

**The New Paradigm  
for  
Industrial Practices  
Total Quality Management**

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## **The New Paradigm for Industrial Practices - Total Quality Management**

### **0. Introduction**

Various concepts have been used to describe the new paradigm for industrial practices that has evolved in the 1990s. A Japanese version has been called TQC (total quality control), CWQC (company wide quality control) or Toyota management system.<sup>1</sup> This approach was later transferred to the West and described by concepts such as "lean production"<sup>2</sup>, "innovation-mediated production"<sup>3</sup> or, maybe the most commonly used term, TQM<sup>4</sup> (total quality management).<sup>5</sup>

TQM consists essentially of systematic management principles that make the best use of all resources. The key in the new paradigm is that the potentials of all employees should be used to achieve demanding goals, set by a committed top leadership, and built on customer requirements. These demanding goals, in turn, require changes in organizational and reward principles.

The model of TQM presented in this paper has been derived from a review of literature, definitions used by the quality awards<sup>6</sup>, and by empirical data from a number of companies in the USA<sup>7</sup>, Europe<sup>8</sup> and Japan<sup>9</sup>. The aim has been to integrate the common aspects from literature and what is present in the front line companies in 1994.

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<sup>1</sup>. Ischikawa (1985), JUSE (1987), Monden (1993)

<sup>2</sup>. Womack et al. (1990)

<sup>3</sup>. Kenney & Florida (1993)

<sup>4</sup>. E.g. Creech (1994).

<sup>5</sup>. Different authors have assigned slightly different meanings to TQM. This is, however, in line with reality, as different companies embrace the new paradigm in slightly different ways, making it their own, including using their own terms, such as "Leadership Through Quality (Xerox), or "T50" (ABB in Sweden). However, there are some general features that can be found in most companies.

<sup>6</sup>. The Deming Prize, the Malcolm Baldrige National Quality Award, the European Quality Award and the Swedish National Quality Award.

<sup>7</sup>. Motorola, Xerox

<sup>8</sup>. Rank Xerox, Pitney Bowes (UK), ABB (Sweden)

<sup>9</sup>. Toyota

The model that was created was developed intuitively through the use of an affinity diagram.<sup>10</sup> Six categories were found: customer focus, leadership, total approach, continuous learning, process orientation and standardizing. In appendix the main components of each category are presented. Below each of the six categories will be presented in more detail.

## **1. Customer Focus**

A common denominator of total quality companies (here called TQM companies, in short) is the focus on understanding the customer's demands and needs and making this a leading guideline to direct the strategies and actions of the company. It includes understanding that what really matters is the customer's perception of the delivered quality. The perceived quality is a function of both the content of the delivered product (or service) but also on the way it is delivered, i.e. there is always a customer communication and interaction component in all products. However, the perceived quality also depends on the customer's level of expectation. This expectation in turn depends on a number of factors among which are the customer's previous experiences with the company, the quality levels of the competitors and of the explicit or implicit promises of quality delivered by the marketing department, or other personnel in direct contact with the customer.<sup>11</sup>

The understanding of these relationships is a characteristic of a TQM-company. The essence is to understand what the selected customer groups value. It could be low cost, fast delivery time, high reliability, or something else, which then has to be translated into goals and action programs within the company.

In order to find out what the customers' requirements are, different methods can be used.<sup>12</sup> Whatever method is used to collect customer data, it is essential to keep in mind that customers do not tell all their requirements. There is one group of requirements that are explicit. In general, the more these explicit demands are

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<sup>10</sup>. Affinity diagram is a method where qualitative data is intuitively grouped together (clustered) by a group of people (Shiba et al. 1989). Each person writes individually on post-it tags sentences responding to the problem at hand. These post-its are then clustered through a group process. In our case this work was performed by three persons (Alänge, Hallenborg and Jarnehammar 1994).

<sup>11</sup>. Grönroos (1990)

<sup>12</sup>. The "voice of the customer" can be heard through customer satisfaction mail questionnaires, customer complaints data, service data, direct customer visits by persons on different levels and from different departments, etc. QFD (quality function deployment) is one systematic method of analysing customers requirements and transforming these into design requirements.

fulfilled, the more the customer gets satisfied. However, certain base requirements (or demotivators) are implicit, and the customer often takes it for granted that they will be fulfilled, but gets a strong negative reaction if they are not. Furthermore, there are novel features that the customer simply does not know about, but these novel features are very essential in order to differentiate one supplier from another. To put it simply, a company needs to satisfy its customers' requirements, but also to find something which exceeds their expectations in an area which is of special value for the customers, in order to "delight" the customer.<sup>13</sup> This ability of delighting the customer is essential in a competitive environment, and can be what distinguishes one firm from its competitors.

However, because of the dynamics of customer requirements, what delights at one point in time has a tendency of rapidly becoming something that is expected the next time. And, subsequently, it becomes part of the implicit base expectations, due to both earlier experiences with the supplier, and because of other competing suppliers which have improved their products and services.

