

Quality Management in the Era of Cyberconomy

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■ ABSTRACT

At the beginning of the twenty-first century, the high utilization of technology and the rapid development of the Internet mean that the market environment and business management have been significantly changed. The new environment is characterized by the pursuit of speed, innovation, quality, and value. Businesses are increasingly making use of information technology (IT), enterprise resource planning (ERP), and supply chain management (SCM) to break through traditional business management skills and style. In this electronic age (e-age), the exaggerated documentation of ISO 9000 and the refined but slow improvements of total quality management (TQM) might not be capable of keeping pace with rapid developments. It is therefore necessary to develop an innovative structure that is suitable for e-age quality management (e-QM). Such a structure must include functions that can capture, in advance, the requirements of customers on a timely basis. Along with this, a high-speed quality system of research and development (R&D), and a quality-management system of preventative management are also required. The development of a specific worldwide industrial standard is a natural accompaniment of such a new environment. Improvement can be pursued with any suitable form of quality improvement method that provides flexibility and mobility, together with the utilization of professionalism and experience. The advent of the e-age means that the development of a new system of e-QM for business competition is unavoidable. However, until such a structure becomes available, business must depend on the full implementation of ISO 9000 and TQM as the basis of e-QM.

Key words: Era of cybereconomy, e-QM, quality management

■ 1. INTRODUCTION

As emphasized by Feigenbaum (1999), it is necessary to develop a new quality system to support and implement quality development in the twenty-first century. During the last 15 years of the twentieth century, two major quality-management systems—ISO 9000 and TQM—were developed, and these have been widely adopted by industries and non-profit organizations. However, the requirements of ISO are complex, with exaggerated documentation and audits being required. TQM systems focus on continuous improvement, total employee participation, and teamwork, and the implementation of TQM requires considerable time and resources in supporting and raising quality performance in all its aspects.

The utilization of high-tech functions (Naisbitt et al., 1999) and the rapid development and application of the Internet (Gates, 1999; Martin, 1999) have changed purchasing behaviour substantially. Customers no longer focus on an evaluation of price, functions, and quality. Rather, they are integrating quality with value (Feigenbaum, 1999). Business-management styles have also changed substantially. In electronic business today, businesses must pursue innovation, speed, and quality if they are to satisfy the overall needs of customers and create new value.

With the popularity of the Internet and the vigorous development of e-commerce in this era of cybereconomy (or e-age) (Martin, 1999), enterprises are becoming more attentive to the huge potential promised by the innovations of the knowledge-based economy (Thurow, 1999). Against this background, ISO 9000 and TQM seem to be insufficient, and a new quality-management system for the e-age (e-QM) is required. Before exploring what such a system might involve, it is appropriate to analyse the special features of the business environment in the current e-age.

■ 2. THE FEATURES OF THE ERA OF CYBERECONOMY

The world economy has been changed substantially with the proliferation of powerful communication technology and the apparently unlimited expansion of the Internet. Examples include the Amazon e-bookstore, which has grown rapidly through e-commerce; and Dell's internet marketing strategies which have created huge sales volumes of computers as compared with Compaq, their main competitor in the US market.

Some of the more significant features of the modern cybereconomy are discussed below.

Dramatic changes in marketing

The rapid growth in the use of the Internet has caused a dramatic expansion in Internet marketing. According to a report issued by Focus on Internet News & Data (FIND) in Taiwan, there were approximately 655 million Internet users in 2002 globally; compared with 2001 there were about 30% growth. Global e-commerce in 2002 had a turnover of more than US\$2.3 trillion; it has about 50% growth compared with 2001 (Institute for Information Industry, Dec. 2002). By 2006, it is estimated that at least 18% of global business activities will be using e-commerce transaction (Institute for Information Industry, Dec. 2002).

E-commerce can be categorized into three types; business-to-business (B2B), business-to-customer (B2C), and customer-to-customer (C2C). Of these, B2B provides the biggest business opportunities. In recent years many firms have also developed a new type of e-commerce, business-to-government (B2G) which is focused on procurement with the public sector.

