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Understanding Management Concepts through Development of their Tool Box: The case of total quality management

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Abstract

This paper offers an alternative approach to defining the management concept. The proposed methodology relies on the identification of tools supporting the given concept. The author assumed that the identification of tools' evolution gives clearer insights into circumstances of constant development of—by its nature—a more general concept. The tools' classification resembles a phylogenetic tree and is based on the idea of an affinity diagram. To provide the proof for such reasoning, the total quality management (TQM) concept was chosen. This proposition can be useful for better understanding origins and the development of management thought. It clarifies relationships among methods constituting frameworks of quality management.

Key words: management concept, evolution, tools, total quality management

1 Introduction

In order to define a concept, general terms are used. Such definitions are especially difficult in the case of philosophies that have evolved over a long period. The nature of such philosophies changes as they develop in different surroundings. Therefore, another approach to defining a concept based on the details of the concept usually expressed by accompanying methods (tools) can be useful. A method is a systematic way of accomplishing something. Depending on how detailed the description is, one can treat it as rules, guidelines, methodology, techniques, procedures, and algorithms. The author uses the word *tool* as an equivalent of these terms.

Tools are easy to describe, but this does not mean that they are easy to grasp in a manner that allows for a better understanding of the concept. The primary research objective of the paper is to describe the idea of a management concept by identifying its tools. The secondary objective is to test whether a classification based on phylogeny is suitable for the main purpose.

The applied methodology refers to evolutionism, which as a theory assumes the constant and continuous development of an idea, concept, paradigm, etc., rooted in the past and adapted to the present conditions of its application (Futuyma, 2005). Evolutionism is based on the Darwinian theory of biological evolution.

Such an approach offers a different point of view and permits the identification of the main characteristics of the concept through the reconstruction of its tools' evolution. This article made such an attempt using the total quality management (TQM) concept, which is a "management approach to long-term success through customer satisfaction. TQM is based on all members of an organisation participating in improving processes, products, services and the culture in which they work" (ASQ, n.d.). In this paper, the development of the TQM concept is described and contemporary sets of TQM tools are presented. An evolutionary perspective is applied to S. Shiba's (1995) thoughts on TQM development. The paper then proposes the classification of TQM tools from an evolutionary perspective. Finally, conclusions are given based on the presented analysis.

2 Development of the TQM Concept

There is no single or commonly accepted definition of the TQM concept. As a result, TQM has become a fashionable expression associated with multiple meanings (Dahlgaard, 1999). Interestingly, P. Crosby, W. E. Deming, and J. M. Juran—considered to be the contemporary TQM gurus—did not actually use the term (Martínez-Lorente, Dewhurst, & Dale, 1998). Martínez-Lorente et al. (1998) embarked on a search for the roots of TQM as a term and its changing interpretations. Based on their analysis of publications from 1986–1997 registered in the ABI-INFORM database, they found that the TQM concept did not appear until the second half of the 1980s, where it replaced total quality (TQ) and quality management (QM). Dahlgaard (1999) reached a similar conclusion. This analysis of the historical development of the TQM concept sheds some light on the differences in nomenclature and, at the same time, helps determine the first management system to possess the features with which TQM is currently endowed.

Initially, a statistical approach to quality control, called statistical quality control (SQC), was used. Its characteristic features became the focus of training courses in Japan, where the transformation of a narrowly conceived control tool into a broader concept occurred. The English phrase *quality control* was translated into Japanese as *hinshitsu kanri*. However, the word *kanri* has a different meaning in Japan than in the West. Xu (1994) explained that, in Japan, there is no separation of control and management (Witcher, 1995). In fact, *kanri* means control, administration, and management. It was the first harbinger of a change in terms from *control* to *management*.

Another premise was the observation that non-production workers have also had an impact on the creation of quality.

In order to give it its proper expression and distinguish from the meaning of quality control as it has been used to date, the word *total* was added in order to underscore the global approach to quality within an organization. In this way, total quality control (TQC) was born. A. V. Feigenbaum was the first author to use and disseminate the term¹ (Witcher, 1995). According to his definition, TQC is an effective system for integrating the development of quality among various parts of a company, quality retention and quality improvement for economical production, and service that considers its goal to be complete satisfaction of customers (Akao, 1991).