As the requirement can be vastly different between different customers, there is a need of looking into different kinds of customers and group them according to similar requirements (customer segmentation).<sup>14</sup> A complication that has to be taken into account is that quite frequently the end users of a product are others than the ones that order and pay for the product. This is for example often the case for public services, such as hospitals.

In one sense, the next person in the chain, even within the company, can be seen as a customer. In this case we talk about internal customers (see further under the heading "process-orientation"). In a wider sense, the employees of a company can also be seen as "customers" (or stakeholders) as well as the owners of the company and the surrounding world (see further under the heading "total approach").

A final comment on the issue of customer focus is that what really matters for a company is not only efficiency, i.e. doing things right, but also effectiveness, i.e.

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<sup>13</sup>. The Kano-model of base, performance and "extras" illustrates the character of the explicit and implicit requirements.

<sup>14</sup>. For example, possible requirements of a customer segment looking for medium priced sports cars could be the following: One explicit requirement is performance and hence, the faster the acceleration, the happier the customer will be. An implicit base requirement is that the brakes do not fade away after a few stops from high speed. What delights this customer group could be a possibility of easily regulating the shock absorbers from a stiff sports ride to a more comfortable city ride, making the car more versatile.

doing the right things. Sometimes, companies aiming for TQM focus too much on doing things in the right way and on internal efficiency, forgetting that what really matters is that they are doing the right things, i.e. to provide the products and services that the customers demand over a longer period of time. In order to make sure that this is done, there is a need of continuously monitoring present and potential competitors, analysing market and technology trends, changes in legal and environmental demands, etc., and to look into their own firms' position and development in the perspective of being a part in a national or regional industrial system.

In summary, the ability of understanding selected customer groups' explicit and implicit requirements is necessary for a TQM-company. However, a company does not reach this point through an automatic process, leadership is necessary.

## **2. Leadership**

In order to select among various alternative strategic routes and make all resources in a company striving in the selected direction, there is a decisive need for leadership. The involvement and possibility for all employees to make use of their brains, not only the hands and feet, is the basic premise that puts new demands on leadership. It consists of empowering the employees and at the same time making sure that each individual contributes to the overall company development direction. This puts demands on goal communication and alignment, on leadership style and function, and on motivation and reward schemes.

The role of the leader is changing from being the one that knows everything and gives the orders, to the coach that creates the environment and makes the teamplayers develop. There are two essential conditions that must be fulfilled to make this work. First, it is the task for the top leader to develop a vision and corporate goals which can work as guidelines for all personnel on other levels in the organization. Second, the top leader must show in practise what is of most importance, i.e. it is not enough to talk or to write and then delegate, the top leader must change his/her own behaviour according to the philosophy he/she wants to follow. The reason is that subordinates see the actions of top leaders and base their priorities on visible signs of what the top leader puts priority on, not merely on what can be seen as "the program of the month" from the top office.

In Japanese companies the expression "quality first" has been used to indicate that it is "a belief" that if companies focus on quality and satisfying their customers, then market share, revenue and profitability will follow.<sup>15</sup> This long term focus on satisfying customers' requirements in order to become competitive on the market place is also a typical sign of Western companies working towards TQM.<sup>16 17</sup>

It is not possible to reach this goal without a clear alignment of the employees to the main goal of the corporation. The deployment of the goals to all levels of the organization is an absolute condition for being able to work according to the new paradigm. In Japan, a very structured way of "policy deployment" was developed, where the goals are broken down to the next level through a "catch ball principle", i.e. the boss gives his goals to his subordinate who formulates his own goals for his level, in such a way that these goals support the above level goals. The new goals are then communicated to the boss who gives an OK when he believes that the goals are satisfactory. Then the process continues to the next level down in the organization in the same iterative way, until all levels down to the shop floor have been covered.<sup>18</sup>

There are Western companies that have used this formal technique, however, not always with total success, as it has a tendency of becoming bureaucratic.<sup>19</sup> The process has therefore been adapted to suit individual companies' needs, e.g. there are companies using a somewhat simplified version of the technique where only the shorter term goals are broken down and the more long term goals are kept for the corporate level.<sup>20</sup> Companies have also been experimenting with other ways of accomplishing the task of deploying the corporate goals. For example, in a Swedish production company, more or less organized according to a dual level structure, the goals on corporate level have been presented by the management team to empowered work teams (which is the next and "only" level) in big meetings where the corporate goals have been discussed. Then the teams have had some time to develop their own goals which then again were discussed with the management group at a later meeting.<sup>21</sup> The point is, however, that the TQM companies studied are in agreement

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<sup>15</sup>. Shiba (1987)

<sup>16</sup>. Kearns (1989), Akers (1990)

<sup>17</sup>. When this link has been understood and is embraced by top management, then ...for change activities.

