CRITICAL REVIEW OF TOTAL QUALITY MANAGEMENT

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ABSTRACT

This paper presents a critical review of total quality management (TQM) and the various concepts surrounding it. It starts by reviewing and discussing issues surrounding quality, including its definition, the historical origins of TQM, and the developments that have resulted in the importance that has been placed by many researchers, academics, consultants, industrialists and professionals on TQM. Finally, an integrated TQM model is presented which captures most of the concepts, principles and elements discussed.

1.0 INTRODUCTION

The development of the quality field has seen it advanced from the simple inspection activities to today's total quality management (TQM) philosophy. Strong competitive pressures and the need to satisfy the various interested parties (customers) have forced companies to adopt new strategies for achieving excellence; TQM being one of them. The concept of quality and TQM should be properly understood before an organisation embarks and involves itself in this

journey so as to obtain maximum and meaningful outcomes. This paper will give an overview of the TQM philosophy, concepts and main principles with the aim of providing a proper perspective and understanding of the subject.

2.0 DEFINING QUALITY

Numerous definitions of quality can be found in the literature. Academics, consultants, practitioners, industrialists, and engineers have proposed some while the much referenced quality gurus such as Deming, Crosby, Juran and Feigenbaum have proposed others. Juran [1] defined quality as 'fitness for use or purpose' which basically translates to the ability of a given product or service to meet the purpose for which it was produced and delivered. Feigenbaum's [2] definition of quality as the 'total composite of product and service characteristics of marketing, engineering, manufacture, and maintenance through which the product and service in use will meet the expectation by the customer' is more comprehensive than Juran's. The formal definition of quality as provided in ISO 8402 as 'the totality of features and characteristics of a product and service that bear upon its ability to satisfy stated or implied needs' [3] has the message of meeting customer needs.

Quality as a concept has been with us for millenniums but it has only recently emerged as a strategic issue. It has evolved from a mere reactive stance in the production function to a much more strategic one, encompassing every function in an organisation [4]. The various quality definitions are in essence all about assuring and ensuring that all products, and services will ultimately be able to satisfy the needs of the customers (industrial and commercial). The actual meaning and concept has not changed but the emphasis and the practice towards producing and delivering products have (due to tough competition posed by other manufacturers of similar products). The need to understand quality from a

strategic perspective is vital as is the need for quality to be managed which is central to the survival of organisations.

3.0 HISTORICAL DEVELOPMENT OF TQM

Different authors have given various definitions of Total Quality Management. Kanji [5] defined TQM 'as the way of life of an organisation committed to customer satisfaction through continuous improvement. This way of life varies from organisation to organisation and from one country to another but has certain principles which can be implemented to secure market share, increase profits and reduce costs.' Berry [6] defined the TQM process as a total corporate focus on meeting and exceeding customers' expectations and significantly reducing costs resulting from poor quality by adopting a new management system and corporate culture.

Different authors ([7][8][9]) have described the development of the quality movement. Garvin [4] identified four distinct quality eras; inspection, statistical quality control, quality assurance, and strategic quality management. The inspection era, which emphasised conformance to standards, focused on measuring, checking, counting, grading, and repairing manufactured goods. Much of today's modern quality control concepts can be traced back to W.A. Shewhart's book '*Economic Control of Quality of Manufactured Product*' [10]. He developed powerful techniques for controlling, monitoring, and evaluating the quality of products and suggested ways to improve product quality. Variability was seen as a fact of industrial life and production processes were modelled using the principles of probability and statistics. The Shewhart control chart, his major contribution, formed the basis of statistical process control (SPC) techniques in differentiating between acceptable or inherent, and unacceptable fluctuations or assignable causes of variation. The era of statistical quality control also saw the

application of sampling inspection techniques attributed to Dodge and Romig. Acceptance sampling techniques, such as the revised MIL-105E standard, was developed with the purpose of reducing 100% inspection to sampling. This helped to reduce bottlenecks at the inspection area, which was slowing down production, and also provided for some improvements in the quality of products [4].

The next stage in the evolution process, that of quality assurance, saw quality expanding from a narrow manufacturing based discipline to one with broader implications for management. Problem prevention remained the primary goal and the tools extended beyond statistics. Quality assurance involved the various functions (from marketing, design, purchasing, maintenance, to sales and service) in ensuring that quality was designed, built and delivered to the customers through systematic procedures and prevention activities in the company. The Quality Department was seen as not having the sole responsibility for achieving product and service quality.

