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Impact of Total Quality Management on Managing and Reducing Total Cycle Time in Manufacturing Projects

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Abstract: In today's modern era, technology is changing rapidly and there is a great demand of creative ability in product development. To cope with this situation, there is an urgent need for Iraqi industries to change the way they operate. However, reduction and managing cycle time in manufacturing is a philosophy that follows TQM and JIT, and considered the most important factors in the process of manufacturing project management that seeks to reduce the total time required to complete on the schedules all the activities that occur during order processing, design, supply management, production, and distribution of a product or service. The ultimate aim of this paper is to study the impact of total quality management (TQM) concept and argues that its application is the critical need of our industries and for successful companies to survive with the emergence and expansion of the global marketplace to continuously adapt their products to meet new market demands in order to stand their ground in a highly competitive environment. This paper is divided into three segments: the first gives a brief introduction to the TQM philosophy and discusses TQM systems and tools; the second discusses the effect of TQM application on Cycle Time Management (CTM) and explains what is meant by "Cycle Time Management"; and the third, presents some of the benefits that were realized by international organizations implementing TQM.

Keywords: Cycle Time Management, JIT, manufacturing projects, TQM.

Introduction

In today's business circumstances, the old saying "time is money" has been expanded to mean that time is a competitive weapon. By reducing the cycle time in manufacturing and administrative processes, organizations are finding that they can respond faster to customers and become more flexible in dealing with marketplace changes. However, many organizations have looked upon adopting total quality management (TQM) as the means by which they could maintain a competitive edge [1]. Implementation of TQM becomes a top management agenda in many manufacturing companies that deal with. In the pursuit of positive business benefits, and improve the level of their performance such as better product quality, higher customer satisfaction and reduce total cycle time. The time element in manufacturing stretches from the moment the raw material is separated from the earth to the moment when the finished product is delivered to the ultimate customer. However, reduce cycle time can translate into increased customer satisfaction. Quick response companies can launch new products earlier, penetrate new markets faster, meet changing demand, and can deliver rapidly and on tirne.They can also offer their customers lower costs because quick response companies have streamlined processes with low inventory and less obsolete stock.

Above that with reduced cycle times, quality improves as well [2]. However, Iraqi manufacturing companies had not started adopting the TQM philosophy It is yet to be seen whether Iraqi, with their less aggressive and more complacent attitude, have gained more or less from TQM, compared with other organizations in other countries, which want quick results. Iraqi have adopted the TQM philosophy in the recommended copybook style. Until recently, very few studies had examined the TQM philosophy in the Iraqi context. The gap in the literature is hardly surprising given that research and theory in TQM implementation are still at an infant stage[3].However. It is obvious from empirical studies that majority of the organisations that implement TQM have viewed the benefits of TQM in various ways . The development of TQM theory has undergone an evolutionary process from quality control, to quality assurance and through to TQM This study aims to examine the impact of total quality management and its core elements, represented by Management commitment and leadership, Employee involvement, Continuous improvement, Supplier quality assurance and management, Customer Focus and Communications, Education and training on reducing total time cycle, on manufacturing project..

2. TQM Philosophy

Total quality management (TQM) has been described as a management philosophy and a way of thinking that has aided many organizations towards achieving world-class status. These organizations are able to produce quality products and services that meet and exceed the needs of their customers. TQM helps create a culture of trust, participation, teamwork, quality-mindedness, zeal for continuous improvement, continuous learning and, ultimately, a working culture that contributes towards a firm's success and existence[4]. However ,The formal definition of quality as provided in ISO 8402 as 'the totality of features and characteristics of a product and service that accept upon its ability to satisfy stated or implied needs' has the message of meeting customer needs. [5]. TQM has been a widely applied processes for improving competitiveness around the world. The Implementation of TQM usually consists of both TQM philosophy from Deming's"14" points" Juran's"ten steps", and Cosby's"14 steps "and techniques such SPC, QCC,benchmark,QFD,etc[6] . There are many companies have become aware of the need to make quality is the competitive marketing strategy in a global market. Large companies for instance, have started to implement total quality initiative in their products and services. The increasing acceptance of Total Quality Management (TQM) as a philosophy of management and a way of company life has taken place for almost three decades[7].

The main goal for many companies the implementation of total quality management (TQM), is to improve the quality level of products and optimize overall functioning. Usually this is accomplished by analyzing collected data in order to find solutions to problems. Applying this philosophy often helps to improve because of the four main benefits of total quality management. These include reduce cost , happier employees, better organization and increased customer satisfaction [8]. Perhaps one of the biggest benefits of total quality management is the cost that it saves throughout an organization, especially in the areas of scrap, rework, field service, and warranty cost reduction. Since these cost reductions flow straight through to bottom-line profits, there can be a startling increase in profitability.. Since this practice aims at improving and creating ideal products, it cuts down on inefficient product creation methods. In turn, TQM creates more successful products which generate higher profit margins. Total quality management also help reductionDefect. TQM has a strong emphasis on improving quality within a process, rather than inspecting quality into a process.