<sup>18</sup>. To assist this process of breaking down the goals from one level to the level below, a matrix technique has been developed, similar to the matrix used in QFD.

<sup>19</sup>. For example, Florida Power & Light and Hewlett & Packard.

<sup>20</sup>. E.g. Xerox in the USA.

<sup>21</sup>. E.g. at ABB Switchgear in Sweden (Nord & Olsson 1993).

with the importance of aligning all employees to the corporate goals, although the way this is done differs.

One common characteristic of the new paradigm is that in order to create a major improvement activity, it is necessary to focus on one or a few key goals which can be used all over a company. Examples of such general goals are leadtime reduction and defect reduction, which have been used in a large number of companies.<sup>22</sup> Together with the development of a suitable measurement system, the use of general goals contribute towards the creation of a common language in a corporation and makes cross-departmental comparisons possible. There is also a possibility of making a direct comparison between the improvements in manufacturing and in administrative areas.<sup>23</sup>

Another common characteristic of the TQM-companies is the use of aggressive goals which set very high expectation levels. It can be in an order of magnitude of lowering the defect rate 60% per year<sup>24</sup> (e.g. Motorola's "Six Sigma") or a 50% shortening of leadtimes in 3 years (e.g. ABB's "T50"). This kind of expectation levels make it impossible only to work a little harder, instead it is necessary to do things differently, to rethink the ways things are done and change the processes within an organization.<sup>25</sup> Initially, most Western companies experienced resistance from their employees and complaints about how these levels were impossible to reach. But, there are many examples that it is possible to reach improvement levels of this order of magnitude. For several firms the use of benchmarking techniques have been a major factor to convince employees that it is possible. It has been proven that process benchmarking does not only show the gap in performance but it also provides indications and examples on how to go about to change.<sup>26</sup>

Of central importance is that the measurements being used reflect the goals. Therefore, the mapping of the relationship between goal, subgoals and measurements

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<sup>22</sup>. Examples of leadtime reduction programs are: ABB "T50" in Sweden, which now also has evolved towards using a defect reduction goal. Examples of combined leadtime and defect reduction programs: Motorola's "Total Customer Satisfaction", IBM's "Market Driven Quality", which are using both leadtime and defect reduction goals.

<sup>23</sup>. Alänge (1992)

<sup>24</sup>. Cf. earlier common improvement goals in industry of 5-10%.

<sup>25</sup>. Motorola claims that their aggressive improvement goals have forced development and manufacturing closer, as it has shown to be impossible to reach the goals without a close cooperation. (Alänge 1992)

<sup>26</sup>. Motorola found by benchmarking Japanese firms that its defect level was around 1000 times worse. Xerox used benchmarking as a major driver for change within many different areas.



can be of great importance both for finding the right measurements, and in order to show all employees (at shop floor as well as management) how changes in measurements affect the goals, which can play a strong motivating role.<sup>27</sup> The parallel use of both result and process measurements is essential, as the latter can monitor the process and provide indications that some corrective action must be taken, long before any result of the faltering process is visible.

A central feature of the needed leadership style concerns the importance of continuous communication<sup>28</sup>, vertically and horizontally. The above mentioned quality policy deployment technique is a structured way of creating communication between different levels in an organization. However, in order to motivate, align and coordinate empowered "associates" there is a need to continuously communicate through all means possible.<sup>29</sup>

On the individual level, feedback on work results, in terms of quality, timing, usefulness for the following steps in the process, etc., is of great importance for work motivation and can create a positive spiral effect for improvement. There is a consensus on the importance of the immediate verbal feedback from supervisors. Concerning the effects of monetary reward systems the picture is more diversified. One tendency though, has been to avoid individual piece work payment on the shop floor and to an increasing extent use different forms of group rewards. It is important to align the reward system to the general goals and way of working in the company.

The use of, or gradual introduction of, yearly development reviews with each and every employee is a common feature in most companies we have studied. This review in itself opens up opportunities both to motivate employees, and to find out essential areas for improvement (see further the section on continuous learning).

Suggestion systems is a special question for leaders, as there is a wide range with different features. The traditional suggestion system in Sweden normally has a bureaucratic structure and therefore a long decision-making and feed-back time.

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<sup>27</sup>. When this kind of mapping was made at American Express, both the chairman and other personnel could embrace and fully support and believe in the goal and measurements. (Spagnol 1994)

<sup>28</sup>. "Communication" indicates that it must be 2-way, which means that in order to take place, both parties must also have an ability of "listening". Asked to indicate the most important leadership skills, Motorola's former CEO Bob Galvin listed the listening ability at the top (Alänge 1992).

<sup>29</sup>. The importance of communication has been underlined by several companies, e.g Xerox former CEO Kearns (1989) and IBM Jarfalla's (the first winner of the Swedish National Quality Award) CEO Alerfeldt (1993).

