
**ASSOCIATION OF QUALITY FUNCTION DEPLOYMENT AND TARGET
COSTING FOR COMPETITIVE MARKET**

Anil Kumar, Assistant Professor
SGND Khalsa College, Karol Bagh New Delhi

ABSTRACT

The difference between product costs and customer-driven costs is the resource-consuming activities that trigger them. Customer driving costs derive from specific customers and their buying characteristics. A number of cost factors are easily identifiable with specific customers and are directly traceable to the respective customers. The most rational system of tracing other customer costs to customers is likely to be based on activity-based costing (ABC) principles. By focusing on activities and the different activity requirements placed on the organization by different customers, ABC provides insight into the activity cost structure of customer-driven costs. Costs are attached to different types of cost objects at different levels. The number of levels of cost attachment varies from one company to the next. For customer-driven activity costs, there are usually five levels: order level, customer level, channel level, market level, and enterprise level. Target costing has emerged as one of the main cost management tools in aiding the manufacturers to become globally competitive. Combining target costing with QFD technique provides companies a competitive cost advantage. This paper describes the effect of quality function deployment (QFD) with the target costing and explores the way in which this tool assists in achieving the target cost. The paper presents application of target costing technique with QFD to improve product quality from cost consideration to satisfy customers. It was found that the QFD–TC process is an essential technique in managing the costs of a product and the overall production process that can help an organisation to survive in highly competitive environment.

Introduction

Dealing with today's competition is challenge enough, even when we have all the right information. However, if we respond to the wrong information, we could be losing a battle. Cost accounting offers very important knowledge for management both at strategic and operational level. In a world of non sustainable competitive advantage costs have to be managed both aggressively and intelligently. A firm that fails to reduce costs as rapidly as its competitors will find its profit margins squeezed and its existence threatened. The competitive environment demands the development of sophisticated cost management practices to keep costs down. The poor state of management accounting is a well-known fact. Johnson and Kaplan made the statement in the book that 'Today's management accounting information, driven by the procedures and cycle of the organization's financial reporting system, is too late, too aggregated, and too distorted to be relevant for managers planning and control decisions.' The management accounting system also fails to provide accurate product costs. Effective and appropriate modern cost accounting systems and information should provide a multi-dimensional focus on a multiplicity of cost objects such as customers, products, services, functions, processes and activities.

The faces of cost

Accountants usually define cost as a resource sacrificed or foregone to achieve a specific objective. The basic problems are closely connected to the nature of cost accounting: the problems encountered emanate from four fundamental problems. The problems are: of scope, measurement, valuation and assigning. The problem of scope entails ascertaining which variables should be taken into consideration. The measurement problem entails a search for suitable variables to measure. The essence of the problem is that what cost accounting needs is monetary units, but the object of scrutiny consists of physical units. Valuation problem means searching for an appropriate way to evaluate resources used. For example the following options are useful: original cost, market value, replacement value and opportunity cost. The division of total cost into parts implies a problem of assignment. Costs should be assigned to cost objects (product, customer, time period, etc.). Any choice among assignment methods of costs is a choice among different ways to divide the whole into parts. Using the cause and effect criterion, managers identify the variable that causes cost objects to incur costs. Most often the principle of causality is used in cost accounting. Direct charge and causal tracing should be used wherever possible. Allocation is the last resort. Allocation is the

indirect assignment of cost. Allocation is a dirty word in cost systems - something to be avoided if possible. It implies arbitrariness of measurement and a limit to the meaning of the resulting information. There are several good solutions to every problem. It is not possible to say that one solution is better than another. The solution is somehow a subjective notion. The presence of basic problems and several options to solve them are the main reasons for the following:

- In a multiproduct environment it is not possible to achieve final certainty of accuracy of results.
- If two persons counted the costs in the same firm without knowing anything about each other, they would not get the same results. The difference between results could be great.

The accounting situation has great influence on options chosen. If the decision situation is well known it will automatically limit the number of options. Networking environment will present a certain kind of accounting situation. The following sections include an analysis of what kind of challenges a network economy creates.

With increased global competition, manufacturers face ever changing conditions and fierce competition in the market. To be competitive in the emerging global scenario, a product must address issues such as performance, delivery, functionality, quality and cost. Now a days competition becoming tighter than ever before, the manufacturers have realized that cost is a major factor in acquisition of a product. The fact is that, for organizations facing high competition, in the price of product will be under constant pressure from the market and a competitive price today may not be competitive tomorrow (Williamson, 1997). This high competition forces manufacturers to use creative operational strategies for maintaining the desired profitability in their business. Therefore, cost management strategies are most important managerial tools and techniques employed by manufacturers. Cost leadership strategy for an organisation is important in the changing market environment. Now continuously quality improvement and cost reduction have been the goals of companies to survive in competitive world. Today's customers can take and avail higher quality products in the market at lower prices. The most visible reason of market driven production and operation is the great variety of products in the market. To compete in this global market, manufacturers have to be flexible, open and responsive to customer desires and requirements. The traditional cost plus-pricing strategy has been hindering creativity and profitability for a considerable period (Gagne and Discenza 1995, Castellano and Young 2003, Hibbets et al.