The TQM era, in the main, is mostly dominated by the quality gurus including Deming, Juran, Crosby, Feigenbaum as well as the newer gurus that have emerged from this plethora of quality information such as Oakland, Dale, and Kanji. Deming was one of the first Americans to teach statistical methods to the Japanese in order to help achieve consistent product quality. His teachings were adopted and adapted to their needs, and disseminated to a large proportion of the workforce.

Deming not only taught the Japanese the science of quality, but more importantly the art of managing it. He also preached about management's role and responsibility in getting the systems right and appropriate for quality to be maintained, improved, and perfected. The Japanese put their faith in this new profound knowledge and by the early 1980's were already on their way towards global economic domination. Deming's teaching is summarised in his 14 points for management [11].

Juran was the other American who helped improve the quality of Japanese products. He was invited by the Union of Japanese Scientists and Engineers (JUSE) to give lectures on quality control techniques as well as on managing for quality. Juran's main idea was the quality trilogy consisting of quality planning, control, and improvement [1]. He defined TQM as 'a philosophy aimed at achieving business excellence through the use and application of tools and techniques, as well as the management of soft aspects, such as human motivation in work'.

Feigenbaum [12] described total quality companies as those having a clear business strategy around the principle that quality was the weapon for achieving simultaneously both customer satisfaction and lower costs. Crosby defined quality as conformance to requirements [13]. His ideas centred around making quality certain, which means getting people (top management and lower levels) to do better all the worthwhile things they ought to be doing. Crosby defines quality management as 'a systematic way of guaranteeing that organised activities happen the way they are planned'. It is a management discipline concerned with preventing problems from occurring by creating attitudes and controls that make prevention possible. He advocated that Zero Defects (ZD) should be the performance standard and that the initiative should be personally directed by top management. Defects which are prevented from occurring do not need repair, examination or explanation.

BS. 7850 [14] gives the definition of TQM as 'a management philosophy and company practices that aim to harness the human and material resources of an organisation in the most effective way to achieve the objectives of the organisation.' The objectives may include customer satisfaction, profit, and growth or market position. The standard, however, warns about the meaning of the word total in TQM. It refers to the concept of management and not to be confused with the totality and characteristics found in the quality definition in ISO 8402.

Oakland [15] says that quality must be managed - it will not just happen. He describes the quality chain involving both the supplier and the customer, and that failure to meet the requirements in any part of the chain, will result in a multiplying effect - in terms of additional costs for example, the further one progresses through the chain the higher these become. According to Oakland, TQM is an approach for improving the competitiveness, effectiveness, and flexibility of the whole organisation. Dale defines TQM as 'the mutual cooperation of everyone in an organisation and associated business processes to produce products and services which meet the needs and expectations of customers' [8]. It is both a philosophy and a set of guiding principles for managing an organisation.

The development of the quality discipline always looked to Japan as a role model. Researchers, such as Garvin [16], Dale [17] and Karatsu [18], have conducted extensive research on the Japanese way of managing quality. The transformation by Japan has been quite rapid and the way they were able to achieve this will be described.

Deming, as explained earlier, was the main instigator of the Japanese quality movement. Statistical quality control (SQC) became the most important commodity ever exported to Japan. Not only did he teach the techniques, but he also encouraged them to adopt a systematic approach to problem solving, following Shewhart's idea, which later came to be known as the Plan-Do-Check-Act (PDCA) or Deming cycle. Juran was also instrumental in the Japanese success story. His series of lectures to the top and middle managers of the Japanese business community, touched on issues such as the need for quality planning, quality organisation, management responsibility, and the need to set goals and targets for improvement. Both Deming and Juran were the catalysts that triggered the transformation, but the Japanese themselves ultimately developed a quality movement unique to their own culture and situation. And the rest is history.

Dale [17] gave a detailed account of the Japanese Total Quality Control evolution, discussing elements such as customer satisfaction, long term planning, quality in research and development, organising and planning for quality, management for improvement, visible management systems, involvement of people, education and training, as well as Total Productive Maintenance, and Just-in-time systems; all within the Japanese context. In as early as 1981, the Japanese had formalised Total Quality into their Japanese Industrial Standards (JIS). TQM was referred to as Company Wide Quality Control (CWQC) and defined in JIS Z8101-1981 [19] as 'a system of means to economically produce goods or services which satisfy customers' requirements, the effective implementation is expected to involve the cooperation of all people in the company, involving top management, managers, supervisors, and workers in all areas of corporate activities such as market research, research and development, product planning, design, preparations for production, purchasing, vendor management, manufacturing, inspection, sales and after-services, as well as financial control, personnel administration, and training and education. Quality control carried out in this manner is called company-wide quality control'.