Typically, it provides monetary rewards based on the company's savings during one year after the introduction of the suggested improvement. This type of suggestion system can sometimes come into direct conflict with continuous improvement activities on the shop floor (Alänge 1992a).

With the Japanese quality control circles as inspiration, work groups are empowered to identify and solve problems within their own work area. The improvement suggestions are typically presented to the next supervisory level for approval. The result is an immediate decision-making process and the feed-back can come within 24 hours. In addition, the persons providing the suggestion, normally participate themselves in carrying out and implementing the changes. There is seldom any type of monetary reward involved, and if there is it is of a minor type. Instead, the reward is mainly the recognition and the possibility of directly influencing the own work situation. Nevertheless, this can work as a major motivating factor for shop floor workers as well as similar problem-solving groups in other areas of a company.

In summary, conscious leadership is a prerequisite for introducing the TQM paradigm. It includes goal-setting and communication to align empowered employees towards a common goal, visible leadership through example, and it must be supported by a congruous motivation and reward system.

### **3. Total Approach**

The new paradigm is built on a basic and positive assumption about the human being - that all of us basically want to do a good job. This assumption combined with the observation that it is the person closest to a specific process who knows how it really is done, and very often also has most ideas on how to improve it, provides the basis for delegation of authority to lowest level possible, i.e. "empowerment". The condition is that the empowered employees know what it is that should be aimed for<sup>30</sup>, that they are trusted to act, within given frames, according to their own judgement, and that they possess the required knowledge and experience.<sup>31</sup>

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<sup>30</sup>. Deployed company goals and knowledge of the requirements of the next step in the chain of customers.

<sup>31</sup>. Tenner & DeToro (1992) define the condition for empowerment in terms of alignment, trust and capabilities. They point out that the trust must be in both direction, i.e. that the boss can trust the subordinate and vice versa.

The implication is that quality, lead time, etc, i.e. what matters for the customer, becomes the responsibility of each and everyone in the organization. It includes the responsibility for continuously improving one's own work processes. This use of all employees' brains and capabilities consists of an earlier largely untapped resource, which has been acknowledged by the leading organizations working according to a TQM-philosophy.<sup>32</sup>

Although people can be very capable doing their individual work task, the use of groups and group processes is a major performance driver. First, through group processes individuals capabilities can be brought together creating new combinations of ideas and solutions. Second, the group can function as an important instrument to align the individuals to work both in the same direction and at a similar pace. Third, the "semi-autonomous" group or team on the shop floor provides the possibility of simplifying organizations and limiting the number of hierarchial levels.

However, groups are not limited to "shop floor" blue or white collar production units, they can as well be cross-functional, cross-hierarchical, etc. The experienced TQM-firms use several forms of groups. The joining of representatives from different functional areas together in the same group provides major opportunities to improve quality, shorten lead-times in a multitude of areas, such as a design change or new product development. In addition, creative group formation can be applied to various kinds of problem solving where there are benefits in involving more than one function in order to get a better decision and a more thorough implementation.

There is a common understanding that quality is a matter that concerns all departments within a company<sup>33</sup> and that the line has the primary responsibility for quality. Therefore, the role of the quality department and specialists is primarily advisory, and a general tendency has been to decentralize the activities earlier performed by a central quality staff unit. In order to emphasize that quality is a responsibility for the line, many total quality companies work with very small central staff functions, e.g. ABB Sweden has, for its T50 program, a small central staff of 4 persons. At Xerox, the quality director reports directly to the CEO, but he has no persons reporting to him. Instead, he has to work through and in cooperation with the line managers. In addition, the role of corporate quality director (corporate change agent) is not primarily a job for quality specialists. Instead respected managers with a

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<sup>32</sup>. E.g. the former Xerox CEO David Kearns (1989).

<sup>33</sup>. The notion that quality is the responsibility of all departments was originally put forward by Feigenbaum in 1951 in his book titled "Total Quality Control" (Feigenbaum 1991).

long and broad career in different leading line positions, and with excellent personal networks, are being chosen for such positions.

Both the fact that bought material and components in many industries account for more than 50% of the total value added, and that it is impossible to produce a product with "zero defects" if the incoming material is inferior or delivered at the wrong point in time, have brought a focus on the supplier relations. Supply management has become a catch-word and a must for total quality companies. Toyota stands out as a role model, of creating very close and long term links to a limited number of system suppliers (which in turn have similar relations to their subcontractors). The Toyota model is built on the assumption of mutual development benefitting both companies, and the suppliers are audited and assisted in their competence development. The drive for continuous improvement is installed already in the agreement between the two companies and visible through a gradual lowering of the price.

Several companies have developed special associations together with their suppliers, in their efforts to upgrade their suppliers. The aim is to make the demands on the "good supplier" clear, and to assist in development, through information sharing between different suppliers. In the case of Motorola, this kind of grouping also had the effect that the supplier group came up with demands on Motorola on how to behave to be a "good customer" (Smith 1991).

