a bona-fide system was quite slow. It was not until the early years after the second change of paradigm that the emergence of a real QM system became noticeable, as illustrated by the second snapshot picture. The third snapshot picture is an illustration of the fact that the structure of the system has developed and changed considerably during the latest decade, along with the continued parallel developments of certification and TQM.

From quality inspection to quality control and assurance. As illustrated by KIF changing its name to the Swedish Society for Quality Control (SKTF) in 1966, a somewhat more holistic approach to quality control began to reach parts of Swedish industry in the 1960s and 1970s. As the export-oriented Swedish industry became more and more involved in international business, the importance of international quality assurance standards grew. In 1971, partly influenced by the founder Lennart Sandholm's close connection to Joseph Juran's management approach to quality, Sweden's first quality consultancy firm was established. Around 1973, the collective research institute IVF initiated some early research efforts relating to a more holistic quality approach. However, the development towards a total approach to quality was slow in Sweden. There still was no sign of a genuine QM system at the national level, even long after the establishment of the quality control and quality assurance paradigm.

From quality control and assurance to TQM. Towards the end of the 1970s, Western companies began to see signs of increasing Japanese competition. The years around 1980 were a mental turning point for many Western managers. The interest in quality issues in general, and Japanese QM practices in particular (collectively believed to be the reason for the tremendous Japanese success), grew among Western company leaders. Inspired by the Japanese development and the early American initiatives to adopt Japanese ideas, quality became an issue on the agenda for top managers in Sweden as well. Eager to learn quickly about the new quality management ideas, many representatives of Swedish industry (and collective research associations like IVF) made a large number of study visits to Japan and the United States.

Eventually, this led to the initiation of a few company-wide quality programs in Swedish industry, e.g. the Ericsson Quality Programme in 1983. But the extent to which committed efforts in a TQM perspective were necessary was not fully understood. The first professor's chair in quality at a Swedish university was installed in 1983, but the universities had so far not really been part of the development, except a certain connection to the collective research institutes and some initiatives in connection with the many study visits that corporate leaders made to Japan and the United States. The exception was in one QM branch, i.e. service quality, where Swedish (e.g. Richard Norman and Evert Gummesson) and Nordic (Christian Grönroos in Finland) professors had taken the forefront in the early 1980s. In addition, the CEO of SAS, Jan Carlzon, laid an important foundation for interest in service quality around the same time, with the widely acclaimed book "Moments of Truth",⁹⁰ in which service quality and the need to focus on the customers was emphasised.

⁹⁰ Swedish title "*Riv Pyramiderna*", published in 1985.

Slowly, a total approach to quality began to take root in industry and, eventually, other sectors in Sweden. The National Committee was formed in November 1986 as a result of a joint initiative by representatives of industry, the quality member association SKTF and labour market actors, together with the government (primarily the Ministries of Industry and Public Administration). The National Committee was behind the nation-wide quality campaign “Svensk kvalitet – rätt sätt” (“Swedish quality – the right way”). From the mid-1980s on, we begin to see the emergence and workings of a true QM system in Sweden, in which many different actors from various sectors participated. An interpretation of the structure of the Swedish QM system around 1986 is illustrated in Figure 8.

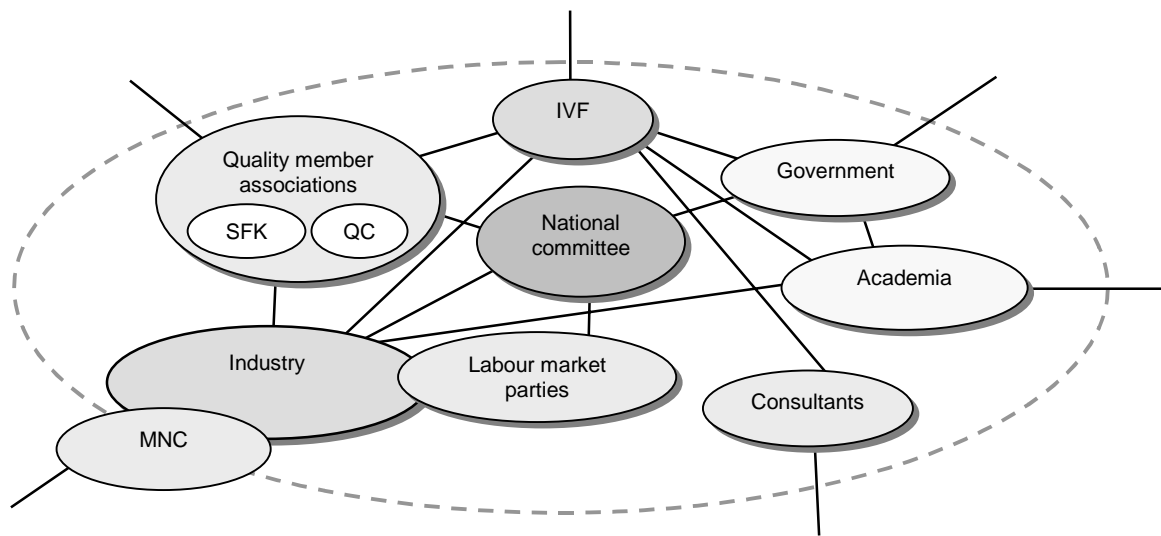


Figure 8 – Snapshot picture 2: Interpretation of the Swedish QM field around 1986.

Towards a mature system and parallel developments of certification and TQM. The establishment of the National Committee affected quality consciousness at the system level. In 1987 the statement that quality development in Swedish industry essentially followed international development (due to the international orientation of Swedish industry), but that the educational performance at the university level was not good enough, was made in a report compiled by Sven-Olof Reftmark. The need to educate people in quality issues was, to some extent, met by internal company programmes and consultants, but the role of the universities was rather obscure. It was suggested that at least one professor’s chair in the field of quality be appointed at each of the major universities and that every student in a Master’s programme in engineering or business administration should take at least one basic course in quality control.

The National Committee was a temporary organisation. In 1988, Sven-Olof Reftmark was assigned the task of suggesting a structure for a more permanent organisation for the promotion of quality development in Sweden. An important point of departure was that the new organisation should be independent and have the same foundation in Swedish society as the National Committee had had. The establishment of a collective research institute was a central component of the proposal for a new organisation and the Swedish Institute for Quality (SIQ) was established in 1990. Funding was provided in equal parts by the government and a supporting organisation, consisting of representatives of different sectors of society, including public and private companies, employers' and employees' associations and other organisations that had strong links to quality practice. SIQ mainly worked (and still works) with information, education, R&D and the development of a national quality award in Sweden (i.e. USK), the latter inspired by the Malcolm Baldrige National Quality Award (based on another important contribution by Sven-Olof Reftmark), which had been successfully founded in the United States in 1987. The first Swedish award was presented in 1992.

An important effect of the establishment of SIQ has been the further diffusion of the view that quality is a key success factor in small companies and the public sector as well. Today, most of SIQ's work is directed towards the public sector (including hospitals, schools and political administration).

The development of international standards for third party certification has been an important parallel activity to the diffusion of TQM. The ISO 9000 standards were introduced in 1987 and the ISO 9000 certification process rapidly acquired a strong foothold within Swedish industry. This was further reinforced by the establishment of several third party auditing organisations and a growing number of consulting firms focusing on certification. The Swedish government also played a role in this process, by funding consultant assistance to smaller firms. In addition, the collective research institute IVF has provided instruction materials and worked on diffusing ISO 9000 practices among small and medium-sized companies. Just recently, a new version of ISO 9000, closer to TQM, was introduced, including issues such as continuous improvement in the certification requirements. While ISO 9000 has been moving closer to TQM, the QM movement itself is at a turning point, seeking a new orientation. For example, concerning the quality award, SIQ recently took the radical first step of allowing Swedish companies to compete for the USK in 2000, based either on the Swedish criteria, the European Quality Award criteria or the Malcolm Baldrige National Quality Award criteria. Furthermore, last year, SIQ initiated a research study on its future. An interpretation of the structure of the modern Swedish QM system in the mid-1990s is illustrated in Figure 9.