This not only reduces the time needed to fix errors, but makes it less necessary to employ a team of quality assurance personnel.Another positive result of TQM isreduces unnecessary and unproductive tasks, which means employee duties can be altered to reduce wasteful spending. Another positive result of TQM is happier employees. By analyzing employee data, a business will be able to understand the strengths of each employee and capitalize on them. Understanding this information will make it possible for managers to place employees in appropriate positions to maximize their skills. This usually makes for happier employees because they are treated as individuals and not merely as tools for mass production. When employees feel like they are playing a serious part in their company, then morale typically improves .As a result, the overall quality of their work and the products they make is likely to improve as well. However, TQM works best in an environment where it is strongly supported by management, it is implemented by employee teams, and there is a continual focus on process improvement that prevents errors from occurring.

3. Historical perspective of Total Quality Management

Total Quality Management as a concepts developed in Japan beginning in the late 1940's and 1950's, pioneered there by Americans Feigenbum, Juran and Deming set the foundations of TQM. The origins of Total Quality Management (TQM) can be traced back to early 1920s when statistical theory was first applied to product quality control. This concept was further developed by the Union of Japanese Scientists and Engineers formed a committee of scholars, engineers, and government officials devoted to improving Japanese productivity in the 40s led by Americans, such as Deming, Juran and Feigenbaum[9]. The focus widened from quality of products to quality of all issues within an organization. American firms began to take serious notice of TQM around 1980." It can be argued that many of the TQM dimensions were being applied by organisations before the TQM movement appeared; consequently, it is not easy to establish the exact date of birth of the term TQM. Stuelpnagel (1993) considers that in Ford and Crowter's book "My Life and Work", published in 1926, the origins of TQM can be found.

Nevertheless, it is clear that the term and the philosophy as a whole appeared around the mid 80's. Bemowski (1992) states that the term TQM was initially coined in 1985 by the Naval Air Systems Command to describe its Japanese-style management approach to quality improvement. Perhaps, the main reason for the origin of the term TQM could be a substitution in the previously used term of Total Quality Control (TQC), the word "control" by "management" with the reasoning that quality is not just a matter of control, it has to be managed. In the USA the development of quality management resulted from the penetration of its markets by Japanese products which started in the 70s, together with the impact of the writings of Crosby, Deming, Feigenbaum and Juran. Consequently, 4 companies and academics studied the works of these authors and others, such as Ishikawa, and, integrating their approaches with quality management, gave rise to the concept of TQM[10].

4. Basic elements of TQM

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

Management commitment and leadership
Management commitment provides the motivating force and resources for organization and controlling activities within the organization. Senior management, including the top executive on site, must act as a role model for how all employees should work to create a safe work environment.

Employee involvement
Every employee that belongs to the organization works with team to achieve common goals. Involvement of each employee is very important and full commitment of an employee is possible only when management has provided proper work environment.

Continuous improvement
Continual improvement process is the core component of TQM which drives an organization to be creative in finding approaches or ways for becoming effective and competitive at meeting expectations of customers and stakeholders.

Customer Focus and Communications
Effective communication is of great importance for motivating employees and maintaining their morale at each level of day to day operations or during times of some organizational changes. Communication helps in correctness of methods and strategies of an organization.

Education and training
Training is necessary for an organization's employee to be highly productive. For maintaining and creating quality improvement environment training programs are essential. Supervisors are responsible for implementing TQM within their departments. Employee training involves interpersonal skills, business and technical skills, problem solving, task management, decision making and performance analysis.

5. Cycle Time Management

Cycle time (CT) has been defined by server scholars as "the length of time between starting and finishing the production of an order. In a broad sense, CT incorporates four time elements that are often described as activities: 1) processing, 2) waiting, 3) moving, and 4) inspection. Although there is some debate about inspection, processing is an activity that changes the composition of the product and thus adds value from the customer's perspective. Clearly, the actual time to process an order must be monitored carefully, both to ensure efficient performance as well as to evaluate possible design changes of new materials and technology[11].

Long cycle times are aindication of poor manufacturing performance and high non-value added costs. Manufacturers need to focus on the continuous reduction of all cycle times. Achieving success requires a specific management style that focuses on proactive problem solving, rather than "fire-fighting". In this process, management takes on a coaching roll, bringing all their people into the process and supporting them in their efforts to improve productivity, customer satisfaction and profitability. Product build/test cycle time is an important element of the total production flow process and provides an excellent focus for a process improvement program.

Product build/test cycle time is calculated as the hourly work content through the longest path of the lean manufacturing process. In the sequential production process, the product build /test cycle time can be calculated by starting at the end of the process and following the longest, cumulative, single path back through the process, regardless of whether it traces the main path or trails off to a sub-assembly path. Many manufacturers have increased their on-time delivery performance and product profit margins by implementing a program of build/test cycle time reduction. The main focus of such a program is the elimination of all non-value-add activities along the path of the product build/test cycle. Reduction time cycle in manufacturing companies differ from traditional organizations in how they structure work, how they measure performance, and how they view organizational learning. They use time as a critical performance factor. They claim that everyone learn about customers, competitors, and the company's own operations, not just top management [12].