A real focus on satisfying the needs of customers brings a need of developing a close relationship with customers in order to make sure that their explicit and implicit needs are understood. There is ample evidence for the importance of close relationships with key customer groups for successful product development.<sup>34</sup> For TQM companies this goes beyond the relationship between the sales and after-sales division with the customer, even including shop floor workers visiting "their" external customer in order to better understand their requirement.<sup>35</sup>

Among leading companies there is a new openness of communicating changes that take place and are under its way. For Baldrige and other Quality Award winners it is even a requirement to share their experiences with other companies. Also other firms have used external media to tell customers, suppliers and the surrounding world what is

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<sup>34</sup>. E.g. Von Hippel (1988).

<sup>35</sup>. One of the features of Zytec Corporation, a 1991 winner of the Baldrige Award and supplier to IBM Rochester, was that the workers met their peers at IBM in order to understand how their component fit into IBM's product and production process (MM, 1991, personal communication)

happening.<sup>36</sup> This has an internal effect as well, because success stories published externally, also can support the change process internally. However, it is a subtle judgement when to publish, because the employees must recognize what is described and feel it is believable, otherwise it can turn out counter-productive.

Finally, the total approach also includes having a long term perspective and taking up responsibilities outside what is demanded by company and other legal guidelines. For example, taking up the task of developing the school system, including assisting primary and secondary school teachers. It includes a concern about the environment, looking into issues such as product life cycle cost. This comes very close to Genichi Taguchi's notion of "lack of quality", as all costs put onto society by a product's lack of quality from its inception to its destruction.

In summary, according to the total approach, quality is the concern and responsibility of all and everyone inside a corporation. In addition, very close links must be developed with suppliers as well as key customers in order to understand their requirements. A TQM company also looks beyond and take a long term stand assisting in developing and protecting the surrounding world.

#### **4. Continuous learning**

The human assets are increasingly seen as the most essential to grow and care about for future competitiveness, which manifests itself in major and long term investment in the development of the employees.<sup>37</sup> Continuous learning is, however, more than investment in training. It means that different processes of learning are put in place: for example, challenge of existing mental models, systemized problem-solving and continuous improvement activities, benchmarking, and audits. To get these processes working is of course an essential leadership question.

The task for management is to create the culture of continuous learning, to make the people reflect and lift themselves above the world of present events, and look upon the company from a new perspective. An aid to accomplish this is a clear vision of where top management want the company to be, which then is put in relation to a

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<sup>36</sup>. E.g. ABB Sweden.

<sup>37</sup>. To provide an indication of the level of investment in human assets development the following figures can be provided: Pitney Bowes UK puts 7% and Nissan UK puts 15% of total wages into training, while Motorola, USA, requires a minimum 40 hrs of training for all employees, and the real average is close to 80 hrs per year.

thorough analysis of facts of where the company is at present. The gap between the vision and the reality can create a positive tension, which helps an organization to develop. This principle of creative tension can provide a major driver for change and it can create the possibilities for "generative learning", in comparison to "adaptive learning", simply being a reaction to environmental change.<sup>38</sup>

However, continuous learning can be blocked in organisations. One common blockage is that individuals are seldom aware of the mental models that guide their thinking, communication and decision-making.<sup>39</sup> Then, an essential step is to lift these existing mental models up to the surface<sup>40</sup> and thereby making it possible to test their validity, and modify them.

Continuous improvement starting from the shop floor is a major component in Japanese TQC<sup>41</sup> and it has gradually diffused into European and American TQM companies. The basis is the improvement cycle<sup>42</sup> (plan-do-check-act) which points at the importance of basing all change on facts, and after the change to follow it up, and finally, to evaluate the result and to establish a "standard operating procedure" if the change was considered good enough, i.e. to learn (the improvement cycle is in itself an example of a standardized way of working, see further section 6). It also aims at finding the root cause, not only to put a remedy to the symptom, and it is a general focus on doing the improvement before there is a break-down.

In order to make sure that every employee is able to participate in the collection and analysis of facts, they are trained in using a set of methods, the 7 QC-tools<sup>43</sup>, and in process mapping<sup>44</sup>. A specific feature of these tools is that they assist in making the

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<sup>38</sup>. This is however the most common cause for major change, i.e. a severe crisis that threatens the very survival of the organization. The point is that this "negative" motivation to avoid a bad situation must be supplemented by a clear vision, which together with knowledge of the present situation can create a positive force for continued learning and improvement.

<sup>39</sup>. Senge (1990)

<sup>40</sup>. This can be done through the "left-hand column" developed by Argyris.

<sup>41</sup>. In Japan the shop-floor improvement is done in QC-circles, which can be seen as a parallel organization to the ordinary authoritarian production organization (Lillrank 1988). Sometimes it is referred to as Kaizen.

<sup>42</sup>. Sometimes referred to as the Shewart or Deming cycle.