TQC was officially introduced in Japan in 1960 during a series of seminars conducted by Feigenbaum. But Japanese managers perceived TQM differently. Apart from the companywide approach to quality control, of equal importance is the commitment² to quality as an organizational strategy (Akao, 1991). In response to the erroneous identification of the TQC concept with its Japanese version, the term *companywide quality control* (CWQC) was used as an alternative (Akao, 1991). In this way, the importance of the word *total* as an approach to management that involved the entire organization was underscored while simultaneously emphasizing its difference from Feigenbaum's approach. Therefore, interpreting TQC at the time as synonymous with CWQC is misguided. However, these concepts are considered similar or the contents of the PN-ISO 8402:1996 industrial standard³ (item 3.7, comment 5).

The transition from statistical quality control to companywide or total quality control occurred in Japan in 1961–1965 in companies whose achievements in the area of quality earned them the Deming Prize in the first half of the 1960s, which contributed to the dissemination of best practices, including those regarding planning. These companies were Nissan Automotive (1960), Teijin and Nippon Denso (1961), Sumitomo-Denko (1962), Nippon-Kayaku (1963), Komatsu (1964), and Toyota Jiko (1965) (Akao, 1991).

The greatest propagator of CWQC was K. Ishikawa, who showed the differences between Feigenbaum's TQC and Japanese TQC (Ishikawa, 1985, 1986). Ishikawa defined quality control (quality management) as the development, design, production, and provision of a product and service qualities that are the most economical, are useful, and always satisfy the customer (Ishikawa, 1986). It should

¹ The first edition of A. V. Feigenbaum's book was titled *Quality Control* (1951), and the second one *Total Quality Control* (1961). Witcher (1995) argued that the change in the perception of quality control as management was presented by Feigenbaum in his article titled "Total Quality Control" published in *Harvard Business Review* in 1956.

² Hence, TQM is also synonymous with total quality commitment.

³ In addition, total quality is mentioned in it as well.

be remembered that, when describing the PDCA cycle, Ishikawa used the term *control*, not *management*.

As a result, this very popular name conceals a number of interpretations and also different perceptions of the scope of the term. This stems from the fact that TQM combines three distinct strands: productivity (process analysis, operational management, statistical process control), the human factor (trained human resources), and strategic management (Costin, 1994; Dahlgaard, 1999). Depending on the researchers' approach, one of these strands tends to predominate, which results in different interpretations of the term.

Thus, taking into account the historical development of the concept, it can be assumed that the name TQM was applied to the first completely formed management system that came into existence in the late 1970s in Japan, in which the relevant methods were used. Such an approach partly converges with D. Garvin's model proposed in 1988, which is commonly accepted among theoreticians in the field (Dahlgaard, 1999). Garvin (1988) isolated four stages of evolution in the history of quality: inspection, statistical quality control, ensuring quality, and strategic quality management (Dahlgaard, 1999). Dahlgaard (1999) asserted that the current perception of TQM is too narrow because it does not include such issues as organizational learning, the sociological approach, or interpersonal relationships. Indeed, given the present standard of knowledge, the scope of TQM has significantly expanded, which is evident, for example, in Dahlgaard's works, with the beginning of the initial TQM concept dating back to the late 1980s—mainly in the United States. The term TQM was accepted by JUSE in the 90s. (JUSE, 2010).

3 Contemporary Sets of TQM Tools

The list of methods to support the implementation of quality management principles is continuously expanding. An example of such a trend is the compendium of management methods and techniques compiled by Kanji and Asher (1998). In addition, Zhang (2000), based on literature studies, identified 83 methods, although neither theoreticians nor practitioners in the field can agree on the number of existing TQM methods or their actual impact on performance. Due to their characteristics, a number of these belong to the group of TQM methods, although they were originally developed for the implementation of other objectives.