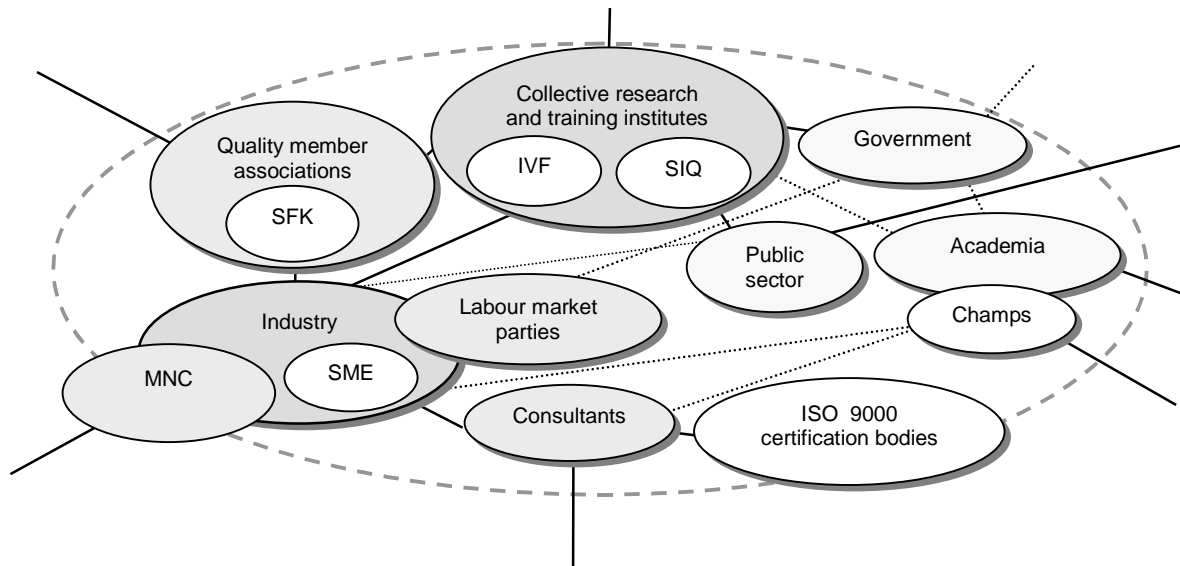


Figure 9 – System snapshot 3: Interpretation of the Swedish QM field in the mid 1990s.

Discussion of the influence of contextual and institutional factors. *The influence of business cycles and government intervention in the macro economy.* When describing our framework, we emphasised the importance of considering contextual factors when analysing the diffusion of OI. Economic fluctuations and monetary policy are examples of such factors which might have had a conditioning effect, albeit indirect and complex, on Swedish QM development, as illustrated by the following observations. The marginal interest in quality among Swedish (and other Western) managers during the 1960s and 1970s when production and export figures were growing, indicates that incentives for organisational change and quality improvement efforts decline in blooming economies. In addition, even if the economy as a whole is in critical condition, government actions on the macro level aimed at supporting the economy can have a detrimental impact on companies' incentive to effect the required organisational change. One such macro policy example is the repeated devaluation of the Swedish currency (SEK) in 1982, 1989 and 1992, which helped to improve Swedish export figures, but also hampered quality development (Kroslid 1998).⁹¹ The fact that companies adopt a more short-term focus on survival when the economy deteriorates substantially is another, for instance during the early 1990s, when Sweden was hit harder than many other countries and the Swedish economy went into a deep recession. This recession had a hampering effect on quality change processes, especially in small companies. This illustrates that the motivation to make changes may be low, both during periods when the economy is

⁹¹ A similar finding was made when analysing the effect of labour policy measures to support the continued employment of older persons in the garment industry in Sweden in the 1980s, which however, had a negative effect on the necessary restructuring of the industry, which led to a poorer competitive position in the longer run. (Alänge and Jacobsson, 1994)

perceived as good and when it is perceived as bad, especially changes including measures with non-immediate effects, such as training in order to change employee behaviour. Hence, it appears that the diffusion of OI, such as QM, is connected to changes in business cycles, but in a complex way. Our data indicates that the incentive for new OI is higher when the economy slows down, because human resources are available (but not when the economy is in critical condition), and during early phases of economic growth, because the future prospects look good and companies invest in the development of their resources (but not during extreme growth, because then all efforts are directed towards directly responding to customer demand). These observations are congruent with previous research, e.g. Kimberly (1980), who found that the diffusion of OI had a tendency to run counter to the business cycles.

The complex interplay between institutions and organisations. As we indicated in the previous presentation of the development phases of QM in Sweden, there is a complex interplay between institutions and organisations and other actors, creating the context for the diffusion process. In principle, institutions can be divided into formal institutions, which include various laws, and informal institutions, which can include the national culture.⁹² There is also an interplay between the formal and informal institutions. For example, Swedish culture forms the context in the development of the formal institutions, e.g. Swedish laws. There is also an interplay between these two institutions and creation of local organisations, which can be observed in the way that Swedish organisations, including political and other popular movements⁹³, as well as public and private organisations, are developed and managed. These particular organisations (which are based in Swedish culture) in turn influence the local population's value system and ultimately the laws being passed. Of course, these developments do not take place in a "closed system", as Swedish culture is the object of constant international influence. And even when an OI is derived from outside the Swedish system, the national system of institutions and organisations still has a strong impact on the diffusion of the new OI.⁹⁴

As stated above, many institutions are informal. Culturally embedded institutional factors may be traced far back in time, and some researchers take their starting point far back in

⁹² Regarding institutions, borrowing from sociology, Alänge & Lundgren (2000) argue in favour of taking normative and cognitive aspects of institutions more into account, as a complement to the predominantly regulative aspects in contemporary IS approaches. Therefore, not only formal institutions such as various regulations and laws, but also softer institutions such as norms, cultural values and peoples' underlying assumptions, must be taken into account.

⁹³ These popular movements (i.e. "folkrörelser") are a typical feature of Sweden.

⁹⁴ Sweden is at the edge of major institutional change since becoming a member of the EU in 1995, which also means that most formal institutions are now based on European law. This law, which in itself is influenced by many member states, has been developed in another institutional setting, both as regards the formal legal system tradition, and concerning the informal institutions (values, norms, basic assumptions), into which this legal system has been embedded.

history, e.g. in the religious mythology as described in the Nordic Edda,⁹⁵ in order to understand today's cultural values and their influence on OI.⁹⁶ Among typical Swedish values today are: equality, the “lagom” concept, the “Jante law”, and the worship of nature.⁹⁷ The current national values have also largely been affected by Lutheran (Protestant) values,⁹⁸ that may be summarised in the following tenets: one should keep a rather low profile but engage in work activities with a positive attitude, doing things properly.⁹⁹ In a way, this may be linked to Sweden's strong craftsmanship tradition and workers' desire to do a high-quality job, which may have favoured QM development in Sweden.¹⁰⁰

Formal institutions, and even more so, informal institutions, normally take considerable time to change. Hence, it is valuable to take a historic look at some of the more recent developments of institutions, which may have influenced the diffusion of QM and other competing innovations. Sweden has had a social democratic government for a long time, i. e. more than 30 years between 1945 and 1976, and for significant periods thereafter as well. This may have spurred the “common understanding”¹⁰¹ between unions and employers' associations, as well as contributed to the typically flat hierarchy and low power distance¹⁰² in Swedish organisations. The working life-related laws from the mid-1970s, e.g. the MBL co-determination law, also illustrate this development of institutions. In addition, the low level of unemployment, compared to most other countries in the West, partly due to an active governmental labour policy, was a distinguishing feature of Sweden until 1991. This created pressure to offer attractive working conditions in order to be able to recruit and retain skilled personnel (Stjernberg & Philips 1993).

