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ABSTRACT

This paper utilizes QFD concepts as a structured approach in integrating the customer's voice in the development of software and hardware products. QFD's emphasis is a team approach to problem solving by various functional areas of a company to develop information technology tools by improving communication, product development, and measurements of end products.

INTRODUCTION

The total quality management (TQM) movement, in the last decade or so, has targeted production and manufacturing processes as areas requiring competitive quality output and lately, the service sector as well. Management Information Systems (MIS) falls under the rubric of the service sector, and little is known on the impact of TQM in this increasingly important function of most organizations. This paper will expound on the impact of TQM in organizations using Quality Function Deployment (QFD) in the functional area of information technology of organizations.

TOTAL QUALITY MANAGEMENT

The definition of TQM as endorsed by CEOs of major corporations, deans of schools of business, as well as deans of schools of engineering, as reported in Procter & Gamble publication (1992), among others is:

> Total Quality (TQ) is a people focused management system that aims at continual increase in customer satisfaction at continual lower real cost. TQ is a total system approach (not a separate area or program) and an integral part of high level strategy; it works horizontally across functions and departments, involves all employees, top to bottom, and extends backward and forward to include the supply chain and the customer chain. TQ stresses learning and adaptation to continual change as

95

keys to organizational success. The foundation of total quality is philosophical: the scientific method. TQ includes systems, methods, and tools. The systems permit changes; the philosophy stays the same. TQ is anchored in values that stress the dignity of the individual and the power of community action.

The core principles of TQM, as pointed out by Evans and Lindsay (1996, p. 17), are:

- Focusing on achieving customer satisfaction;

- Striving for continuous improvement; and

- Encouraging the full involvement of the entire work force.

Osterle, Brenner and Hilbers (1991), discussing quality management, pointed out that most CEOs require and demand that information systems support the major business function in order for the firm to achieve a strategic advantage over its competitors. Perfunctory issues such as systems integration, centralization, decentralization, and distribution processing are of lesser gravity in importance to most CEOs. These issues for the most part are delegated to Chief Information Officers (CIO). Hence, total quality information systems should focus primarily in the IS division.

The five levels of total quality information systems are:

- Strategic use

- Information systems framework

- Information systems project portfolio

- Information system project

- Information systems support

Tom Peters (1987) identified ten areas expected to change total quality management. These are: manufacturing, marketing, sales and service, international business, innovation, people, organization, MIS, financial management and control, and leadership. Below we will expound a discussion on the impact of TQM on MIS through QFD. The mistaken approach of MIS managers is to focus on the technology (software and hardware) rather than on people. TQM requires that the focus be on people to attain quality product, service, and improve responsiveness to customer requirements. The emphasis on the importance of people to the organization should also be emphasized. Satisfied workers, in the long run, are generally more productive and interested in the quality level of a product or service they render. One alternative method to system development technique is the Quality Function Development (QFD) which falls as a subsystem to TQM. QFD was initially developed in Japan by Mitsubishi in 1972, and later adopted by Toyota as presented by Hauser and Clausen (1988). Lately, QFD is used in all kinds of activities to improve processes and make organizations more competitive in the marketplace.

The QFD concept, unlike the traditional System Development Life Cycle (SDLC), is based on team approach of various functional areas of an organization to develop IT by improving

96

communication, product development, and measurement process and systems. This approach involves end-users, MIS specialists with an approval and oversight of middle management in the development of quality end product. QFD, according to Myers and Maani (1995, p. 64), is:

> It can be seen as one of the approaches to Total Quality Management (TQM), where the focus is on customer satisfaction and continuous quality improvement. The aim of QFD is to capture and preserve the needs and wants of customers, known as the Voice of Customers (VOC), through the design and development process. The QFD approach is multifunctional and various stakeholders in the design process, marketing people, planners, R&D, designers, engineers, manufacturing and so on, come together from a project's inception to concurrently plan, design, and produce a product or service.

QFD in software and hardware production can change the end result significantly. In most organizations communication barriers are major hurdles of QFD to be implemented. If functional areas made major effort to break communication problems then QFD approach, which is multifunctional (i.e., marketing staff, planners, R & D, designers, engineering, manufacturing, and distribution) can make QFD work for customer advantage and satisfaction. The QFD approach in information system development is thought to be superior to conventional system development approach. One of the major differences between QFD and traditional system development is the fact that QFD's emphasis is in cooperation between functional areas, whereas system development's emphasis is in the individual, or individual projects, with no attempt at integration. If planning and design have no idea what type of problems production may be facing down the line, it is potentially troublesome to rework or refit the plan into a doable design.