Their sheer number requires at least an attempt at classification. The proposed groups of methods—or families, as understood in biological classifications—usually correspond to the basic activities undertaken as part of TQM. The literature

includes no agreement on the nomenclature; however, three types of such methods can be indicated. For example, Juran (1986) proposed a “trilogy” comprising quality planning, quality control, and quality improvement. A similar division was proposed by Duffin (1995), who also came up with three main groups: control, continuous improvement, and prevention. According to Duffin, the latter comprises quality function deployment (QFD) and policies, which may be interpreted as a reference to planning.

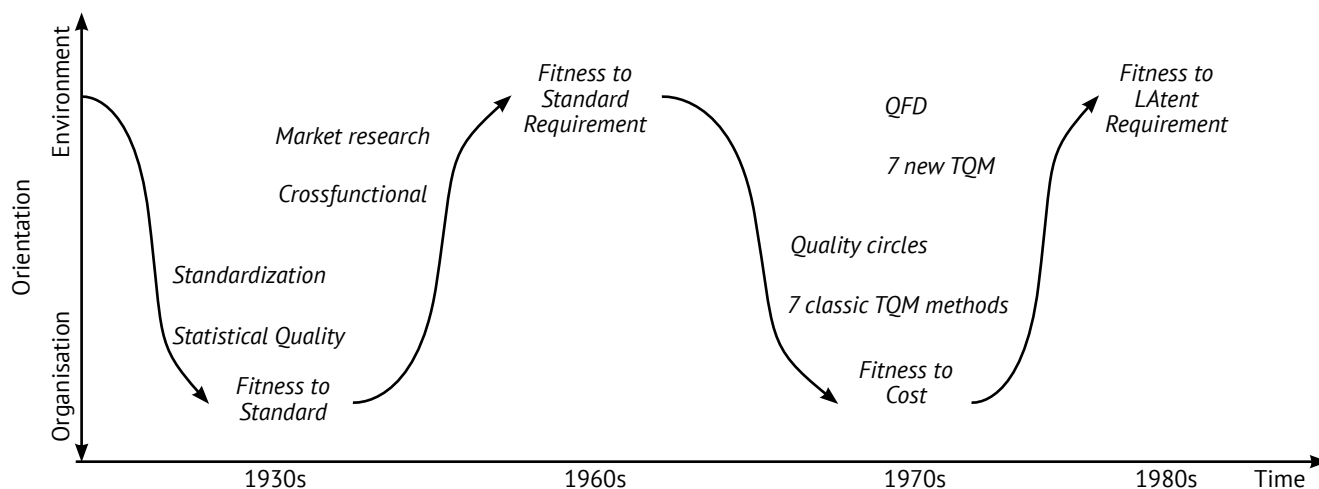
Consequently, those wishing to find out about the inventory of quality management tools are faced with a variety of classification proposals that are, at times, different from one another.

4 Evolution of Approaches and Management Methods According to Shoji Shiba

Shiba (1995) and Shiba and Walden (2001) enunciated the application of management methods in response to social and economic changes that have occurred in the business environment in the recent decades. Fitness to standard⁴ constituted the first phase of quality management evolution, which came in response to an increased demand for mass-produced goods and contributed to the development of statistical quality control methods developed in the 1930s. The inspection function of management and standardization of tasks were accorded paramount importance as it was thought that only in this way could a product's conformance with the designer's criteria be ensured. This tendency, as indicated by Shiba, represents the development or improvement of methods for measuring and standardizing work (*Time and Motion Study*) in industrially developed countries, such as the United States and the United Kingdom. This is further supported by the sample observations method proposed by L. H. C. Tippett and explained in *Random Sampling Numbers* in 1927 and the methods–time measurement (MTM) method developed in the 1940s by H. B. Maynard, J. L. Schwab, and G. J. Stegemerten.

However, the separation of control from production did not solve the issue of defective products. Furthermore, in mass production, customers' needs were not fully addressed. Consequently, in the 1960s Japan saw the development of methods that would ensure fitness to use and fitness to market requirements (i.e., customers' needs). The ways of analysing them were developed (market research), and within organisations, the need to cooperate among various types of staff who fulfil different functions in the generally

⁴ In the French edition of Shiba's book, the word *adéquation* was used.

Figure 1: Evolution of management methods according to Shiba

Source: Author's own idea (based on Shiba, 1995; Shiba & Walden, 2001).

conceived production process was underscored. This was accompanied by the drive to eliminate the variable quality of products.