Parallel and competing organisational innovations. The pressure to create attractive working conditions is one of the explanations for the development of the “socio-technic

⁹⁵ The Edda tradition (myths and religious practice) was in existence before Sweden (or, as it was referred to in those days, Scandinavia) became Christian, around 1000 AD.

⁹⁶ Gustavsson (1995).

⁹⁷ It is almost impossible to portray national, including Swedish, values in a generalised manner since values differ between individuals and groups of individuals.

⁹⁸ An early account of the 'Protestant Ethic and the Spirit of Capitalism' was provided by Weber (1976) who claimed that Protestantism encompasses the idea that “the highest form of moral obligation for the individual is to fulfil his duty in worldly affairs.” and that “the moral responsibility of the Protestant is cumulative” p.4 (foreword by Anthony Giddens).

⁹⁹ The role of religious beliefs for the diffusion of managerial principles is emphasised by Guillén (1994).

¹⁰⁰ A few excerpts from our interviews can be mentioned: Jan-Christer Persson (interview 1998) argues that there may be basic patterns and values in Swedish culture that support QM. According to Peter Lindwall (interview 1999), there seems to be a good balance between individual values (as primarily found in the United States) and group-oriented values (as found in Japan). Similarly, Björn Jernberg (interview 1999) thinks that Swedish values, e.g. a strong consensus orientation, have supported the implementation of modern QM practices in Swedish organisations. Sven-Olov Reftmark (interview 1999) points out the open communication climate that is naturally present in most Swedish companies and society at large. For example, an open climate may favour the establishment of collaboration networks and joint ventures between e.g. academia, government and industry. At the same time, however, Reftmark adds that one must be cautious when trying to explain Swedish quality development exclusively in cultural terms.

¹⁰¹ Sometimes referred to as “Saltsjöbadsandan” (see e.g. Kroslid 1998).

¹⁰² Hofstede (1980).

movement”, which can be regarded as a parallel OI (to TQM),¹⁰³ developed and implemented primarily in Sweden and Norway. In this case, we also see strong links between the governmental funding organisations, the academic community, and the companies where socio-technical systems were being implemented. Swedish informal institutions, i.e. values concerning participation and low power distance, were the basis on which this OI (socio-technical system) was developed.

There are several possible diffusion barriers, based in Swedish informal institutions, for a new and partly competing OI (TQM) originating from a concept developed in other institutional settings (Japan and the US). First, does the new OI go against any of the Swedish national values? Second, does it compete to any extent with parallel or previous OI (e.g. socio-technical systems), which are perceived by the members of the Swedish system to better satisfy their demands, most often unconsciously based on Swedish national values?

In comparison to the case in many other cultural settings, most components of TQM¹⁰⁴ correspond well to Swedish national values. For example, empowerment is a central concept of TQM. Two cultural dimensions directly linked to empowerment are “human nature” and “uncertainty avoidance”.¹⁰⁵ The Swedish national values asserting that human beings are basically good (and want to do a good job, given the opportunity) and that uncertainty can be tolerated, are compatible with the delegation and loss of direct control which are required for empowerment.

Which components of TQM are incompatible with Swedish institutions? In our practical work on implementation of TQM in company settings, the most frequently discussed issue has been the use of positive reinforcement and acknowledgement. Especially in industrial communities (“bruk”), the use of positive reinforcement by leaders (or even co-workers) is almost unheard of.¹⁰⁶ This non-use of positive reinforcement could possibly be referred back to deeply rooted Swedish national values, which have been expressed as the “Jante law”, indicating that no one should differ from the group.¹⁰⁷ Other components of TQM that have been new to Swedish companies, such as process orientation, go against the tradition of a functional hierarchy, but this does not necessarily mean that they contradict deeply rooted values; instead, the opposite seems to be the case (e.g. values relating to equality).

¹⁰³ The TQM (total quality management) version of QM has been chosen for this comparison.

¹⁰⁴ Alänge (1994).

¹⁰⁵ Hamed and Miconnet (1998).

¹⁰⁶ At one company, where the authors had the opportunity to meet all 400 employees, the question concerning positive reinforcement was answered with an almost unison no, while it was pointed out that everyone heard a comment from their leaders when something went wrong.

¹⁰⁷ This typical Swedish value was formulated by Aksel Sandemose, a Dane living in Norway. The Jante law may be perceived of as the other side of the “equality” coin, referring to a “do not think that you are important” attitude, which may be rather typical for Swedish mentality. This attitude relates to the equality principle asserting that if people are supposed to be equal, nobody is allowed to stand out, at least not too much; in this latter sense it relates to the “lagom” concept as well.

What then of collective perceptions of the extent to which a competing innovation meets the demand of Swedish organisations? Here, an interesting phenomenon occurred, i.e. resistance from parts of the Swedish socio-technical movement¹⁰⁸, which primarily regarded the new OI as a threat. The new OI was debated in newspaper debate articles and research articles, often portraying the OI as ‘the Japanese innovation’, rather than an innovation that might be adapted to the Swedish organisational context.¹⁰⁹ Instead, the perceived negative aspects were emphasised, especially, of course, the fact that most Japanese TQC firms used the production line concept, while alternative material flow solutions had been a major contribution from the socio-technical school.¹¹⁰ This meant that proponents of two concepts with a great deal in common in terms of enriching working life, both emphasising the active participation of all members of a group, still had difficulty seeing what each might contribute to the other.

This means that a collective perception of OI (regardless of if this perception is ‘correct’ or ‘wrong’ in any objective meaning) can influence its potential diffusion. This collective perception can be based on what Abrahamson (1996) refers to as “the management fashion setting community”, which can primarily be regarded as an international phenomena, but can also be based on local Swedish fashion setting communities. In the case of the socio-technical movement, this local trend setting community had a high degree of connectivity across organisational boundaries, including industry, university-based researchers and state funding agencies. This high level of connectivity and diversity of representatives meant that this fashion setting community was strong in the Swedish context, which contributed to a certain inertia and resistance to even considering a new and competing OI. The QM community, on the other hand, was characterised by much weaker links between academia and industry, which also may partly be explained by its origins in industry. Hence, while the value system can provide a basis for analysing if an OI clearly contradicts accepted ways of relating within a society, which might be regarded as a more definite barrier, it cannot provide conclusions as to which OI will actually diffuse. This process is far more complex, involving many possible

¹⁰⁸ In this context, the expression ‘socio-technical movement’ is used to describe closely co-operating representatives of industry, academia and funding agencies, a co-operation which resulted in internationally successful practical Swedish research on creating new production systems as an alternative to line production.