E-commerce has also changed business sales channels, with cyber advertisements changing traditional commercial patterns. In addition, recruitment websites are replacing traditional headhunting and employment services.

Changing concepts of time and space

E-commerce effectively removes limitations on the time and place on consumers' purchases (Aschner, 1999). For example, the sales channel on the website of the Amazon e-bookstore allows customers from all over the world to purchase books published in the USA at any time of the day or night, and within a very short time after publication. (Saunders, 1999)

Electronic mail (e-mail) allows people to contact their friends, relatives, and business associates no matter where they are. Teleconference systems can allow people located in different places in the world to hold meetings at a time of their choosing. Such intensive developments have forced business to adjust to new concepts of time and space.

Changes in consumers' purchasing behaviour

As concepts of time and space have changed, the expectations and desires of consumers have intensified. Consumers now expect to receive delivery of their orders faster than ever. In addition to the adoption of Internet marketing, suppliers are therefore being forced to pursue speed and performance in the production, management, and delivery of goods. As Wen (2000), the Vice Chairman of the Board of Inventec Corp., has observed: "today's competition means speed of reaching your end customers".

Apart from speed, consumers are also seeking novelty and value in their purchases. Innovative R&D and the offer of distinctive products and thoughtful service are becoming part of the required core competencies of companies today (Wen, 2000).

Re-engineering of management practices

The Internet, together with intranets and extranets, form a digital network that is an enterprise in itself. Such a network offers speedy communication channels among enterprises, customers, suppliers, and distributors (Martin, 1999). This allows

management information within the various enterprises to be operated adequately, promptly, transparently, and consistently. In particular, order-processing status and related information between customers and suppliers can be obtained promptly and accurately.

Many enterprises now implement enterprise resources planning (ERP) and supply chain management (SCM). In using these systems, enterprises exert better control in meeting customer requirements. Such systems provide better understanding of the resources operating status and other activities within the companies on a timely basis.

In addition to the utilization of these networks and related systems, it is essential that companies proceed with the necessary process of organizational re-engineering, because such practices can have significant effects on the prevailing company culture.

The knowledge-based economy

Knowledge can create wealth. Intellectual property rights (including copyright, patents, and trademarks) can be a source of significant company value and wealth. In this era of the knowledge-based economy (Thurow, 1999), enterprises must recognize that knowledge is an asset (Boyett & Boyett, 2001).

The enterprise itself should become a learning organization. It should develop intellectual property and accumulate expertise and technology with a view to increasing the productivity of knowledge-based workers. Knowledge management should become the operation focus of an enterprise because intelligence, knowledge, expertise, and innovation all create great value.

■ 3. QUALITY MANAGEMENT IN THE E-AGE

The era of the cybereconomy is producing vast changes in business environments. Such changes have rendered obsolete some of the functions of ISO9000 and TQM that have been implemented over the past fifteen years. It is now time to adjust quality-management systems to produce a quality-management structure that can satisfy the demands of the modern environment. This can be referred to as e-era quality management (e-QM). The components of such an e-QM structure are discussed below.

A research and analysis function to capture customers' requirements in advance

To satisfy customers, firms must understand their customers' requirements in advance, and must then be able to provide those requirements. In e-QM, all of this must be done with even greater accuracy and speed. It is therefore the firms should have a powerful function to research and analyse the customers' requirement in advance. Again, as Wen (2000) has observed: "today's competition means the speed of reaching your end customers".

In the 1940s, quality control focused on products. During the 1960s, quality assurance focused not only on products, but also on processes. In the 1980s, TQM had covered all levels of business operations (Mangelsdorf, 1999). In the twenty-first century, the focus of e-QM has expanded to include the whole marketplace (see Figure 1)

In the e-age, speed is critical. Whoever can provide the required products or services first will surely have a significant competitive advantage (Yang, 2000). Increasingly, companies are implementing customer relationship management (CRM) systems to predict their customers' purchasing behaviour and needs.