The next phase reflected the focus on cost adjustment, which Shiba (1995) described as the retention of high quality and low costs. This was influenced by the perception that product price is determined by the market, not by costs and profits. In the 1970s, methods were developed to reduce production costs while maintaining or improving the quality of products. Methods such as quality circles or the seven classic QC methods (ASQ, 2011) were intended to improve the operation of the organization. Methods mentioned by Shiba (1995) could be supplemented by Toyota's development of one of the most important complete production management systems—namely, lean management—in 1973–1975. However, such solutions were copied by countries with smaller production costs. As a result, it was necessary to seek further sources of competitive advantage.

A search for new markets led to the emergence of a new approach that Shiba (1995) called the fitness to latent requirement. In the mid-1980s, methods were developed to enable the identification of these needs as well as the adjustment of organizational activity to develop new products. According to Shiba, they comprise the QFD method and the seven new TQM methods (ASQ, 2011). The author does not mention other approaches created at the same time to integrate company operation with a view of addressing customers' needs. H. Takeuchi and I. Nonaka (1986) called these ways *rugby*, which became the basis for the development in Japan of concurrent engineering⁵

⁵ The emergence of the concept of *concurrent engineering* in the West has been related to the activities of the Concurrent Engineering Research Centre, West Virginia, since 1990.

Shiba (1995) applied two dimensions to the previously identified phases: production focus (organization) and market focus (customer). The transitions among them demonstrate a logical consequence of an evolution in the approach to quality or, in other words, to customer satisfaction (Shiba & Walden, 2001). The diagram proposed by Shiba can be supplemented with a timeline, as shown in Figure 1.

5 Classification of TQM Methods: An evolutionary perspective)

The identified classifications of TQM tools have been generated from the contemporary perspective and are the result of the deductive process. In this part, the proposed division of TQM methods is developed along inductive lines. The number of methods considered is limited to those that were used as part of TQM in 1931–1978. They constitute the primary set of TQM methods. The justification for this timeline is the conclusion that TQM reached maturity as a management concept well grounded in practice and theory in the 1980s (ASQ, 2013). Since the 1990s, other management approaches, such as lean manufacturing and six sigma, have started to gain in popularity. The tools were chosen based on the results of the literature review that included journals and books published in the last 30 years and discussing TQM as a main topic and unified management approach towards quality. The detailed presentations of the chosen TQM tools were described by Ćwiklicki and Obora (2011). The authors divided them into two main time periods: 1920–1948 and 1948–1978.

I prepared the classification of TQM, based on the idea of an affinity diagram. It helps organize diverse qualitative data

into groups. Similarities between individual methods were detected along several parameters—namely, structure, target use, profile, inspiration, and context of its creation. Whenever it was impossible to find a correspondence between a given method and any other at a given level, similarities were sought at the level of previously combined methods.

The results are presented in the form of a tree (see Figure 2). The tree consists of three main families of methods. The first one comprises methods termed statistical quality control and approximately corresponds to the division into seven classic QC methods that make use of numerical data. The second family involves methods whose main focus is to analyse the reasons for the occurrence of problems and planning and includes several of the seven new QC methods. The third family consists of methods whose main focus is to improve and—more broadly—implement total, comprehensive management involving the entire organization, with its best example being the *hoshin kanri* method (King, 1989).

The families of methods described above can be called:

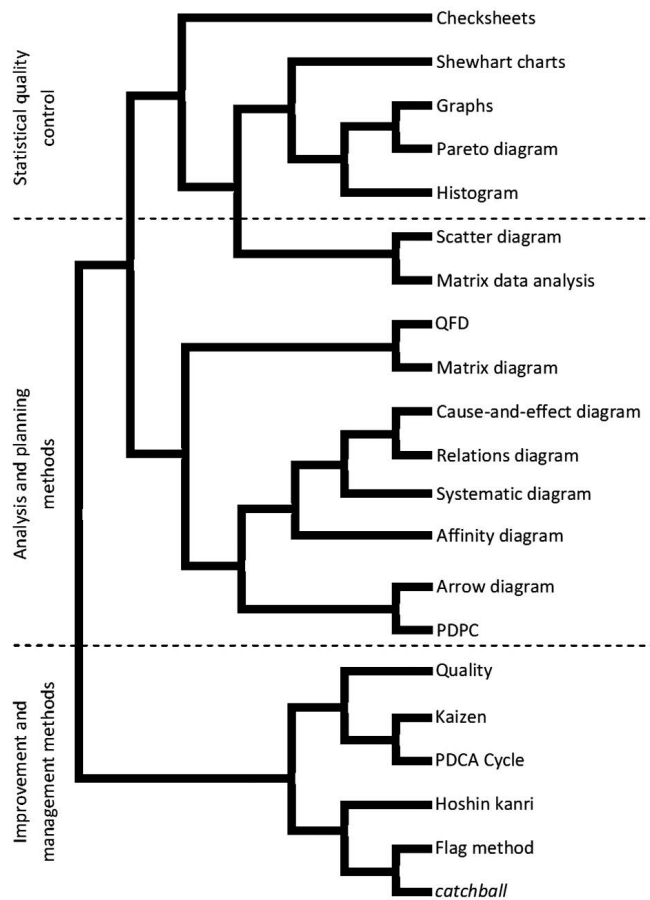
- 1.) Statistical control methods;
- 2.) Analysis and planning methods; and
- 3.) Improvement and management methods.

These three families of methods correspond with the evolution of the TQM concept. First, they applied to aspects of quality control supported by statistical methods. Next, the reasons for low quality were sought using analytical methods, such as the cause-and-effect chart or the matrix chart. The need to manage quality across the entire organization led to the development of appropriate methods, the key one being *hoshin kanri*. From the perspective of the latter phase of the formulation of TQM, this family can be termed TQM methods proper.

The classification presented above offers another attempt to precisely match methods to categories. A much clearer and more comprehensible division that illustrates the process of emergence of TQM is the division that takes into account the passage of time. Additional information on the place of origin or a significant modification of the method (marked with ‘*’ in Figure 3) indicates the original influences within the three categories identified. A modified version of Figure 2 is shown in Figure 3; wherever possible, the first application of a given method is given in brackets.

For the most part, control methods originated in the West. Improvement methods—specifically, analysis methods—can be found in both the West and Japan. However, planning methods, or more broadly, management methods implemented or applied to quality management have been developed by Japanese practitioners and researchers, who frequently drew their inspiration from Western management concepts.