¹⁰⁹ See e.g. a 1991 debate book from the Productivity Delegation (Produktivitetsdelegationen) and the Working Life Fund (Arbetslivsfonden) in which Torsten Björkman discussed the possibility of introducing Japanese approaches (here, “lean production”) to Sweden: “Lean production innebär inte mycket mer än att den välkända japanska produktionsfilosofin förpackats i amerikanskt omslagspapper. Det räcker förmodligen inte för att göra den populär.”...”Modellen avviker för mycket ifrån vad svenskar uppfattar som attraktivt för att den skall kunna bli allmänt accepterad. Det är tveksamt om den ens slår igenom i sin ursprungsbransch, bilindustrin. Den ytliga amerikaniseringen av modellen är en förklädning som inte kommer att lura särskilt många.” ... “Lean production måste modifieras om systemet skall ha en chans i Sverige.”... “Skall lean production ha en chans att slå igenom i Sverige bör systemet förmodligen se ut ungefär som ABB:s T50-program.” (pp. 121, 123-124, 128).

¹¹⁰ E.g. Christian Berggren, in international debate with e.g. Adler on the experiences from Japanese transplants and the NUMMI factory (joint venture in the U.S. between Toyota and GM).

solutions to the same kind of organisational problem, as was shown in the above example of the partly overlapping but competing OI: socio-technic movement and QM.

Main exchange mechanisms involved in the diffusion of QM in Sweden. The role of dynamic exchange mechanisms was emphasised in our theoretical framework. This leads to two questions: Which mechanisms were identified in the Swedish system? And which mechanisms, pinpointed in the theoretical framework, were shown not to exist in the Swedish system?

In order for an exchange to occur there is a need, from the perspective of the receiver, to scan the external world for possible OI, to select which OI to test, analyse, adapt and implement and finally, to evaluate the chosen OI. From the perspective of the IS, there can also be a need to further diffuse an adapted OI which has proven to work well in a Swedish context. These activities of searching for and selecting an OI place a demand on receiver competence (or buyer competence), not always existing within the organisation in need of a new OI. The market can provide some assistance, through consultants and other suppliers, but required information and advice may also come from non-market sources. From the IS perspective, there might be a desire to improve the workings of these market and non-market mechanisms, to the benefit of the system as a whole (this is the typical role of policy).

In the following, we will discuss a number of non-market mechanisms: formal and informal networks, national gatekeepers, human rotation, media, role models, demonstration sites, study visits and benchmarking, brokers and facilitators, internal champions, and pilot projects. In addition, we will comment upon the market exchange mechanism and the role of national policy in supporting knowledge mechanisms.

Formal and informal networks. By definition, network is a key concept for understanding the structural aspects of knowledge exchange mechanisms. There are many different kinds of networks, both external and internal, influencing the diffusion of OI. The external networks serve as a means of finding and legitimating new potential OI, as well as of supplying OI content. These external networks can be formal and informal, international, national and more local, professional, and they can be either personal or company networks. The buyer-supplier network, which has been shown to be of considerable importance for the diffusion of TI, has another character when it comes to OI, and will be discussed below under the heading of market exchange mechanisms. In his discussion of connectivity of the technical IS, Carlsson (1997) underlines the importance of the problem-solving type of network, which overlaps with the buyer-supplier network, because of the nature of the supplier industry (primarily consultants who supply a solution which must always be adapted, although some firms of consultants have tried to create a standardised package offering). The informal national community networks play a very important role when it comes to the diffusion of QM in Sweden. Some of these networks existed earlier between industries based on the diffusion of

TI, but they have also been a mechanism for the diffusion of QM. For example, the networks created over the years by the bridging organisation IVF and Mekanförbundet (the Engineering Industry Association) have had a substantial impact both on what was searched for globally, adapted and subsequently diffused into small and medium sized engineering firms. However, this kind of informal network, e.g. contact networks between individuals in hospitals, can be found within other sectors of the economy as well, and played an equally important role for the diffusion of QM in these sectors.¹¹¹ Especially in early phases, this type of informal contact between pioneering individuals proved to be important for the exchange of ideas, for moral support and for making improvement work, according to the QM approach, legitimate.

National gatekeepers. By definition, a gatekeeper is someone who has a lot of contact with important sources of knowledge outside an organisation, as well as a broad internal contact network.¹¹² This function has proven to be very important for the diffusion of new knowledge within organisations.¹¹³ The gatekeeper performs a search and screen function to the benefit of the rest of the organisation. When studying another unit of analysis, the innovation system, we can identify a similar mechanism. On the national level, there are individuals (and organisations), that have excellent international networks where they learn about new OI. This knowledge is then transferred not only to their own organisations, which is the traditional role of the gatekeeper, but also to other organisations and sectors of the economy: the specific function of the national gatekeeper. We have identified a number of important national gatekeepers, both individuals and organisations, in the Swedish system. Sven-Olof Reftmark is a good example of an individual who moved from industry to other sectors of the economy, working as a consultant to the government; he has an excellent international network, improved especially when he served as technical attaché in the United States. Some of the large Swedish MNCs also served as national gatekeepers, identifying new ideas and bringing them to different sectors of the economy through newspaper articles, participation in conferences, etc. These MNCs, such as ABB, Electrolux and Ericsson, often functioned as role models for other organisations, i.e. the same organisation can of course be active via different knowledge exchange mechanisms at the same time. In addition, IVF, a bridging organisation, also reached other sectors than the 'pure' engineering industry, at least, for example, with its books and reports on different tools. Both the Quality Award Manuals and the textbooks on TQM, which became widespread in the mid-1990s also reached several sectors of the Swedish economy.

Human rotation. The Swedish system's ability to allow skilled, knowledgeable individuals to gradually assume new roles in the national system must be acknowledged. The

¹¹¹ Alänge and Jarnehammar (1999).

¹¹² The gatekeeper concept was originally introduced by Kurt Lewin.

¹¹³ The role of the technical gatekeeper for technical innovation has been emphasised (Allen 1985).

moving of people among actors in the system has been a key knowledge exchange mechanism in the Swedish case of QM diffusion, in accordance with the predictions of our framework. The stories told by the interviewees have in many ways pinpointed individuals' contributions, e.g. the role played by Lennart Sandholm in endeavouring toward the establishment of a more holistic perspective of quality as early as in the 1960s, and his subsequently moving on to other positions, from industry to consulting and academia. The story of Kerstin Jönson and her research colleagues who worked at IVF during the 1970s and 1980s, thereafter moving on to consulting and the changing roles played by individuals in the government, e.g. Bengt Norström at the Ministry of Industry who later played a key role in the National Committee and in SIQ, are other examples. This list is not all-inclusive, but it illustrates the importance that may be ascribed to individuals moving between different organisations and sectors of the Swedish IS.

Media. In the case of the U.S., it has been pointed out that a NBC television program served as an important starting point for a more general interest in learning from Japanese practices. In Sweden, we cannot point to a similar role of national media; instead, it appears that media has played a relatively limited role for the diffusion of QM. The National Quality Award has, for example, received very limited interest from media, although the Swedish king is involved in its presentation. However, some newspapers and magazines have published articles about changes in industry, which have been directly related to the introduction of QM approaches. Furthermore, a commercial magazine was started with a focus on reporting about quality change processes, but it had a relatively limited circulation.