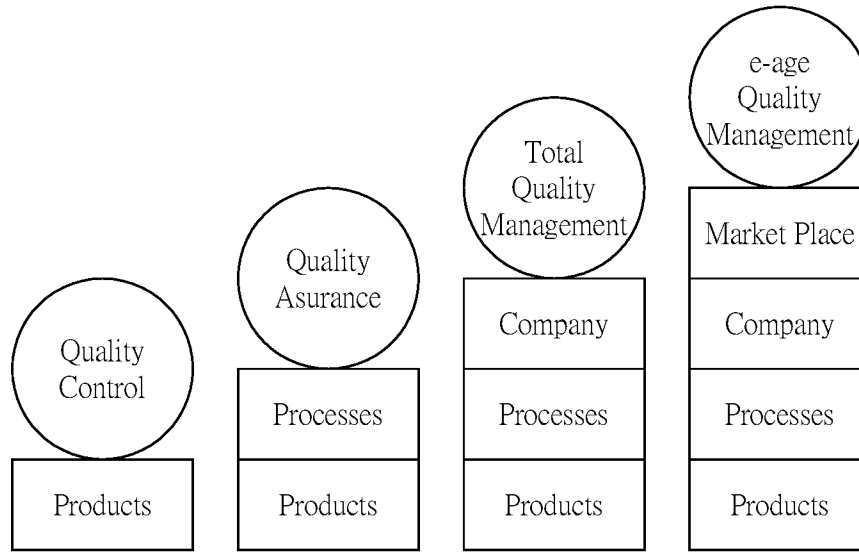


Figure 1: Evaluation of the quality concept from quality control to e-QM

A strengthened R&D quality system

It is not sufficient for a company to understand their customers’ requirements accurately and promptly. It is also necessary that they develop and provide products of a consistently high quality. Effective R&D is therefore vitally important. In the e-age, the life cycles of products are decreasing rapidly, and it is therefore necessary during the R&D process to use a practical modular approach to the design process, and to utilize the management tools of concurrent engineering effectively (Krajewski & Ritzman, 2002). In addition, the implementation of knowledge management (KM) enhances R&D significantly.

In addition, tools such as quality function deployment (QFD) and failure mode effect analysis (FMEA), which are widely implemented in industry, should increase their functions, and there are also many professional tools for designing software. Related laboratory equipment should be well prepared.

Global professional standardization trends

The ready acceptance of the ISO 9000 system in many countries indicates a tendency to embrace one universal quality standard. However, it is also necessary to have a specialty standard for specific industries—for example, QS 9000 for the automotive industry, TL 9000 for the information technology and telecommunication industries, and AS 9000 for the aviation and aerospace industries (Mangelsdorf, 1999). Thus, in this new e-QM system, the trends of globalisation and specialization cannot be ignored.

In addition, global competition has seen many dramatic changes, with companies now emphasizing cooperation in addition to competition. In any new quality standard for the e-age, these tendencies towards worldwide alliances and partnerships must be taken into account. When designing a product, it is necessary to consider the international trends of compatibility, as well as standardization.

Finally, the increasing consciousness of environmental concerns requires that the design and implementation of so-called “green products” should also be recognized as a global tendency.

Speed of quality improvement

Quality control circle (QCC) activities, which have been implemented about 40 years, also require change in the new e-age. A period of 4–6 months is needed for QCC to implement the improvement action plans for some critical problems might be too sluggish for today environment. Improvement activities can no longer be constrained by the methods of QCC. Rather, the methods of quality improvement team (QIT) or other timely improvement teams can be utilized flexibly if problems are to be solved effectively within the shortest possible time. The flourishing GE-6 σ practice is a powerful tool for achieving these goals (Breyfogle et al., 2001; Lucas, 2002; Treichler et al, 2002)

Due to the importance of swift improvement, it is necessary to have sufficient experts with sound experience available. Enterprises should enhance professional training and technical expertise among its employees. In addition, by establishing database and expertise systems of improvement models, quality improvement could be conducted rapidly and effectively.

