

## Abstract

Quality has become an increasingly important means of competition in the healthcare industry. A marketing strategy has to be based on management commitment to continuous quality improvement (CQI), and this has to be applied hospital-wide and systematically. Our earlier paper, "Total Quality Management in Practice: A Singapore Healthcare Study" have indicated that Singapore hospitals have reached a certain state of development in their total quality management (TQM) practices. However, these practices have failed to meet customers' expectations. Quality Function Deployment (QFD) which is a systematic technique for designing services or products that are based on customers' expectations has been used successfully in almost all industries. This paper discusses why QFD is chosen as the methodology for the development of a total quality healthcare model. Through a case study of a hospital, this paper explores the feasibility of using QFD in healthcare. Based on the results, a total quality model was developed to guide healthcare managers in their CQI/total quality journey.

### Keywords:

Continuous Quality Improvement, Healthcare, Quality Function Deployment, Total Quality, Total Quality Management

## Introduction

The rapid growth and the dramatic changes in the hospital industry are challenging healthcare managers to find alternative ways of remaining viable. CQI is recognised as the winning strategy in today's rapidly changing and competitive healthcare environment. In our paper, "Total Quality Management in Practice: A Singapore Healthcare Study", the authors have recommended that hospitals should evaluate their existing TQM processes and activities and the result should be used to form the basis for the policy-making process. However, a hospital would need to identify and articulate the expectations and perceptions of their customers before they could evaluate the effectiveness of their TQM processes and activities. The problem is that learning how to elicit customers' expectations is not an easy task for an industry that has always assumed it knows what the customer needs. While it is clear to all healthcare managers that the financial incentives have changed and the "golden days" of medicine are over, answers about how to respond to customers' expectations are few and far between. Some researchers have argued that the application of TQM may offer a partial solution (Geber, 1992; Anderson, 1992; Fried, 1992; Lawrence and Early, 1992 and Bergman, 1994). This is because TQM is a process which embraces the conscious striving for zero defects in all aspects of an organisation's activities or management with workforce co-operating in the processes, developing, producing and marketing quality goods and services which satisfy customers' needs and expectations first time and every subsequent time (Haigh and Morris, 1993). TQM is also a system or process to improve both efficiency and quality through continuous improvement of the delivery of patient care and of the

organisational processes that support that care (Bluth et al, 1992; James, 1993; Kaluzny and McLaughlin, 1992) where quality is defined broadly to include not only clinical dimensions but also financial, administrative and patient satisfaction measures (Milakovich, 1991). TQM promises to increase customer satisfaction and improve healthcare organisations' competitiveness as well as operational and financial performance (McCarthy, 1991). Hence, it is the authors' belief that TQM offers a methodology for organisational renewal and CQI. However, effective TQM practices are primarily found in larger and/or multinational organisations (Barrier, 1992). Little has been written on how TQM can be implemented effectively in the healthcare industry in Singapore and South East Asia. This is a major deficiency, especially because this sector represents S\$1.3 billion in GDP in Singapore. Given the lack of systematic research in this area and in attempting to account for the inevitable complexity and diversity of quality issues in healthcare, this paper unravels the feasibility of using an exceptional TQM tool, QFD in the development of a total quality model to guide healthcare managers as they decide, prepare, start and expand phases of their CQI/total quality journey.

## Background

The TQM literature is inundated with articles extolling the virtues of TQM. Despite the attention given to TQM in the real-world organisations in the past 10 years, relatively little research has addressed the topic on the specifics of applying the TQM theory and concepts to healthcare. Anecdotal evidence had suggested that the healthcare industry is not uniquely different from any other organisation or industry. However, on closer examination, the authors are of the opinion that hospitals are uniquely different on five major counts. These are: its closer linkage to politics, its complex organisational structure, its inherent characteristics, and its objective is continually shifting because its environment is under siege from concurrent government changes. Just like the carpenter and the joiner who use the same tools in different ways, hospitals will have to implement and use the tools of TQM in their own unique ways.

In our paper, 'TQM in Practice: A Singapore Healthcare Study', the empirical results indicated that TQM practices in Singapore hospitals would reach a certain state of development. However, an empirical study conducted by the authors on patients' expectations and perceptions of Singapore hospital service quality revealed that 40% of the respondents (patients) have rated Singapore hospital service quality poor/very good. This is also true in the U.S. where in 1993, although more than 40% of the U.S. Joint Commission on Accreditation of Healthcare Organisation hospitals have adopted some aspect of a quality improvement program (Reeves and Bednar, 1993; Chaufournier and St Andre, 1993), critics contend that the quality experience of most of these hospitals have been less than satisfactory (Nance, 1995). Why is this so? The reasons behind this include failure of healthcare providers in understanding the voice of the customer, discrepancies between expectations of providers and customers and the simple fact that TQM practices may not have been correctly implemented.