Ishikawa, a Japanese quality guru, contributed much on the concept of Quality Control Circles (QCC). Genichi Taguchi, another Japanese guru, developed the idea of quality being 'a loss to society' and also the 'Quality Loss Function', which, together with his Taguchi experimental design methods are now being adopted in many companies. The Japanese were convinced by his ideas, have applied them zealously, and achieved astonishing results [20]. To achieve quality is not a matter of saying aloud that a company is pursuing TQM, but rather it is the total commitment for long term improvement and perseverance through the application of statistical and scientific knowledge, supported by sound management principles and systems, as well as practices.

4.0 BASIC ELEMENTS OF TQM

A detailed review of the literature revealed that there are various quality management elements currently being perceived as being the components of total quality within the TQM domain. However, despite the differing views given by various writers, these components are actually centred around six major elements. The discussion that follows will describe these; they are:

1. Management commitment and leadership
2. Employee involvement
3. Continuous improvement
4. Supplier quality assurance and management
5. Customer focus
6. Education and training

4.1 Management commitment and leadership

The need for management commitment and leadership is recognised by most, if not all, writers ([1][2][4] to [16]). Leaders are responsible for putting in place systems to ensure that people are competent to shoulder continuous improvement responsibilities [21]. To create an atmosphere that facilitates change, leaders must inspire everyone in the organisation with a vision of what they should be accomplishing to improve customer satisfaction. When managers do not change their fundamental assumptions about how to do business, inconsistencies will emerge in their actions. Employees will then perceive these inconsistencies negatively and they may infer that management is really not committed, or that they are trying to manipulate them with another 'flavour of the month' programme. George and Weimerskirch [22] pointed out that quality leaders are converts to the new faith of TQM. They gave examples from the CEOs of the Malcolm Baldridge Award winners such as Federal Express, Corning Corporation and Marlow Industries who preached quality to every employee in

their own organisations and even to other organisations. Senior management must personally lead the quality improvement process through committing to quality, understanding the company's systems and values, participating in the quality process, and finally, integrating quality into the company's management model.

Leadership involves defining the need for change, creating new visions, and using new frameworks to mobilise commitment to those visions - frameworks for thinking about strategy, structure and people [23]. At Girobank, leadership is not just about creating the vision, and pointing the way, but personally exemplifying the aspects of behaviour that they wish to become the norm [24]. They seek to move managers towards an open, participative leadership style where managers serve as team leader and coach, rather than the traditional authoritative, directive style of the past.

Commitment and leadership also entails expressing the company's values, then communicating them throughout the company via open, two-way communication. Deming's theory of management (his 14 points) are all directed at the top management of all types of organisation [11]. He expressed his view that it is not enough that top management commit themselves for life in quality and productivity. They must know what it is that they are committed to and what they must do; further obligations cannot be delegated.

Management commitment also requires developing management systems that assure and ensure that quality is built into each and every process in an organisation. In short, management commitment and leadership represents a paradigm shift from the traditional management role and responsibilities, towards a new role, supporting and enhancing the total quality culture and environment. TQM must be led by the converts who have a deep understanding and thinking, who know what and how to lead the change process and to create the *raison d'être* in their businesses.

4.2 Employee Involvement

Management commitment and leadership alone, although very fundamental, will not be sufficient for TQM's success. To achieve TQM status, it needs the involvement of employees in all functions, and at all levels. Employee involvement is a long-term commitment for a new way of doing business and needs a fundamental change in culture [22]). Wilkinson et al [25] carried out a study on TQM and employee involvement where they argued that the links between TQM and employee involvement were complex. Binney [26] described unlocking people potential as one of the total quality principles whereby it creates an environment in which people can readily learn, where teamwork can flourish and individuals grow in self-confidence, and self esteem.