<sup>43</sup>. The 7 QC-tools consist of: data collection, histograms, scatter diagrams, stratification, pareto analysis, cause-effect diagram (also called fishbone- or Ischikawa-diagram) and control charts (statistical process control).

<sup>44</sup>. Process mapping is a tool which aims in making the real process visible. It can be done at different levels (e.g. key business processes vs. detailed maps of a specific work process) and by different methods (e.g. cross-functional maps, detailed maps, maps showing the physical movement of material, persons or documents, etc.). The key is that all maps are made in order to make the specific process visible and it is then analysed based on the principle of keeping

information visible and, hence, they are a major means of communication as well. The power of continuous improvement (Kaizen) consists in shop floor personnel having tools for data collection and analysis, following a systematic problem-solving approach to improve the areas which they themselves have the primary knowledge about.

Continuous learning is also exemplified in organisations when there is evidence of sharing from others' experiences. Avoiding the "non-invented here" barriers and using and building upon ideas developed in other organizations is a clear characteristic of TQM organizations. Benchmarking, or process comparison, is a thorough and systematic approach of sharing experiences<sup>45</sup>, which can take place between internal divisions, competitors or with companies outside the industry.<sup>46</sup> The starting point is to do the homework, i.e. to analyse and document (map) your own processes that are in need of improvement and to which you would like to get new fresh ideas. Through benchmarking it is possible to both finding out how big the performance gap is in relation to the best practice, and to get specific ideas into how the process can be improved. I.e. once again it is a systematic procedure to speed up learning.<sup>47</sup>

Internal and external audits are other means to assist in continuously learning by looking at a certain product or process with fresh eyes, in order to find ways of improving.<sup>48</sup> The international ISO 9001-3 standards provide a framework for a

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only those activities that create value for the customer, and otherwise simplify, combine, or take away non-value adding steps.

<sup>45</sup>. It is built upon the idea of friendly sharing in order to reach a win-win situation. A basic code of conduct is never to ask about anything that you yourself wouldn't like to answer to (Bob Camp 1994, personal communication).

<sup>46</sup>. Experiences from the pioneering companies such as Xerox shows that only a limited share of new improvement ideas comes from internal or competitive benchmarking (around 30%), while benchmarking outside the own industry in best practice companies provides the major benefit.

<sup>47</sup>. Process analysis (mapping and benchmarking) starts out from the notion of checking existing facts, i.e. to analyse the process "as it is" carried out in reality, not how it "should be" or "could be". These are the next steps, where the "should be" are the simple improvement steps that can be taken by only analysing the process from a customer value-added perspective, while the "could be"-solution can benefit from benchmarking. Sometimes, when either the process is done in such a inferior way or there are reasons to believe that large opportunity exist if the process is radically changed, e.g. when introducing information technology, the process can also be reengineered from a clean sheet of paper (see for example Davenport, 1993 or Hammer & Champy, 1993). Just adding information technology to an inferior process should however be avoided, because the result can be automation of waste.

<sup>48</sup>. A more direct way of intervention are the PICOS-teams that visit suppliers and during a few days work together with the supplier's personnel in order to show in practice what is possible to accomplish (this is a practice developed by General Motors, but now also diffused into other industry). There is a great similarity into the way Kaizen-activities are introduced into a company, i.e. in a very practical way showing to what extent it is possible to improve if you look at a process with fresh eyes and with the assistance of a set of simple tools, among which are different variants of process maps, i.e. making the real process visible.

documented quality system. This tool has been diffused widely, especially in Europe, with UK far ahead. ISO 9001-3 do not automatically lead to improved quality, but it can be used as a framework for learning and improvement.<sup>49</sup> Different Awards Programmes, such as Malcolm Baldrige National Quality Award, the European Quality Award and the Swedish Quality Award can all be used as internal tools for improvement. They consist of a way of operationalizing what is meant by total quality, and can be used internally as a checklist<sup>50</sup> for learning and improvement. In addition, winners of the awards are required to share their experiences with other organizations, which provide another means of change and learning through a role model approach. This open information also makes it easier for management in companies trying to change to set their visions and to communicate them internally, in order to create a positive change force, through the principle of creative tension, in the direction of generative learning.

As was mentioned initially, TQM companies allocate major resources in developing the human assets. This is a long term effort and hence, a number of practices have become common. First, is the use of regular yearly talks with the immediate supervisor, including follow-up of previous goals and the agreement of new goals for development of the individual. Second, a basic rule is that training should take place as a response to a need and the new skills should be applied immediately, otherwise its a big risk of just being waste. Third, in order to prepare the ground for an increasing empowerment, there is a need both for problem-solving tools (7 QC-tools, etc) and a broadened training in order to create a multi-skilled more flexible workforce with an increased systems perspective. This can take place on-the-job through work rotation. A specific strength of Japanese firms is that they also have a history of a very strong cross-functional rotation, including moving development people with the product out to the production units.<sup>51</sup>

## **5. Process orientation**

There is ample evidence of losses (time, quality, etc.) that occur because a company is working only according to its functional organization. It can even be that each

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<sup>49</sup>. Alänge & Bengtsson (1993)

<sup>50</sup>. These awards provide checklists, but have tried to avoid giving specific instructions on how TQM should be designed on the company level. The corresponding Japanese award, the Deming Prize, is more prescriptive.