A review of the literature revealed that the TQM implementation models of the quality Gurus and other TQM researchers could be categorised as 'a step-by-step approach' or 'a cultural change route'. These models represent a plethora of prescriptions which, whilst informative per se, falls short of constituting a coherent and a comprehensive set of action. They failed to provide advice on how to design mechanisms for improving the staff-customer encounter, empowering the user or improving access which are important in a healthcare setting (Kogan et al, 1991). They have shown themselves not to be sustainable in the face of the 'shortmist' political and financial pressures prevalent in the hospital industry. Furthermore, their rigid step-by-step approaches are not sufficiently flexible to permit the integration of directives such as purchasers' specifications and clinical audit requirements. Their apparent limitations can be summarised as:

- the lack of attention directed to the 'people issues' within an organisation
- the absence of a realistic approach to organisational politics, in particular, the politics of organisational change
- the failure to address the issue of organisational culture
- weak on 'how' to operationalise, sustain and follow through their ideas in an organisational context
- failure to furnish the specific/essential details of an action plan
- failure to contextualise their ideas within a comprehensive framework
- failure to deliver a 'statement' which both underpins and elaborates the philosophy of TQM.

Against this background, the specific objective of this paper is to explore through a case study the feasibility of using the QFD tool in the development of a total quality healthcare model for CQI/TQM in healthcare.

## **TQM Tools for the Development of a Total Quality Healthcare Model**

In our paper, "Total Quality Management in Practice: A Singapore Healthcare Study", the authors have delineated the principles of TQM. A look into the implementation of the TQM principles can be confusing. However, in driving improvement at meeting customers' expectations, TQM tools can make it work. TQM tools such as flowcharts, benchmarking, Taguchi methods, QFD etc provide the strategies for successful TQM implementation by looking outside the organisation for expectations, targets and improvements; integrating many different quality improvement efforts and co-ordinating expectations and deployment. Hence, enabling organisations to understand, simplify and improve processes that exist to meet and exceed customers' expectations and provide an overall co-ordinating discipline for the quality improvement process.

## Why Use QFD in the Development of a Total Quality Model

QFD was initially developed in Japan as an effort to get engineers to consider quality early in the design process. It started in the late 1960s at Kobe Shipyard as a way to expand and implement the view of Quality as taught by Deming and others. From there it was developed much further by the Japanese automotive industry. The first reported success story was the "Toyota rust study" in which Toyota reported how in the late 1970s, they practically eliminated warranty costs due to rust (Sullivan, 1986). Yoji Akao together with the late Shigeru Mizuno and other quality experts in Japan, developed the tools and techniques of QFD and organised them into a comprehensive system to assure high levels of product quality and customer satisfaction in new products and services (Mazur, 1993). In the mid 1980s, Donald Clausing introduced QFD to Xerox Inc., USA. Since then, a large number of organisations worldwide have promoted and successfully utilised QFD.

The original Japanese name of QFD is 'hin shitsu kino ten kai'. Lockamy III and Khurana (1995) provide the following translation:

- *hin shitsu* means quality or feature or attribute
- *kino* means function or mechanisation and
- *ten kai* means deployment, diffusion, development or evolution

A number of widely reported definitions of QFD include:

- A *philosophy* that ensures high product quality at the design phase (Akao, 1990).
- A *system* for translating consumer requirements into appropriate company requirements at every stage of a product's life cycle, from research to sales to service (Slabey, 1990).
- A *set of planning and communication routines* to focus and co-ordinate the skills of an organisation, first in design, and then in manufacturing and later in the marketing of the goods that customers want to purchase (Clausing and Hauser, 1988).
- A *process* that provides structure in the development cycle to focus on customer requirements (Bossert, 1991, pp. 1).
- A *technique* that identifies the true voice of the customer and ensures that this information goes through all stages of the product life cycle (Burn, 1991, pp. 66).
- A *systematic planning process* created to help a project team bring together and manage all elements needed to define, design, and produce a product (or deliver a service) that would meet or exceed customer expectations (Daetz et al, 1995, pp. 9).