Different gurus have stressed the roles that employees play in continuous improvement. There is this combination of hard technical aspects as well as the soft human relation issues that need to be considered. QCC as a form of employee involvement is a voluntary form of teamwork activity in problem solving and has been proven to be very successful in Japan [27]. Its primary aim is more towards contributing to both the improvement and development of an enterprise, and the respect for humanity and to build a conducive workplace environment in which everyone enjoys working. It also acts as a lever to display human capabilities, which will eventually draw out infinite possibilities. Wilkinson et al [25] believed that participation and involvement are compulsory in TQM as opposed to being voluntary in quality circles. Juran as quoted by Hill [28] said that responsibility for quality should be assigned to people who can control the quality of what they do and have the authority to implement improvement. Employees should not be asked to accept responsibility for what is beyond their control. Conditions necessary for greater self-control such as job enrichment and workgroup autonomy must be created in order for employee participation to work.

Even though all these sound ideal, the point is that employee involvement and participation have been proven to work in many organisations as one of the vehicles for improving and achieving quality. The different names associated with employee involvement, such as QCC, Quality Improvement Teams (QIT), Self-directed work teams [29], are irrelevant. To get people involved and implement teamwork needs patience, and above all an improvement infrastructure is needed as outlined by Cook and Dale [30] for teamwork to flourish through management sincerity and commitment.

4.3 Continuous Improvement

Closely related with employee involvement is the principle of continuous improvement in the TQM philosophy. Kaizen (ky'zen) is a Japanese term meaning continuous incremental improvement [31]. In a TQ company, the involvement and participation of employees is geared towards building the attitude of continuous improvement into all aspects of the business. Information on the needs of the customers will have to be elicited through a proper system before any improvement can be realised. The improvements must focus on the customers and efforts must concentrate on improving the key business processes.

According to Hill [28], quality improvement occurs in two main areas; firstly in an existing vertical structure, or within function, and the second is across the horizontal structure or cross-functional. He suggested that business improvement involved major innovation as well as incremental improvements which challenges Business Process Reengineering (BPR) proponents that TQM only concentrates on minor incremental improvement. TQM entails both major and incremental improvements.

Authors such as Dahlgaard et al [7], Oakland [15], Binney [26] and Logothetis [32] have explained the importance of focusing on the facts, or fact-based management, in the pursuit of improvement. Actions must be based on data and seeking the root causes of problems is a prerequisite for permanent

solutions to many of the improvement opportunities in organisations. Continuous improvement should be viewed ultimately as a way of life, whereby the philosophy to continuously seek better ways of doing things is embedded in everyone's mind. The author believes that the culture for continuous improvement is a direct result of interventions introduced through systems, procedures, good practices, and management leadership. Culture change does not occur overnight but with proper systems and practices it can be nurtured and developed.

4.4 Supplier quality assurance and management

TQM will not be complete without the involvement of suppliers in the improvement process. All the gurus have in one way or another stressed the need to consider suppliers as part of the quality chain. Two of Deming's 14 points for management (Point 3: Cease dependence on mass inspection and Point 4: End the practice of awarding business on price tag alone) are closely related to supplier involvement in TQM [11]. Mass inspection cannot compensate for useless incoming materials, bad design, or less than optimal process maintenance. Time and effort are wasted if goods are merely inspected without any consideration for making them better and requiring suppliers to engage in quality improvement [18].

Deming's idea of ending the tender system for supplier selection based on price alone extends to an ideal situation of one item one supplier. Deming suggested that suppliers must provide statistical evidence of the quality of their products. By involving suppliers in the quality journey, an organisation will have those related functions such as purchasing, design, or production planning in decisions such as vendor selection. Deming also pointed out the need to replace supplier confrontation with a long term relationship or partnership. Only through this can one assure the success of the quality initiatives made by any company.

4.5 Customer focus

Central to any organisation's existence is the customer. The ability to meet customer's requirements is vital, not only between two separate organisations, but also within the same one [15]. The phrase 'the customer is king' which in Japanese becomes *'O-kyakusama wa kamisama'*, has long been adhered to by the Japanese people. Many business centres in Japan have specially assigned personnel to greet customers visiting their premises. The respect and honour for customers of this kind cannot be found anywhere else in the world. This customer focus does not end here, but includes the provision of excellent products and services. Tools such as Quality Function Deployment (QFD), which was invented in Japan, have the primary purpose of translating customer requirements into design and process requirements.

Kano as quoted by Dahlgaard et al [7] was the first to propose the idea of customer delight to go beyond customer satisfaction. He described 'attractive quality' as those additional quality features, which have the effect of delighting the customer. Customer focus requires organisations to collect relevant information from customers through market surveys, customer feedback, focus groups, customer perception surveys, etc, and input back to the internal processes for improvement. It is pointless to collect data and information and not to analyse and convert them into actionable items for improvement.