THE QFD PROCESS

In the software and hardware area of IS, customer's requirements and expectations should be integrated in the design of the final product. The related customer's voice can be captured via surveys, interviews, focus groups, customer complaints, and industry conferences and meetings.

The QFD process can be organized in a matrix: customer's voice listed in rows and products' expectations (technical plan, process, manufacturing) in columns. The QFD matrix is sometimes called the house of quality. In summary the house of quality consists of identifying:

- Customer requirement
- Technical requirement
- Relate customers and technical requirements
- Evaluation of competing products
- Evaluation of technical requirements and develop targets
- Determination of selected technical requirements and their deployment in the production process.

Volume 7, Number 2

THE HOUSE OF QUALITY FOR INFORMATION SYSTEMS

The house of quality with its detailed matrix of customer requirements and expectations provides top management a strategic direction as well as a tool to control the overall quality of the information systems available in the organization. The strategy should encompass customer voice throughout planning, designing, and production of information systems. For example, say, a software company wants to develop a multi-platform browser for the Internet. The software production process begins with system planning, design testing, and production of the software. In the initial stage, a prototype software with customers' requirements as the driving force for the project is initiated and tested. After beta testing of the software, further improvements are implemented based on customers' requirements as to input. After further reviews and improvements of the software, the product is embarked into the relatively long and complex stage of another iteration of beta testing of the software. The beauty of the house of quality is that each subsystem can have its own house of quality. And the process can entail as much details as one requires – sort of a spreadsheet within a spreadsheet.

The key attributes of the house of quality are:

- Customer requirements or voice of customers
- Internal analysis
- Relational matrix
- Competitive analysis
- Trade-off analysis
- Goals and targets

The next section will elaborate the above attributes in detail:

Customer Requirements

Customer requirements or voice of the customer are essentially a list of customers' specifications in terms of needs. This is the major input of quality function deployment. The information can be collected in many ways that include: sole representatives, customers' surveys, industry conventions and conferences, focus groups, customer complaints, warranty replacements, and repair. Customer requirements can be divided into primary, secondary, and tertiary requirements. Primary requirements must direct needs of the customer. Secondary requirements are requirements that enhance customer satisfaction, and at the same time, by their absence may not reduce customer satisfaction. Tertiary requirements are requirements that enhance customers' satisfaction but their absence may also reduce customer satisfaction.

Internal Analysis

Internal analysis is detailed analysis that provides an assessment of whether technical characteristics are agreeable with customer requirements and are customarily listed in a matrix format to show relationships.

Relational Matrix

Use of a relational matrix shows whether the technical requirements usually listed in columns, and customer requirements listed in rows sufficiently meet customer requirements. These requirements are customarily obtained through teams made of different departments who may have expertise, customers' surveys, and laboratory based experiments. Also, the matrix can provide correlation indexes between technical and customer requirements.

Market Competitive Analysis

This essentially lists the ratings of each customer requirements and compares the requirements to existing products and services. The market analysis then lists the strengths and weakness of competing products and services to identify possible areas of improvements. Market Competitive Analysis can also be used as a strategic weapon by top CEOs for selling and marketing the product or service.

Trade-Off Analysis

By establishing measurable targets the QFD analyst can make tradeoffs between conflicting customer requirements and retain only the technical requirements with high positive correlation to customer requirements.

Deployment of Goals and Targets

Those characteristics that have the highest correlation between customer requirements and technical requirements are deployed in hierarchical method throughout the remainder of the design phase. Those requirements with weak correlation are either dropped from the design phase or are given low priority for inclusion.

CONCLUSION

In this article, QFD was addressed as a subsystem of TQM implementation. The method was initially developed in Japan, and later refined in the U. S. QFD is a structured form of design and process control that is used in many U. S. companies including Ford, Xerox, Hewlett-Packard, Procter & Gamble, Kodak, Motorola, IBM, and others. QFD provides a highly structured process of translating customer voices into specific products and services, in this case information system development. The goal of QFD is to transfer customer requirements, or voice as is commonly known, into a list of technical requirements, prioritize the wants and needs that are to be included in the final design, and process the information systems product. QFD as a sub-system

99

of TQM implementation, requires that all key players be included in the development of the information system product. The emphasis is cooperation by all stakeholders and not competition or pushing individual objectives, which in the final analysis, is the philosophy of TQM.

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