Almost all the definitions emphasise QFD's application in the product and manufacturing industries. The one exception is Mazur (1993) who defined QFD for application in the service industries. According to Mazur, QFD consists of a system and a set of procedures to aid in the planning and

development of services. It assures that customer expectations will be met or exceeded.

However, whether QFD is viewed as a process, a system, or a technique, its purpose is to ensure that customer needs are taken into account in the design and development of new products and services and that this consideration is made as early as during the design phase. Furthermore, all QFD definitions convey the power of QFD as a tool or voice of the customer that drives everything an organisation does, from the development stage through to delivering the products and services (Hunter and Landingham, 1994).

## **Why Use QFD in the Development of a Total Quality Healthcare Model**

Although the customers did not specifically call for QFD, their quest for quality care placed a heavy interest in the implementation of a TQM system. Hence, hospitals need to restructure its management quality practices towards a TQM system. QFD is not designed to replace other quality and engineering tools already in use by an organisation. Rather QFD works with other tools to meet customer expectations. Existing procedures and processes can continue to service the day to day customer expectations. Complementarily, QFD can be used to provide focus on customer expectations for products/services that are not competitive.

Generally, the four reasons for using the QFD tool in the development of a total quality model are:

- customers' requirements
- improved communications
- better integration of customer requirements into service requirements
- performance measurement

### **Customers' Requirements**

In healthcare, quality is an elusive and a multi-dimensional construct. Often mistaken for imprecise descriptions like *"goodness or luxury, or shininess or weight"* (Crosby, 1979), quality and its requirements are not easily articulated by consumers (Takeuchi and Quelch, 1983). Hence, a tool is needed to understand these diverse customer requirements. Referring to the opinion of Bergman and Klefsjo (1994), they stated *"The finding of exciting features of a service does not relate to any gaps that can be removed. On the contrary, delight is formed by human interaction and by creating acts based on knowledge and understanding the customer"*. Furthermore, QFD provision for documenting the information in a comprehensive form, the matrix, results in a much more reliable definition of customers' expectations and it also allows customers to prioritise their expectations.

## Improved Communications

An effective communication tool is essential to keep a quality improvement team focused and on track with customers' expectations. QFD which is defined by Slabey (1990) as "*a system for translating customer requirements into appropriate requirements at each stage from research and product development to engineering and manufacturing to marketing/sales and distribution*" shows that QFD takes the voice of the customer all the way through product development to the factory floor and out into the market place. Hence, QFD is therefore not a quality tool, but an important planning and communication tool for improved communications.

Furthermore, as QFD is part of TQM (GOAL/QPC, 1989), QFD actually permeates throughout and encompasses many of the other items. Hence, QFD inherently employs and orchestrates the desired attributes, processes and tools of TQM for improved decisions, good staff and good communication (Weisbrich and Eneco, 1992).

## Better Integration of Customer Requirements into Service Requirements

In service industries, of which hospitals are a part, customer satisfaction or dissatisfaction takes place during moments of truth. A moment of truth is every instance in which a customer comes in contact with an employee of a company (Evans and Lindsay, 1996). At a moment of truth, customers form perceptions about the quality of service by comparing their expectations with the actual outcomes. Given the highly personalised nature of hospital services, great attention should thus be paid to its delivery.

According to Mazur (1996), QFD focuses on delivering value by finding out both the spoken and unspoken needs. It translates customer needs into actions and designs, and communicates them throughout the organisation. Hence, QFD is the right tool to implement service planning in hospitals.

## Performance Measurement

Performance measurement is vital for an organisation that wants to succeed in the competitive market (Adam, Hershauer and Ruth, 1981). It enables hospitals to develop a systematic mean of identifying shortfalls and enhance its future performance. Although hospitals provide the same type of service, they do not provide the same *quality* of service. It is *performance* (or service quality) that differentiates one hospital from another, creates true customers who are more loyal and spread favorable "word of mouth". Thus, a performance measurement tool is necessary to guide a hospital in assessing their ability to create value for their customers. Whilst financial measures are important, they are not sufficient as they only provide a single, narrow perspective of how an organisation functions. Increasingly, more creative and better financial measures have been devised, such as the Balanced Scorecard. The Balanced Scorecard is useful in demonstrating the different targets and in monitoring an organisation's performance using four

perspectives: financial, customer, internal business processes and learning, and growth. However, to get to the stage where the managers can agree upon these targets, we need techniques such as QFD to identify the processes necessary for achieving the targets.