Besides the important external customer and users, there must also be a focus on the internal customers or employees as well. Focusing on internal customer processes will need the cooperation and commitment of all, including management. Processes can be documented using tools such as process flow charts and the requirements necessary for effective process performance, will need to be identified through an understanding of the next process needs and requirements. There is also the need for management to create a job environment, both physically and emotionally, that is satisfying to the employees. Satisfied internal customers will ensure that external customers will also be

satisfied. Many schemes can be created according to the company's capability, financial or otherwise, to invest in employee training, education, career development, family welfare, etc. which will ultimately give high returns to the company. If companies believe that many happy external customers will attract more people to buy their products, then similarly, happy internal customers will convey that same message to their friends and the community at large.

4.6 Education and training

The final and probably the most important element of TQM are education and training. In order that there is management commitment and leadership, education on the true philosophy of total quality is a must. Senior management must, at least, be exposed to the various tools and techniques in quality improvement, they need not necessarily master them. Continuous improvement means continuous learning and companies seeking to adopt TQ, need to become learning organisation [26]

Not only must management demonstrate that they are prepared to learn, they must also provide learning opportunities for all employees engaged in continuous improvement. Education is needed to make everyone aware of, and realise the need for, improvement, and to be able to compete in today's harsh business environment. Training on the other hand must be geared towards equipping employees with new skills of the job and specifically with the tools needed to enhance teamwork and to conduct improvements on the task, activities, and processes. Training must be properly planned and be based on a system that includes elements like training need identification, training provider selection, and effectiveness evaluation. Both education and training are important, and can be expensive if the funds available for training are not spent wisely.

5.0 REASONS FOR TQM FAILURES

Success stories of TQM from well-known companies like Xerox, Motorola, Ford, Hewlett Packard, British Airways, and IBM can be found in various publications (see for example [7] [22][26][33][34][35][36]). These companies have committed themselves to TQM by making fundamental changes in their management practices and have the philosophy to improve quality and company performance. Parallel with these successes are companies which have tried to implement TQM, but have not achieved the desired results or have even failed in their attempt. The sceptics will immediately blame TQM as just one of the many management fads before abandoning it.

Many factors can contribute to the failure of TQM, an aspect investigated by several researchers. Dale and Cooper [37] reported the kinds of common mistakes made by senior management. They include failing to commit sufficient time to learn about TQM and be personally involved in planning for its introduction and development. They also identified underestimating the resources needed to start and develop a process of quality improvement, not establishing an effective infrastructure, not committing sufficient resources to TQM training and education and finally treating output and cost targets as the main business priorities.

Kotter [38] cited things like not establishing a sense of urgency, lack of vision, under communicating, no systematic planning, declaring victory too soon, and not anchoring changes into corporation culture as some of the reasons why TQM and BPR failed. Masters [39] compiled a list of causes of failure from 17 different references. The main reasons can be summarised as:

- Lack of management commitment
- Inability to change organisational culture
- Improper planning
- Lack of continuous training and education

- Incompatible organisational structure and isolated individuals/departments
- Ineffective measurement techniques and lack of access to data and results
- Paying inadequate attention to internal and external customers
- Inadequate use of empowerment and teamwork

TQM failure can be avoided only if these problems can be overcome. On reflection, what Deming described as the deadly diseases of management (such as lack of constancy of purpose (vision), use of visible figures only) have been proven true to the extent that these have become the reasons for TQM failure. Management do not want to understand the barriers and they will blame anything, including TQM, to avoid their own lack of commitment when TQM has failed in their own organisation.

6.0 INTEGRATING THE CONCEPTS, PRINCIPLES AND ELEMENTS IN TQM

The whole philosophy, concepts, or elements of TQM have been thoroughly reviewed and the best way of integrating them together is through a diagram as shown in Figure 1. It is believed that management commitment and leadership is the foundation for TQM to flourish in any organisation. To gain commitment and leadership, knowledge and understanding is crucial. The building blocks for total quality are the management systems (not in the narrow sense of procedures as expressed in standards but systems designed for efficient and effective management) that Deming advocated for management to develop and improve. Systems, such as for quality assurance, quality improvement, human resource development (or human development), etc., must be developed with the full knowledge and understanding that they contribute towards controlling, assuring, maintaining, improving, and enhancing quality in all aspects of the organisation. All these building blocks will then lead to changing attitudes towards quality and