Role models. The importance of role models for the motivation to change is well known in motivation theory and also applies to the introduction of OI. However, the role models initially came from outside the Swedish national system, i.e. from companies which were early adopters of the TQM innovation. Because of the perceived distance between Japanese and Swedish culture and company practices, the Japanese pioneers were not always direct role models; instead, the early U.S. implementers, for example, the two first winners of the Malcolm Baldrige National Quality Award, Motorola and Xerox, became important role models for Swedish leaders and decision makers. In addition, some training programs for Swedish leaders were directly designed to make use of such role models as Bob Galvin, CEO, and Bill Smith, six sigma, process creator at Motorola, or Dick Palermo, manager at the U.S. branch of Xerox (Champs TQMx program). However, in the early 1990s, when Swedish firms had gained their own experience of TQM-inspired change programs, some firms and leaders became strong advocates for the new OI and role models on a national basis. The foremost role model, both as a person and as a representative of his company, was Bert-Olof Svanholm, CEO of ABB Sweden, and an active leader of ABB's T50 program. An earlier case, from the 1980s, was SAS and its charismatic leader Jan Carlzon, who was an important

role model for other company leaders and organisations in accomplishing change by motivating and empowering employees to focus on service quality. Carlzon and SAS was also a pioneering case in an international perspective, which meant that Carlzon and his company became role models outside Sweden as well, among other means via a widely distributed book, published in the mid-1980s. These examples demonstrate the importance of role models for accomplishing change on a national scale, as many company leaders are reluctant to do anything that differs substantially from their previous activities. Hence, there is a need for true pioneers in order to create a collective perception of the new OI as legitimate, which is in turn required for its wider diffusion.

Demonstration sites. In the case of TI, an important factor for influencing potential adopters' decision-making concerning a new innovation, is the possibility to see the TI in a real work setting. Hence, it is very important for vendors to have a demonstration site, where it is possible to learn about the TI in use. In the case of OI, this possibility is limited, as the innovation may not be so visible in practice; also, the use of OI is most often context-specific. However, site visits can still provide important input, especially when the visitors have the opportunity to ask direct questions of any of the employees they meet. This has been organised on a wider scale in the Swedish Quality Award Program, as each winner agrees to arrange visits from other Swedish companies and organisations with an interest in learning from its experiences. In the Swedish context, the use of "success stories"¹¹⁴ is another important means of portraying what the application of the QM innovations could mean in practice. This type of description, often only in the form of a few overhead pictures, can convey at least a partial understanding of such a complex OI as QM. In Swedish companies, this kind of description is used both when receiving guests at one's own firm, and when giving external presentations at conferences and to university students.

Study visits and benchmarking. Study visits or more systematic exchange of experience in the form of regular benchmarking, are important means of learning and thus exchange mechanisms. In the Swedish QM diffusion, the travelling in order to learn, primarily to U.S. and Japanese companies, has been extremely important. These trips have been arranged in many different ways: MNCs have arranged their own trips to visit other companies and groups of companies have travelled together under the umbrella of a university organisation, a collective research institute or another form of organisation. The trips varied in their degree of systematic search, and the use of regular well-prepared benchmarking, including process comparisons, has not been the rule. Some of the collective

¹¹⁴ In the Japanese IS, there has been a systematic use of "success stories" in order to diffuse the QM innovation. A success story is a description of *how* a "problem" (e.g. implementation of an OI) was identified and *solved*. This takes place on different system levels, including QC group, foremen, and company executives, both in informal settings and at national conferences. This was one of the main messages provided by Professor Shoji Shiba in his address to the group establishing the Swedish Institute for Quality, in May 1989.

trips had important information-sharing and reflection components designed into their processes, including written documentation of experiences. As pointed out earlier, the visits to Japan sometimes yielded sparse results for various reasons, e.g. that the visitors were not accustomed to asking questions in the manner expected by their Japanese hosts. Nevertheless, this kind of data collection and search for examples of OI provided the Swedish companies with important input. However, sometimes the visits to Japan appear to have been passed through a cultural filter, which meant that it was more difficult to see the direct applicability of philosophy and processes in the Swedish context; rather, the tools used were regarded as less context-dependent and were thus part of what was brought home for application. On the other hand, companies working according to a QM approach in the United States provided a stronger direct impact (even if these companies had in turn learned from the Japanese).

Brokers and facilitators. A broker connects different individuals or organisations with each other, in this case with suppliers of OI or other users of OI with whom it is possible to share one's experience. Facilitation indicates one further step towards involvement in the learning process, e.g. making arrangements for two or more parties to meet and share their experience. The key difference between the gatekeeper and the broker lies in the intention of either sharing knowledge (gatekeeper) or in aiding connection (broker). However, the difference between a broker and a gatekeeper can be minor, e.g. when the broker connects someone to a knowledge source.

In Swedish society, there are organisations designed to function as knowledge brokers to aid the functioning of the market for TI and OI. The 24 collective research institutes are typical examples, jointly founded and financed by the government and industry. In the case of QM, two collective research institutes are noteworthy, the pioneer IVF and SIQ, established in 1992. The purpose of IVF is to search the world for new technology and new OI, to screen the identified innovations and to select promising innovations for a trial project. Then, most typically together with a major firm (one of the MNCs), an adapted Swedish version is developed and tested, and eventually, this Swedish version of the innovation is further diffused, primarily to medium sized and small companies.¹¹⁵ The goal of SIQ is similar, although its scope is wider in the sense that it is oriented towards companies and organisations in the total Swedish economy (while IVF focuses only on the manufacturing industry). On the other hand, SIQ's focus is more narrow in another sense, as it only focuses on the QM innovation, excluding technical innovations.

These collective research institutes also serve as meeting places for the sharing of experience, e.g. through conferences, such as SIQ's yearly Winning Leadership Conference. Another activity is the creation of groups for sharing experience and learning in new areas,

¹¹⁵ Interview, Sven-Erik Andersson (1993, at the time head of IVF).

which is a typical activity for both organisations, e.g. IVF's group of small-scale firms jointly learning about QS 9000, or SIQ's benchmarking groups. In leading these groups, the collective research institutes assumes a more active facilitator role.

Internal champions. In our interviews and case studies, it has been clear that individual champions of quality ideas have played an important role in initiating and implementing QM inside their own organisations. For a long time, these champions were found among quality specialists, e.g. quality inspectors or quality engineers; thus, when an individual champion left, there was a direct detrimental effect on continuing QM work. In this case, one may note that top management support seems to have been an important prerequisite for success in the longer perspective. The quality programmes at corporate level, which became more common during the 1980s, such as the EQ programme at Ericsson and the T50 at ABB, mainly started at the initiative of top corporate managers. Björn Svedberg at Ericsson and Bert-Olof Svanholm at ABB are examples of top leaders functioning as internal champions. In addition, these managers and programs were also a direct source of inspiration to other companies, as role models and as trustworthy national gatekeepers, because they could combine knowledge acquired from abroad with their own experience of trying to implement these ideas in a Swedish context.

Pilot projects. One method, frequently practised in Swedish organisations starting to implement QM, is the creation of pilot projects involving only parts of the company, for example a division or a functional unit, focusing on only testing parts of the complex QM innovation. This method provides an opportunity to test the OI with a more limited investment, and possibly with a larger potential for success, because the OI can be adapted to the specific requirements of the individual firm and management time, often a limited resource, can be used in a focused manner. This way of more successfully introducing new OI is also in accordance with other studies (e.g. Beer et al. 1990). The limitation of this approach lies in the divisibility of the OI.¹¹⁶

The above mechanisms are all non-market exchange mechanisms and our study of Swedish quality management diffusion strongly indicates the importance of this type of mechanism. However, although the supplier industry is different from the case of TI, there are important suppliers who work in a pure market as well.