## Case Study on the Application of QFD in a Hospital

The hospital participating in this study is a restructured regional care acute hospital. The 1980s saw rapid expansion of departments and subspecialties when it became one of the major hospital service providers in Singapore. This hospital has a bed size of more than 1,000 serving close to a million people. Like many hospitals, this hospital has attempted to implement a TQM philosophy to keep in step with rapidly changing times in the healthcare environment. Unfortunately, like many other hospitals, this hospital has not realised many of the operational and strategic benefits of TQM.

In order to demonstrate the application of QFD in a hospital, the approach in developing a generic QFD framework needs to be established first. A brief outline of the six phases and the methodology adopted at each phase is shown in Table 1.

*Table 1: Outline of Phases and Methodology*

Phase	Methods
1. Who is the Customer?	Literature Review
2. Identify customer expectations	Patient survey conducted in the hospital
1. Ranking customer expectations	Patient survey conducted in the hospital
2. Identifying current management quality activities and processes	Survey, structured interviews and focus group meetings conducted in the hospital
3. Development of correlation matrix	Experiment by the authors
4. Identify unmet expectations	Experiment by the authors

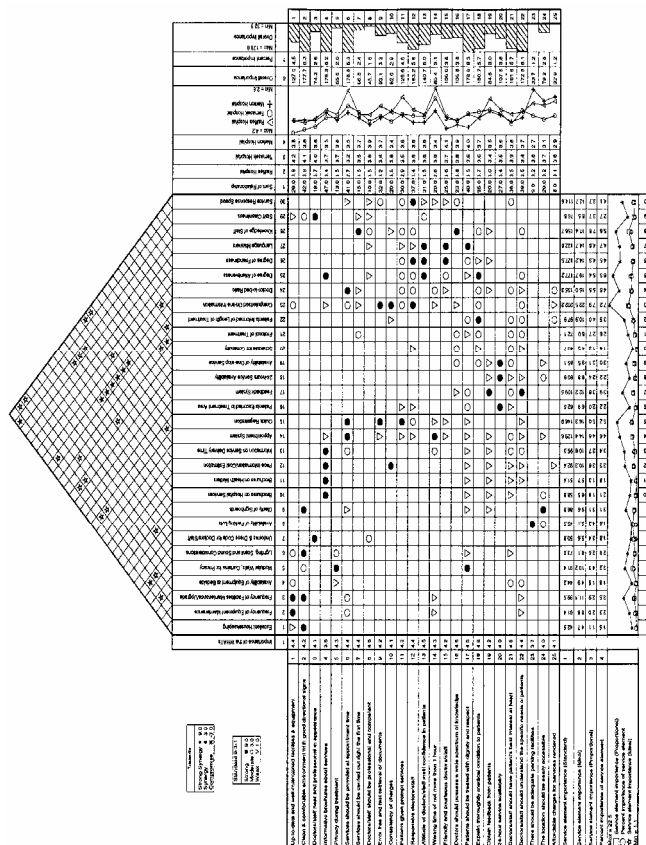
*Source: Compiled by the Authors*

Based on this framework, it is imperative that CEOs and Quality managers start their CQI/TQM efforts from the premise that the expectations of the customer must be understood first. They need to move from the 'prescribed perspective' of professional quality to the 'felt perspective' that is, rendering services according to the customers' needs and expectations rather than according to the 'professionals' ordainment.

## Results of the Application of QFD and Managerial Implications

The results on the application of QFD in the hospital are depicted in Figure 1.

Figure 1: The Completed QFD Matrix



Source: Developed by the Authors

### Analysis of Overall Importance

The use of QFD to understand the voice of the customers demonstrated that QFD is a systematic approach for identifying and prioritising customers' expectations. The three most important quality dimensions are:

- i. Assurance
- ii. Empathy
- iii. Responsiveness

The result shows that patients focus their expectations on the 'how it is done'. This finding is consistent with the views of Ware et al (1983), Yi (1990), Koch (1991), Oliver (1993) and Jayanti (1993). Hence, to improve customer satisfaction through the provision of higher quality, healthcare managers and



clinicians should focus on the functional aspects captured in the Assurance, Empathy and Responsiveness dimensions, rather than the technical aspects captured in the Tangibility and Accessibility and Affordability dimensions.