As for machinery and equipment, it is necessary to implement total preventive maintenance (TPM), utilizing database and expertise systems for maintenance and repairs, or even use tele-conferencing to have the original supplier experts offering suggestions for maintenance.

Preventive quality management

The best method for improvement is to avoid quality problems before they occur. Established quality-management systems should therefore have an early warning system, as well as a prevention-management function. Both the hardware equipment and the software application system should be foolproof. It is necessary to implement prevention management comprehensively.

Production processes are expected to achieve 6 σ capability as the target for eliminating defects. It is also recommended that the concepts of 6 σ be implemented for all operation processes to control mistakes effectively.

The total implementation of empowerment

In addition to quality, customers seek value in products and services. Product innovation and added functions can add value. However, the provision of distinctive, honest service allows customers to perceive the real value. Because such service is provided directly to the customers by frontline staff, they must have the competence and empowerment to provide the prompt service that customer' desires, and to satisfy their various requirements.

The full implementation of decentralization and delegation to all staff is necessary, along with adequate technical training to those on the front line, if they are to be well prepared to serve customers. As part of this process of empowerment, all employees should understand the concept of total customer service, with everyone in the company being a service provider and everyone being responsible for serving customers.

The above factors constitute the main structure of the e-QM framework. However, it is necessary to work from a fundamental basis of quality. If any enterprise wants to implement the above factors of e-QM effectively, it must first implement quality management within a well-established culture. The fundamental elements of such a culture are: (i) the comprehensive implementation of ISO and TQM; (ii) the establishment of culture of pursuing quality; (iii) a policy of zero defects; (iv) doing the right thing right the first time; and (v) making the customer the first priority. The whole framework of the e-QM system is shown in Figure 2.

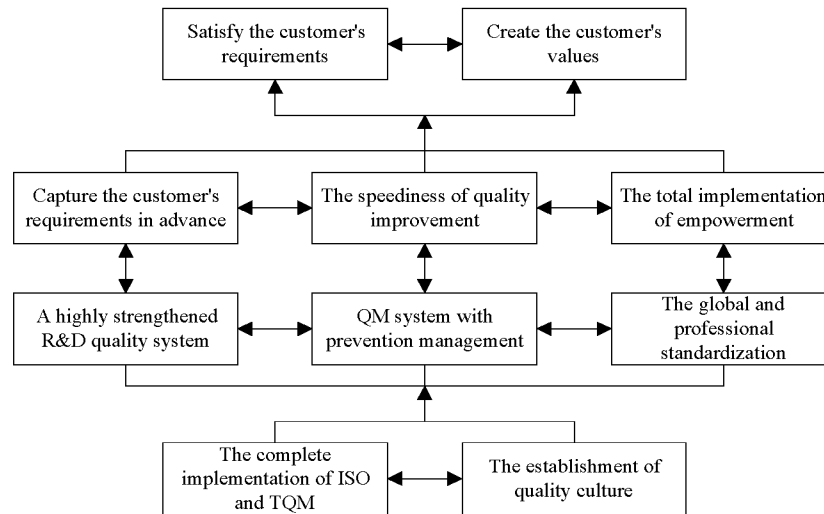


Figure 2: The whole framework of the e-QM system

■ 4. CONCLUSION

All enterprises are affected by the profound changes of the e-age, the existence of global competition, rapid market growth, dramatically short product life cycles, and the need for prompt delivery. Under such circumstance, how to use information and Internet technology, how to innovate the product and service, and how to pursue customer satisfaction and value are the competitive issues that enterprises have to face.

In this environment, the current ISO 9000 system and TQM might not be able to provide the necessary elements of quality management. It is therefore essential to expand the concepts and implementation methods of ISO and TQM, and to develop an e-QM quality management system that is applicable to the twenty-first century. As discussed above, if a firm can utilize such systems as SCM, ERP, CRM, and KM integrally based on a well-established IT infrastructure, and if it can implement the GE-60 program thoroughly and effectively, it will be able to perform e-QM successfully.

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