Market exchange mechanisms. The primary suppliers of OI are firms of consultants and different kinds of training institutes. The initial suppliers of QM on the Swedish market were quality specialists, among which Björklund & Sandholm was a pioneering Swedish firm. In addition, some international consultants were active on the Swedish market, primarily on invitation from the large MNCs. Eventually, larger international firms of consultants started

¹¹⁶ Alänge and Jarnehammar (1999).

to embrace QM, and they began more actively marketing QM as a general management approach. Again, the primary customers were the large MNCs. At the same time, pioneering firms started acting as consultants, selling their experiences and advice on the market, e.g. SAS in the 1980s, and IBM Järfälla, the first winner of the Swedish Quality Award, in the early 1990s. Many small firms of consultants also started to promote different aspects of QM, also finding customers among medium sized and smaller firms. In addition, Champs and other commercial training institutes (including Björklund & Sandholm) provided courses for managers. Hence, we can see the growth of several market based exchange mechanisms parallel to the non-market mechanisms. A specific point concerning this market is that it was the object of several interventions, e.g. the increase in consultants working on diffusing the ISO 9000 to smaller companies was stimulated by a state subsidy to this group of companies. An important observation is that the connectivity between the suppliers and buyers of QM was initially very weak, as was shown in the earlier presentation of the network during the 1960-1970s. Gradually, new players entered the scene, for example general management firms and firms with their own experience. Hence, connectivity increased, but was still relatively limited, although bridging institutions such as SIQ and IVF performed different activities to bring different parties together.

Finally, the market and non-market exchange mechanisms presented above work in a context, which is regulated by informal and formal institutions. The state is an important player, especially when it comes to formal institutions, but also concerning other interventions in the functioning of the IS. We have chosen to study the actions of the state as a separate mechanism, although, in practise, this mechanism often works through the other mechanisms presented above.

National policy. One basic assumption is that the state has cause to intervene on the market in cases of market imperfections, i. e. the actors do not have enough information about OI, or their competence level is too low, e.g. their receiver competence is weak, or their risk aversion is higher than the socially desirable level. In addition, the argument has been brought forward that different spill-over effects, i.e. knowledge and accumulated experience are being transferred to other organisations in the Swedish IS, could be a reason for the state to intervene on the market.

Traditionally, the Swedish state is the responsible for the educational system, i.e. the identification of new OI, the conduction of research leading to new OI and the provision of up-to date education on different levels in the school system. In the case of QM, the educational system has seldom been a pioneer, except in a few limited areas; instead, when it comes to most parts of the OM innovation, the educational system can be seen as a laggard, in comparison to the leading companies. However, in the 1980s, initiatives were taken to provide more resources at the university level to establish professors' positions and resources

were also provided for improved research and education. In the mid-1990s, the University Chancellor made the decision to introduce quality audits at the national level covering all Swedish universities, i.e. the intent was to directly promote the QM innovation in the educational sector.

During the 1980s, the government commissioned a number of consultant studies on improving the national situation. This was partly linked to the parallel development of the National Committee for Quality, founded at combined government/industry initiative, with the objective of raising awareness of QM on a broader national level. The activities within this committee led to the establishment of a collective research institute directly focused on QM. In addition, the government provided funding, e.g. to support the introduction of ISO 9000 in small and medium sized companies.

This means that while the State is always involved to some extent in influencing the educational system, specific initiatives to influence the diffusion of QM have been taken by the Swedish state, starting in the mid-1980s and continuing with various measures in the 1990s. These measures have included the creation of awareness programs, participation in creation of support organisations, and in directed subsidies.

The Swedish government has been restrictive in passing new laws, i.e. creating new formal institutions. We did not discover anything of the calibre of the case of Margaret Thatcher's UK Government's direct intervention on the market with its requirement of ISO 9000 certification if the supplier was interested in selling to the state.

Summary. As revealed by the attempt to analyse the diffusion of QM paradigms and practices in Sweden, the development is characterised by many interactive learning processes, involving contributions from many interrelated actors and various influences from the Swedish institutional setting. We may conclude that most of the actors and exchange mechanisms outlined in the theoretical framework have been of importance in the empirical case of Swedish QM.

A few special features are noteworthy. In the Swedish case of QM diffusion, certain individuals appear to have been of especial importance, indicating the significance of informal communication networks as a mechanism for knowledge exchange. The opportunity for individuals to change roles seems to be an important diffusion mechanism in the system. Large, internationally oriented corporations have been important actors in many ways, both in engaging in search activities abroad and in developing ideas in internal quality programmes, as well as in participating in disseminating knowledge to other companies, either as role models or as part of knowledge-sharing networks. Learning acquired abroad, through study visits as well as books and seminars held by quality researchers and practitioners from the U.S. and Japan, have been of considerable importance during the shifts in QM focus.

Furthermore, government initiatives to support the diffusion of QM by various means, for example an industry- and government-led national campaign and collective research institutes, must be acknowledged, especially concerning the diffusion of QM to the public sector. Newsletters, courses and conferences have been important knowledge exchange mechanisms in this context. Books written by international quality gurus also influenced Swedish managers' understanding of QM. In the 1990s, Swedish interpretations of TQM also had an impact and were used primarily in university courses. Compared to most theoretical descriptions of the functioning of actors involved in the generation and diffusion of management ideas, the Swedish universities seem to have played quite a modest role in the case of QM development in Sweden, at least in terms of research and idea generation. The universities have, however, participated to some extent in learning networks, for example, together with industry in development projects at IVF and SIQ. Universities have also been involved in education and training, both in undergraduate courses and the establishment of management training institutes, such as Champs.

The common understanding between the parties of the labour market, i.e. representatives of industry, labour unions and government, is another typical feature of Sweden. The relative ease with which joint collaborations have been established in the system, for example between academia, government and industry, resulting in the creation of collective research institutes and a national quality institute, seems to have favoured Swedish QM development. In the Swedish case, the public media (including television) have not been very active in describing and promoting QM development.

The role of SFK in reinforcing the inspection and control paradigms among its members and the role of the national quality campaign in promoting a holistic view of quality throughout society has been acknowledged. However, it would be interesting to devote more study to the role of the community of managers and other professionals in defining what is rational and legitimate in terms of QM over time. More work on understanding the perceptions, capabilities and incentives of various actors in the system is also required.

CONCLUSIONS AND FURTHER IMPLICATIONS

» *In this final section, some conclusions are drawn and some further research implications are discussed.*

The main conclusion of this paper is that the framework developed in Alänge and Lundgren (2000) is well suited as a structuring frame of reference for use when empirically addressing cases of diffusion of OI. We may thus conclude that the attempt to fulfil the purpose of this paper has been a successful endeavour. Hopefully, the empirical application of the framework developed in Alänge and Lundgren (2000) can contribute to the overall research aim of obtaining a better understanding of the OI diffusion phenomenon.

The contents of this paper may be of interest to academia, i.e. researchers of innovation and technological change in general and QM in particular and, hopefully, also to practising managers and quality consultants.

Furthermore, there has so far been a lack of empirical research on and knowledge of QM in national contexts. Therefore, the very attempt to systematically address the case of QM development in Sweden may be a rather important contribution in itself, especially in a system perspective.

Much remains to be accomplished, however, and there are several potential implications for further research. In order to increase the explanatory power of the framework, further empirical refinement is required; thus, comparative studies, for which many opportunities exist, may be a promising avenue to follow. It would, for example, be of great interest to compare the Swedish case with the development of the QM area in another country or institutional setting. Another possibility would be to test the framework on another type of OI (in Sweden or in another country) and compare the results with the QM case. Given their rapid development and diffusion in the latest years, it would be interesting to examine business system innovations (e.g. ERP). A third possibility could be to take a second look at the Swedish QM case through the use of another theoretical framework and compare the explanatory power of each framework. Such a complementary view could, for example, be built on the concept of ‘memetics’, which tries to explain how an idea is spread in a certain community, analogous to the replication of genes in a population of humans, animals or plants. Yet another approach would be to focus more explicitly on what happens inside the adopting and potentially adopting organisations, i.e. to develop a framework that attempts to capture the dynamic interplay between different system levels.