<sup>51</sup>. Many US and European firms are planning to or in the starting phase of introducing a similar cross-functional rotation.



individual function, e.g. production or marketing, is working in an efficient way, but the result can still be a suboptimization for the organization as a whole. The main reason is that the "white space" in between the functional areas is not managed<sup>52</sup>, i.e. delays and misunderstandings have a greater tendency to occur when a job (customer order, document, etc.) is transferred from one functional area to another.

This provides the starting point for a process view, i.e. seeing the work as a large number of work steps that are going across the organization, over functional boundaries. In order to obtain a smooth process flow it is necessary to analyse the work processes in the way they really are done, i.e. in terms of a chain of work steps, which each is started by an input, then it performs its process-step, and delivers an output to the next step. The next step in the chain can also be seen as an internal customer.<sup>53</sup>

Then, if the process flow is what is of importance, the process has to be managed, not only the functional areas. Hence, the organizational measure has been to create process owners, responsible for design and execution of the process and for ensuring that customer needs are met.<sup>54</sup> The difficulty in defining ownership, of course, is that processes seldom follow existing boundaries of organizational power and authority. Hence, there is some variation in the view of the specific role of process owners<sup>55 56</sup>, but the need for someone to take a cross-functional responsibility is without doubt.

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<sup>52</sup>. Rummler & Brache (1990)

<sup>53</sup>. From an external customer's point of view the company is not seen as specialized functions, rather it is seen as one integrated body that receives an order and delivers a product or service according to this order.

<sup>54</sup>. According to Rummler & Brache (1990): "A Process Owner (sometimes called a Process Sponsor) is an individual who is charged with responsibilities for the efficiency and effectiveness of a cross-functional process." (p.134)

<sup>55</sup>. "Like a matrix manager, who oversees the cross-functional performance of a product or a project, the Process Owner oversees the cross-functional performance of a process. Unlike a product or project manager, however, the Process Owner does not represent a second organizational structure. Individuals are not continually torn between their commitments to their vertical (line) and horizontal (product or project) managers. In effective Process Management, reporting relationship remain vertical; the functional managers retain their power. The horizontal dimension is added if the functional managers are judged by their departments' contributions to one or more processes and if Process Owners ensure that interface problems are resolved and that process considerations dominate functional interests. There is one more distinction between a Process Owner and a product or project manager: products and projects come and go; processes are permanent." (Rummler & Brache, 1990, p.135)

<sup>56</sup>. "Process ownership must be seen as an additional or alternative dimension of the formal organizational structure that, during periods of radical process change, takes precedence over other dimensions of structure. Otherwise, process owners will not have the power or legitimacy needed to implement process designs that violate organizational charts and norms describing 'the way we do things around here.'" (Davenport 1992, p.7)

Processes can be analysed on different levels of aggregation. On the highest level in a firm are the key business processes and the main supporting processes.<sup>57</sup> It is the responsibility of the top management to make sure that the key processes are identified and communicated throughout the organization. These processes can then be broken down into subprocesses, depending on the need for analysis and improvement. The key to improvement is to make the processes visible, which can be done through many different techniques (see notes 44 and 47).

Process mapping is one of the most fundamental steps towards the improvement of processes, i.e. focusing on how the work really is done rather than on specific skill categories or functions. Examples of to what extent it is possible to shorten lead times in different processes have been provided by many companies, e.g. ABB in its T50 program, Xerox, Motorola, and the use of process mapping is "mandatory" in these companies. The following example, which is given at some length, illustrates the potential that may exist within a white collar company. Worth mentioning is that already before the process-analysis, this company was considered efficient in its industry.

A group of employees involved in a specific process receive a customer request on telephone, then they do some internal analysis, make a decision and finally return to the customer with the information requested. When analysed, it was found that the process took in average one month, while the actual working time was 46 minutes (The delays were caused by two different computer systems, documents waiting for different people to read and sign, etc.). The working group analysed the mapped process, took away steps that did not create any value and ended up with a modified process taking 4 minutes. That is, if it is found that it is of value for the customer, the company can provide the same information while the customer is on hold for 4 minutes, instead of waiting for more than a month. The improvement in speed of answering is unbelievable 240.000%, if we look into working hours.<sup>58</sup>

Product development is one area where major improvements have been made possible through process-orientation and the use of cross-functional teams. Today it might seem obvious in a large part of Western industry, but only a few years ago Japanese

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<sup>57</sup>. The process view does not only concern industrial businesses but all kinds of organizations can benefit from being analysed according to this view. For example, for a hospital a key process could be the "care-chain", focusing on the patient (customer) and following each step in the treatment from the identification of a need until the patient is home and cured.