6. Proposed Method

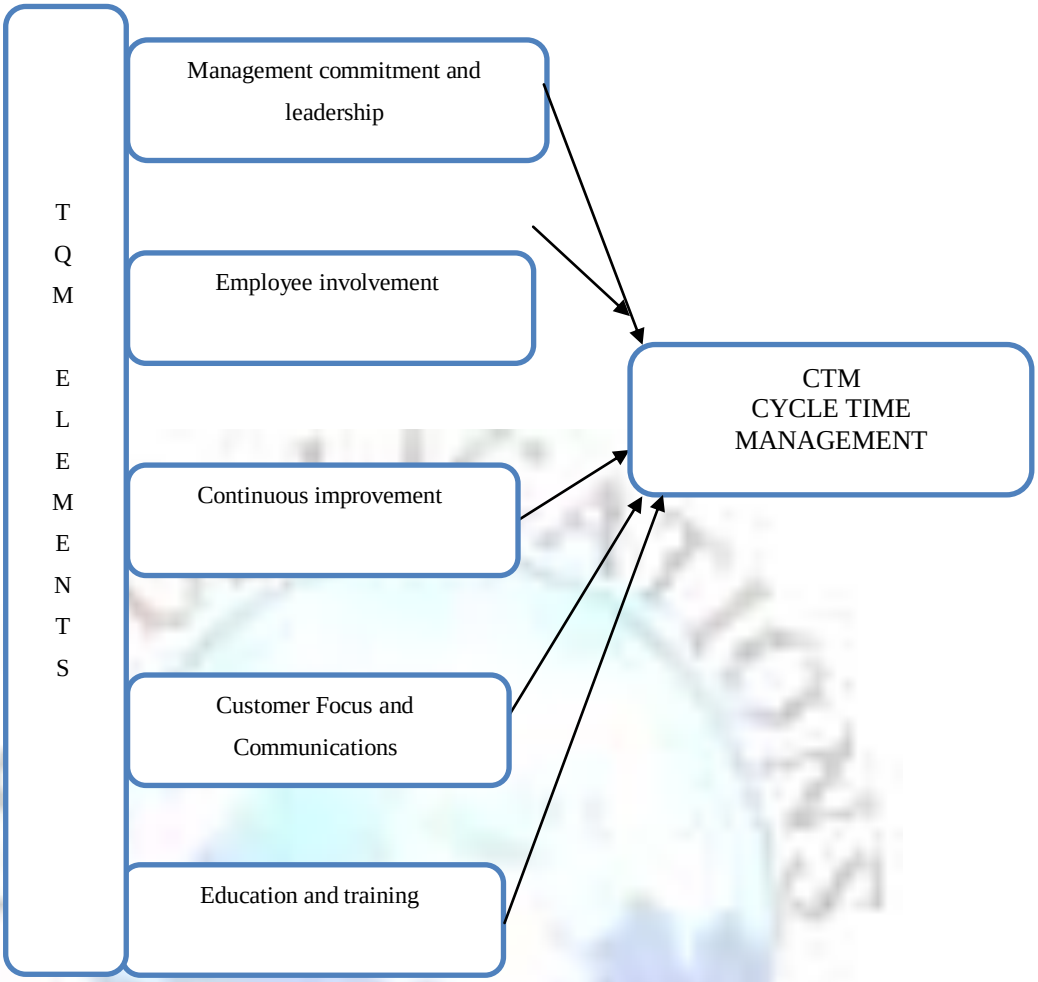

Figure 1. Conceptual Framework

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Conclusion

Cycle time has become one of the most critical indicators in competitive, manufacturing environments because it helps management focus on the two key factors in today's marketplace – fully satisfying customer needs and conducting operations as cost efficiently as possible.Cycle time management and reduction (CTM) is the manufacturing philosophy that follows after TQM and JIT. CTM seeks to reduce total cycle time (which is the time required to perform the activities that occur during order processing, design, supply management, production and distribution). Same TQM and JIT, CTM's objectives are to reduce cost further, improve quality, reduce delivery time and increase flexibility. Conceptual framework has been developed for supporting CTM by introducing core TQM elements such as, Management commitment and leadership, Employee involvement, Continuous improvement, Customer Focus and Communications, Customer Focus and Communications and Education and training.

A new approach should assist manufacturing organization to reduce cycle time. The framework are an initial attempt to develop decision tools for managers charged with implementing cycle time management/reduction. The models must be fitted for the manufacturing environment where they will be used in manufacturing environments. When a CTM model is applied to a manufacturing environment it identifies the activities that represent the largest components of cycle time.

Those activities are then targeted for cycle time reduction. However, the data are limited in this study due to the current circumstances. The proposed model can be used in manufacturing firms when the data is available and the results be quite comprehensive.

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