Another issue that may require more attention is the further exploration of how the dynamic properties of the framework may be captured. We believe that visual illustrations may be very helpful in enhancing the understanding of complex innovation processes. For

example, the description and analysis of the Swedish QM development might perhaps have been more easily communicated if visual illustrations of timelines and timespaces (e.g. borrowing from the visual language, not only the business process perspective, developed by Frankelius 1999) had been used. However, due to limited space, this option was not made use of in this paper. It may be worth emphasising, however, that since visual models alone cannot lead to optimal understanding, they benefit from being accompanied by text-based descriptions, as in this paper.

Contemporary static (and non-interactive) media, e.g. print media (text, pictures and diagrams), may limit the possibilities of communicating complex historical data, since it may often be viewed from different angles and at many levels of detail. Hence, future attempts to develop a visual language that might facilitate visual communication of dynamic historical multi-dimensional data would be welcome. The development of interactive, three-dimensional computer software is clearly beyond the scope of this study, but may offer interesting future possibilities in this respect.¹¹⁷

¹¹⁷ In his study on “imaginary organisations”, Gatarski (1997) discusses the design of academic representations, indicating the limitations of ordinary paper media. In an early effort to make use of computer software he is experimented with three-dimensional, virtual models of organisations.

REFERENCES

- Abrahamson, Eric (1996): "Technical and Aesthetic Fashion", in Czarniawska, B. and G. Sevón, Eds. (1996): *Translating Organizational Change*, Berlin and New York: Walter de Gruyter
- Allen, Tom (1985):
- Alänge, Sverker (1994): Swedish QC-circles, *Total Quality Management*
- Alänge, Sverker et al. (1994):
- Alänge, Sverker and Rikard Lundgren (2000): "Diffusion of Organisational Innovations: An Innovation System Perspective", Göteborg: Chalmers University of Technology
- Alänge, Sverker (1987): *Acquisition of Capabilities through International Technology Transfer: The Case of Small Scale Industrialization in Tanzania*, doctoral dissertation, Göteborg: Chalmers University of Technology
- Alänge, Sverker and Staffan Jacobsson (1994), "Evaluation of Industrial Policy - The Case of the Swedish Textile and Clothing Industry", *Small Business Economics*, no.6, pp. 465-475
- Alänge, Sverker, Sanjay Siragowni and Lionel Bousquet (1996): "Can Management Tools be Adopted Across National Borders or Do They Need to be Adapted to Local Environments?", CIM Working Papers, No. WP 1996:03
- Alänge, Sverker and Annika Jarnehammar (1995): "Determinants of the Diffusion of Organisational Innovations - the case of TQM", Dept. of Industrial Management and Economics, Göteborg: Chalmers University of Technology
- Alänge, Sverker and Annika Jarnehammar (1999), "Diffusion of Organisational Innovations – An empirical test of an analytical framework", Dept. of Industrial Dynamics, Chalmers University of Technology, Göteborg
- Alänge, Sverker, Staffan Jacobsson and Annika Jarnehammar (1998): "Some "Some Aspects of an Analytical Framework for Studying the Diffusion of Organizational Innovations", *Technology Analysis & Strategic Management*, Vol. 10, No. 1
- Archibugi, D. and J. Michie (1995): "The globalisation of technology: a new taxonomy", *Cambridge Journal of Economics*, Vol. 19, No. 1
- Argyris, Chris and Donald D. Schön (1996): *Organizational Learning II: Theory, Method, and Practice*, Reading, MA: Addison-Wesley
- Axelsson, Jan (2000): *Ergonomics and Quality*, doctoral dissertation, Linköping: Linköping University
- Beer, Michael, Russel A. Eisenstadt and Bert Spector (1990): *The critical path to corporate renewal*, Cambridge: Harvard Business School Press
- Bergman, Bo and Bengt Klefsjö (1991): *Kvalitet – från behov till användning*, (in Swedish), Lund: Studentlitteratur (2nd enlarged edition in 1995)
- Bergman, Bo, Bengt Klefsjö, Rick L. Edgeman and Jens Dahlgaard (1999). "The Development of Quality management in Sweden", *Quality Engineering*, Vol. 11, No. 3, pp 463-474
- Björkman, Torsten (1991): "Lean production" på svenska – Vad främjar respektive hindrar spridningen av "mager produktion" i Sverige?, pp.107-128 in Efter Taylor (1991): *En debattskrift från produktivetsdelegationen och arbetslivsfonden*, Stockholm
- Boman, Helve (1992): *Förändringen - En berättelse om svenska ABB och T50*, Stockholm: Affärsvärdens Förlag AB
- Bonniers ISO guide (1995, 1997, 2000): *Certifierade företag med kvalitetsystem enligt standard ISO-9001, ISO-9002 eller ISO-9003*, a guide to Swedish companies with certified quality systems that comply with ISO 9001, 9002 and 9003, Stockholm: Bonniers företagsinfo

- Bångens, Lennart (1998): *Inter-firm Linkages and Learning: An Empirical Exploration of Firms in the Third World*, doctoral dissertation, Göteborg: Chalmers University of Technology
- Bäckström, Henrik (1999): *Den krattade managen: svensk arbetsorganisatorisk utveckling under tre decennier*, doctoral dissertation No. 79, (in Swedish), Department of Business Studies, Uppsala: Uppsala University
- Carlsson, Bo, ed. (1997): *Technological Systems and Industrial Dynamics*, Boston: Kluwer Academic Publishers
- Carlsson, Bo, Staffan Jacobsson, Magnus Holmén and Annika Rickne (1999): "Innovation Systems: Analytical and Methodological Issues", working paper, preliminary draft, April 1999, cited with permission
- Carlzon, Jan (1985): *Riv Pyramiderna*, (Swedish version), English version in 1987, with the title: *Moments of Truth*, Cambridge, MA: Ballinger
- Crosby, Philip (1979): *Quality is Free*, New York: McGraw-Hill
- Czarniawska, B. and G. Sevón, Eds. (1996): *Translating Organizational Change*, Berlin and New York: Walter de Gruyter
- Davenport, Thomas H. and Laurence Prusak (1988): *Working Knowledge: How Organizations Manage What They Know*, Cambridge: Harvard Business Press
- Deming, W. Edwards (1986): *Out of the Crisis*, Cambridge: Cambridge University Press
- DiMaggio, Paul J. and Powell, Walter W. (1983): "The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields", *American Sociological Review*, No. 48, pp. 147-160
- Edvardsson, Bo and Anders Gustafsson, eds. (1999): *The Nordic School of Quality Management*, Lund: Studentlitteratur
- EFS (1998): *Intellectual Capital Accounts - Reporting and managing intellectual capital*, Copenhagen: Erhvervsfremme Styrelsen
<http://www.efs.dk/publikationer/rapporter/engvidenregn/kap03001.html>
- Frankelius, Per (1999): *Företagande över tid – Kontextuellt perspektiv och visuellt beskrivningspråk*, JIBS Dissertation Series, No.5, Jönköping: Internationella Handelshögskolan
- Garvin, David A. (1988): *Managing Quality: The Strategic and Competitive Edge*, New York: The Free Press
- Gatarski, Richard (1997): "From papers to elers – about the design of academic representations",
http://www.bat.se/research/richardg/from_p2e/ts_970424_2330.html
http://www.fek.su.se/forskar/program/imorg/io_world/io_world.html
- Granovetter, M. S. (1973): "The Strength of Weak Ties", *American Journal of Sociology*, No. 78, pp. 1360-1380
- Grønning, Terje (1998): "The concept of innovations within systems of innovation-approaches", paper to the Thorstein Veblen Conference on Institutional Analysis of the Economy Today: Conceptual Cores, Analytical Approaches and challenges to Institutional Analysis, Oslo, June 18-19, 1998
- Grönroos, Christian (1984): "A Service Quality Model and its Marketing Implications", *European Journal of Marketing*, No.4
- Guillén, Mauro F (1994): *Models of Management: Work, Authority and Organization in a Comparative Perspective*, Chicago: University of Chicago Press
- Gummesson, Evert (1987): *Quality - The Ericsson Approach*, Stockholm: Ericsson
- Gustafsson, Robert and Torbjörn Jacobsson (1999): "Mervärdet av QS 9000 – ett leverantörsperspektiv", masters thesis, No. 99-07, department of Industrial Dynamics, Göteborg: Chalmers University of Technology
- Gustavsson, Bengt (1995): "The Human Values of Swedish Management", *Journal of Human Values*, Vol.1, No. 2, pp 153-172, New Delhi: Sage Press
- Hamberg, Arto (2000): personal communication
- Hasselbladh, Hans and Eva Bejerot, eds. (2000): *Kvalitet utan gränser*, forthcoming, Stockholm: Arbetslivsinstitutet