Furthermore, the results show that patients placed high priority on the following statements:

- *Patients treated with dignity and respect - assurance dimension*
- *Services provided at appointed time - reliability dimension*
- *Clean and comfortable environment with good directional signs - tangibility dimension*
- *Informative brochures about services - tangibility dimension*
- *Doctors/staff understand patients' specific needs - empathy dimension*

### **Analysis of Unmet Patients' Expectations**

A list of unmet patients' expectations is:

- Privacy during treatment - tangibility dimension
- Doctors/staff neat and professional in appearance - tangibility dimension
- Services carried out right the first time - reliability dimension
- Doctors/staff professional and competent - reliability dimension
- Consistency of charges - reliability dimension
- Waiting time of not more than 1 hour - responsiveness dimension
- Obtain feedback from patients - empathy dimension
- Adequate parking facilities - accessibility & affordability dimension
- Affordable charges for services rendered - accessibility & affordability dimension

This list represents 36% of the patients' expectations but none of these unmet expectations is ranked amongst the five most important patients' expectations and none of these unmet expectations is in the Assurance dimension, the most important dimension ranked by patients.

### **Analysis of Management Quality Practices**

The two most significant management quality practices are:

- i. Staffing
- ii. Service Delivery

### **Analysis of Quality Dimension Needing Improvement**

The hospital is weakest in the service dimensions of Accessibility and Affordability and Responsiveness. Since the Responsiveness dimension is the third most important dimension of patients, efforts should be made to improve the 'waiting time of not more than 1 hour' statement due to the large difference between the rate of satisfaction and expectations.

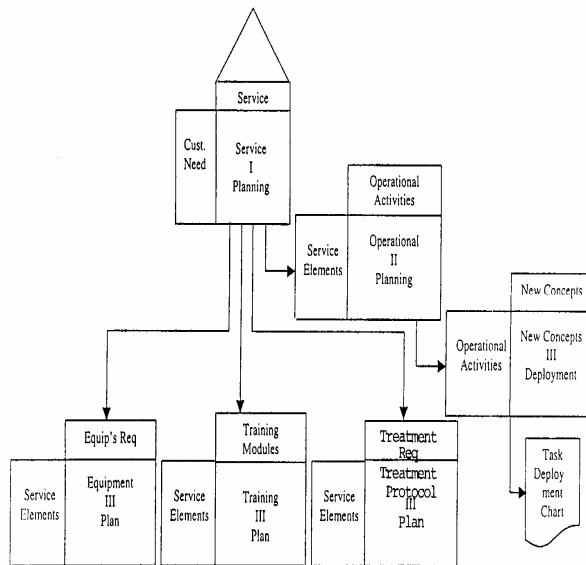
## **Management Quality Activities/Processes Needing Improvement or New Process Development**

The management quality activities/processes that should be improved are:

- i. Service delivery which includes: appointment system, quick registration, feedback system, computerised on-line information system and doctor-to-bed ratio.
- ii. Staffing which includes: degree of attentiveness, knowledge of staff and service response speed.

The application of QFD in the hospital demonstrated the wide applicability of QFD as an organisation tool. The findings revealed that since patients focused their expectations on the functional aspects of quality, particular attention should be paid to 'doctor-patient' relationship and 'staff-patient' relationship, staffing and service delivery elements. QFD is found more superior than the other TQM and financial measurement tools because QFD not only enables a hospital to identify and prioritise customers' expectations, it is also capable of assessing the unmet expectations of customers and provides a map for the hospital to improve its services. Considering the superiority of QFD, the authors together with the focus group members developed a total quality model consisting of seven parts (Figure 2) to help hospitals in their CQI/TQM journey. As QFD's applications in the manufacturing industries are structurally different from its applications in the healthcare industry, this total quality healthcare model is a modification of the model developed by Hofmeister (1995).

Figure 2: The Total Quality Healthcare Model



Source: Developed by the Authors and the Focus Group Members. Modified from Hofmeister, 1995.

## Conclusion

Although we have discussed the application of only one part of the proposed total quality model, (Part I - Service Planning) as shown in Figure 2, the results show that QFD provides a practical approach for hospitals to become more quality oriented. The power of the proposed model comes from the detailed discussion with customers about their expectations, comparisons with competitors and considerations of how the hospital can meet the customers' expectations most effectively. However, in order to achieve success in the implementation of the proposed model, it is critical that there should be commitment and involvement of company top management.

Another important factor to be considered is the required training to be offered by the hospital. Since new techniques and tools are usually difficult to implement, they strongly require efficient theoretical and practical training. Besides, they generally represent changes in employees' attitudes and behaviour.

Further study will concentrate on providing a generic framework for the successful implementation of the proposed QFD-led model. This will be reported in a future paper.

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