Figure 2: Families of TQM methods

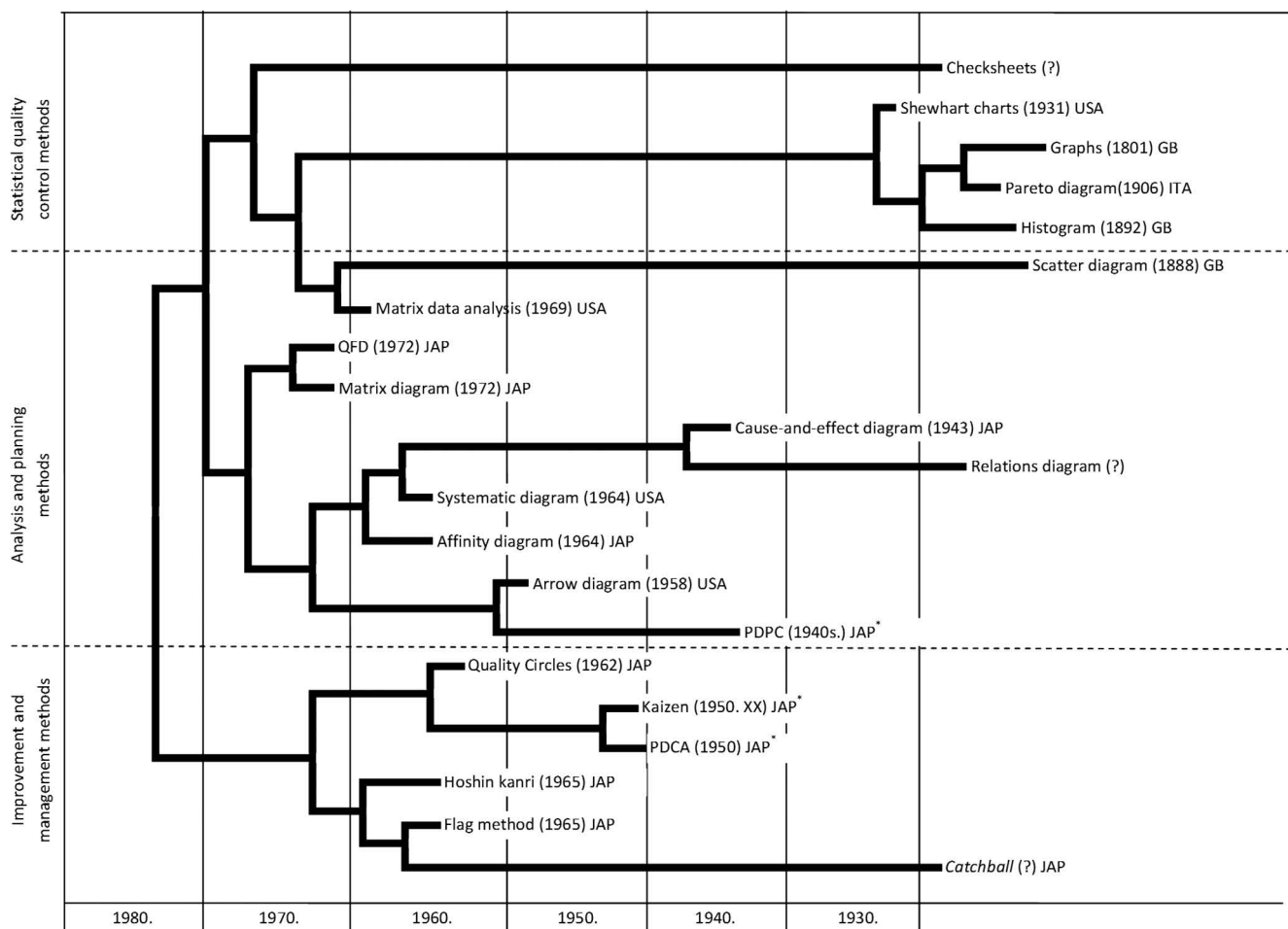


Source: Author’s own analysis.

6 Conclusions

The presented analysis gives a solid basis for identifying the main changes within the TQM concept. The tools clearly indicate parts of the concept that could be separately studied. All of them create a unified view and allow for understanding how the given concept evolved. Thanks to identification of its small pieces (i.e., tools), it is possible to present the major aspects that shaped and created a contemporary shape of the management concept. Thus, the primary research objective—namely, to describe the idea of a management concept by identifying its tools—were achieved. The second research objective referring to testing classification based on phylogeny as suitable for the previous objective was also achieved. Using an affinity diagram proved to be not only useful, but also efficient. The obtained result indicates that it can also be applied to identifying other management concept, especially those consisting of many supporting tools.

Figure 3: Families of TQM methods viewed from the perspective of time and place of origin



Source: Author's own analysis.

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Razumevanje konceptov menedžmenta s pomočjo razvoja njihove „orodjarne“: primer menedžmenta celovite kakovosti

Izvleček

V članku je naveden drugačen pristop k opredelitvi koncepta menedžmenta. Predlagana metodologija temelji na razpoznavi orodij, ki podpirajo navedeni koncept. Avtor je domneval, da daje poznavanje razvoja orodij jasnejše vpogled v okoliščine stalnega razvoja – po naravi bolj splošnega – koncepta. Razvrščanje orodij spominja na filogenetsko drevo in temelji na ideji o diagramu podobnosti. Za zagotovitev dokaza za takšno utemeljevanje je bil izbran koncept menedžmenta celovite kakovosti. Ta predpostavka je lahko uporabna za boljše razumevanje začetkov in razvoja menedžmentske misli. Pojasnjuje odnose med metodami, ki tvorijo ogrodja menedžmenta kakovosti.

Ključne besede: koncept menedžmenta, razvoj, orodja, menedžment celovite kakovosti