- Hasselbladh, Hans and Rikard Lundgren (2000): forthcoming chapter in Hasselbladh, Hans and Eva Bejerot, eds. (2000): *Kvalitet utan gränser*, forthcoming, Stockholm: Arbetslivsinstitutet
- IVA (1985): "Kvalitet för ökad konkurrenskraft", Report No. 288-1985 (in Swedish)
- Jarnehammar, Annika (1995): *Towards a Framework for Analysing the Diffusion of Organisational Innovations*, Göteborg: Chalmers University of Technology
- Jernberg, Björn and Catarina Tholin (1999): *Framgång 2005 – framtidsstudie utförd våren 1999*, Göteborg: Swedish Institute for Quality (available at <http://www.siq.se>)
- Juran, Joseph M. ed. (1951): *Quality Control Handbook*, New York: McGraw-Hill
- Kimberly, John R. (1987): "The Study of organization: Toward a Biographical Perspective", in Lorsch, J. W. ed. (1987): *Handbook of Organizational Behavior*, pp. 223-237, New Jersey: Prentice-Hall
- Kostova, Tatiana (1998): "Success of the Transnational Transfer of Organizational Practices within Multinational Companies", working paper, Carnegie Bosch Institute, <http://cbi.gsia.cmu.edu/newweb/1998WorkingPapers/Kostova/kostova.htm>
- Kroslid, Dag (1998): *Quality management – National or Global Driving Factors?*, licentiate thesis, Linköping: Linköping University
- Kroslid, Dag (1999): *In Search of Quality Management: Rethinking and Reinterpreting*, doctoral dissertation, Linköping University
- Krüger, Volker (1999): "Towards a European definition of TQM – a historical review", *The TQM Magazine*, Vol. 11, No. 4, pp. 257-263, MCB University Press, 1999
- Kvalitets-nytt (1987), SFK's member journal, No. 1 May 1987 (in Swedish)
- Kvalitets-nytt (1990), SFK's member journal, No. 4 November 1990 (in Swedish)
- Kullberg, Robin (1995): "Dynamic Timelines", master thesis, School of Architecture and Planning, Cambridge: Massachusetts Institute of Technology <http://acg.media.mit.edu/people/robin/thesis/toc.html>
- Lorsch, J. W. ed. (1987): *Handbook of Organizational Behavior*, pp. 223-237, New Jersey: Prentice-Hall
- Lundgren, Anders (1991): *Technological Innovation and Industrial Evolution - The Emergence of Industrial Networks*, doctoral dissertation, Stockholm: Stockholm School of Economics
- Lundvall, Bengt-Åke (1992): *National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning*, London: Pinter
- Macdonald, John (1999): "The quality revolution – in retrospect", *The TQM Magazine*, Vol. 10, No. 5, pp. 321-333, MCB University Press
- Martínez-Lorente, Angel, Frank Dewhurst and Barrie G. Dale (1998): "Total quality management: origins and evolution of the term", *The TQM Magazine*, Vol. 10, No. 5, pp. 378-386, MCB University Press, 1998
- Normann, Rikard (1984): *Service Management*, New York: John Wiley
- North, Douglass C. (1990): *Institutions, Institutional Change and Economic Performance*, New York: Cambridge University Press
- Oakland, John S. (1989): *Total Quality Management*, Oxford: Butterworth-Heinemann
- Park Dahlgaard, Su Mi (2000): *From Ancient Asian Philosophies to TQM and Modern management Theories*, Licentiate Thesis, Linköping: Linköping University
- Powell, Walter W. and Paul J. DiMaggio (1991): *The New Institutionalism in Organizational Analysis*, Chicago: University of Chicago Press
- Reftmark, Sven-Olof (1988): "Förslag till organisation för svensk kvalitetsutveckling"
- Rickne, Annika (2000): doctoral dissertation, forthcoming Göteborg: Chalmers University of Technology
- Rogers, Everett M. (1995): *Diffusion of Innovations*, 4th Edition, New York: The Free Press

- Rostow, W. W. (1960): *The Stages of Economic Growth: A Non-Communist Manifesto*, Cambridge: Cambridge University Press
- Sandholm, Lennart (1995): *Kvalitetsstyrning med total kvalitet*, Lund: Studentlitteratur
- Sandholm, Lennart, (1996): "Maturity in Quality – Still to Come?", in Sandholm, Lennart, ed. (1996): *Quality Without Borders: Silver Jubilee Book*, Djursholm: Sandholm Associates AB
- Sandholm, Lennart, ed. (1996): *Quality Without Borders: Silver Jubilee Book*, Djursholm: Sandholm Associates AB
- Shewhart, Walter A. (1931): *Economic Control of Quality of Manufactured Product*, New York: Van Nostrand
- Shingo, Shigeo (1982): *Study of 'Toyota' production system from industrial engineering viewpoint*, Tokyo: Japan management assoc.
- Shingo, Shigeo (1984): *Den nya japanska produktionsfilosofin*, translation to Swedish by Lars O. Södahl, Lidingö: Svenska managementgruppen
- Shingo, Shigeo (1985): *A revolution in manufacturing : the SMED system*, Stamford : Productivity Press
- SIQ web (2000): <http://www.siq.se>
- Stjernberg, Torbjörn and Åke Philips (1993): "Organizational innovations in a long term perspective: Legitimacy and souls-of-fire as critical factors of change and viability, *Human relations*, Vol. 46, No. 10
- The National Committee for Swedish Quality (1987): "Svensk kvalitet – rätt sätt", information brochure (in Swedish)
- Swedish Government (1987): Proposition No. 1986/87:74
- Taylor, Efter (1991): *En debattskrift från produktivitsdelegationen och arbetslivsfonden*, Stockholm
- UHÄ (1987): "Kvalitetsstyrning – utbildning och forskning" (in Swedish), UHÄ-rapport 1987:5
- Weber; Max (1976): *The Protestant Ethic and the Spirit of Capitalism*, New York: Charles Scribner's Sons (first version in German in 1904-05)
- Womack, James P., Daniel T. Jones and Daniel Roos (1990): *The Machine That Changed the World*, New York: Rawson Associates
- Yamashina (1985): personal communication