<sup>58</sup>. For the customer, however, the only time that matters is calendar time, and in such a case the improvement would be 1.080.000%.

firms using this technique excelled in short product development times and very few changes after market introduction.<sup>59</sup> However, interestingly enough, in areas outside engineering and production, Japanese companies presently are lagging in their development. In addition, U.S. firms are ahead in using different kind of process analysis techniques in order to improve white collar productivity.<sup>60</sup>

## **6. Standardization for Creativity**

One factor often overlooked or narrowly seen is the use of standardization and systematization in order to reap the benefits of an improvement process. Standardization concerns both the content and the way this content is diffused and put into use within a company.

In Japan this thinking was applied early and it has lead to a nation-wide standardization of a set of tools and techniques. The rationale is based on the Pareto-principle<sup>61</sup>, i.e. it was found that most problems could be solved with a set of "7 QC-tools" and a general problem solving logic (PDCA)<sup>62</sup>. Later on, an additional mainly qualitative "seven management tools" were standardized, as they were seen to be the tools needed to solve most problems for managers and other white collar employees. While these standardization were made on a national level, it can also be beneficial to further standardize on the level of the individual companies. For example, Motorola standardized their way of measuring quality, in terms of the number of defects in relation to the opportunity of making an error (six sigma program), which created a common language in the company and provided the ground for a common goal structure.<sup>63</sup> In a similar way ABB's T50 program has standardized the way that leadtime reduction should be calculated.

There is a common understanding of the importance of having a standardized way of solving problems, which even can be used by the shop floor people. The need to

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<sup>59</sup>. Clark & Fujimoto (1991, p. 255) uses the concept "heavy-weight product manager" to describe a process-orientation in product development, where the heavy-weight product manager has a process owner function for the product development process.

<sup>60</sup>. Lillrank (1994).

<sup>61</sup>. The Pareto-principle, or as it is also known as the 80/20 rule, indicates for example that, most often, 80% of the total revenue is based on sales to only 20% of the total customer base, or another example, that 20% of the components cause 80% of the product quality problems, etc.

<sup>62</sup>. The PDCA-cycle (Deming or Shewart-cycle) in itself contains a standardization feature, i.e. the "A" (act) which says that after analysing a realized process improvement, and if it was found to be good, the improvement should be made into a standard operating procedure.

<sup>63</sup>. Alänge (1992)

standardize more creative processes is though less understood. One example of the latter kind of process is Xerox's "Quality Improvement Process" (QIP), which provides all Xerox employees worldwide with a common understanding on how to work together in a systematic way.<sup>64</sup> One senior Xerox employee gave the following example: "We have competent people coming in from all over the world to work on improvement issues. They all have their experiences of fruitful ways of developing and improving. We used to bring such a group together for 2 days, and 1.5 days were spent on discussing how we should go about. Nowadays, everyone knows how (the QIP) and we can immediately concentrate on more creative processes than to discuss how we should get started." (free quotation)

Naturally there is a conflict between these two different goals, the first of standardizing and using the most efficient standard working procedure, the second of empowerment, making people buy in and feel ownership into the change process. Here, there is no clear cut rule on what is best and different companies follow different routes. As a rule, U.S. companies seem more eager to more strictly follow the standardizing route, while a company such as the Swedish part of ABB, focus on the work teams' and also individual company units' ownership of their own change processes, and has been more reluctant into standardizing in more detail. However, a common goal set and certain over-ruling general principles are used at ABB Sweden as well.

A further area of standardization has been the training and development of the personnel. Standardizing content (courses, tools and techniques, etc) but also the way that the content is trained. One example is the use of the cascading principle to diffuse TQM all through the organization, which for example has been used by the first European Award winner, Rank Xerox.<sup>65</sup> Cascading means that first the top manager learns, then he trains his subordinates, then they in turn continue and train the people under them, and so forth.<sup>66</sup>

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<sup>64</sup>. Palermo & Watson (1993)

<sup>65</sup>. Rank Xerox (1992)

<sup>66</sup>. The advantage is that the subordinates know what their manager thinks is important, the manager knows in detail what his subordinates have learned, and in addition, training others is the best way to make sure that you have really understood yourself.

## **Concluding Remarks**

Regardless of the terms used (total quality management or something else), the new emerging paradigm for industrial practices has a number of distinctive characteristics. In this paper these are presented under the six major categories; customer focus, leadership, total approach, continuous learning, process orientation and standardization for creativity.

The implications on a practical level were drastically expressed by the CEO of Zytec Corporation, a 1991 winner of the Baldrige Award:

"If you're not on the quality journey now, you better get on it. Only those companies that are on this journey will be around in the future."

(Brown 1994, p.xi)

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