2003). Modarress et al. (2005) stated that standard cost accounting techniques do not sufficiently consider the importance of quality and functionality, which are the desires of today's customers. Cost minimisation or cost reduction is not a proper strategy to obtain competitive advantage without the support of other market considerations. There is a need for companies to create higher value in their products with low costs (Ibusuki and Kaminski 2007). Now price is market driven and quality and functionality is customer driven, the most appropriate operation strategy for manufacturers should be designed around balancing cost quality- functionality which is defined as survival tripod by Cooper (1995). Cost competition can be achieved by managing costs without sacrificing functionality and quality of the products. Traditional cost-plus-pricing strategy has replaced by the philosophy of maximising customer satisfaction with product quality and functionality while minimising costs. There are a number of cost management techniques used in different phases of the product life cycle (Cooper and Slagmulder, 2004). This study aims to explore the application of target costing with other management tools and techniques but mainly quality function deployment. Here we shortly present QFD and target costing process and their applications in different functional areas. This paper describes the effect of quality function deployment with the target costing and explores the way in which this tool assists in achieving the target cost and also presents application of target costing technique with QFD to improve product quality from cost consideration to satisfy customers. It is discussed that the QFD-TC process is an essential technique in managing the costs of a product and the overall production process that can help any organisation to survive in highly competitive market.

Survival triplets

Now a day in competitive market the main problem is how to maximize customer satisfaction and increase market share at target cost. This trade-off exists between the customer satisfaction and the cost spent for the product. The customers are looking for more quality products at less cost. Target costing focuses less on cost than on customer requirements (Lockamy and Smith,2000). Cost is viewed as a result whereas customer requirements are viewed as binding competitive constraints. However, in a system where the customers are important, services and products will be required high quality with a certain price. This is the situation in highly competitive environments industries like automobile. Literature stated that those automobile manufactures that designed quality cars at a certain target price have been

the most successful in the automobile market over the last decades. As stated by Taguchi (1986) the loss to society is minimized when the products are produced at the target value and when the product is away from the target value, the loss increases. Cooper and Slagmulder (1997) stated that the target costing process comprises a series of activities. Firstly, a complex market research is conducted in order to know customers' needs and preferences in the field of product's price, quality and functionality. These three product related characteristics, referred to as the survival triplet, play a critical role in determining the success of the firm (Cooper and Slagmulder, 1997, p.6). On the basis of the market and customer requirements the company determines the target price of the product in its whole life cycle. In the target costing approach the price does not depend on the cost level but on the market conditions. It is quite opposite to the traditional costing approach wherein the product price depends on the product cost level and it is calculated according to the "cost plus profit margin" formula. While determining target price two other product related characteristics quality and functionality must be considered. Quality is defined as conformance with product specification (Cooper and Slagmulder,1997). Functionality refers to the degree of success in designing the product to meet the specifications that customers require (Cooper and Slagmulder,1997). The levels of these three product related characteristics bound a three dimensional space within which a product can succeed. It is called the product's survival zone.

Target costing

Target costing was first introduced in Japan in 1960 as a cost-management tool. It has been perceived as a significant tool for increasing competitiveness since the early 1990s (Ellram 1999). Target costing has emerged as one of the main tools to help the manufacturers to be globally competitive. Being aware of forthcoming market changes manufacturers have taken advantage of target costing as an effective cost management strategy to maintain their share or to become a market leader. Target costing is a process for determining the selling price that customers are willing to pay for a specific level of product quality. Target costing is a reverse costing methodology in which the selling price and the required profit margin are used to determine the allowable cost for manufacturing a new/existing product (Dekker and Smidt 2003). The target cost is based mainly on three items: the desired profit margin, the

expected selling price for the product, and a reasonable estimation of a product cost. This can be expressed as follows: Target Cost = Expected Selling Price - Desired Profit Margin.

Unlike the traditional costing approach, target costing uses price information in the market and customers requirements gathered from the market to determine product costs. Borgernas and Fridh (2003) defined target costing as a product development process, because it focuses all factors starting from market price back to the product design. Target costing is not just a cost management technique, but a strategic management tool that involves other valuable managerial tools and techniques such as QFD and VE. It is a multi-functional team work that involves the active and continuing participation of customers, engineers, designers, accountants and sales people. It is best implemented by a team that aims to develop the right level of quality and functionality with proper pricing (Cooper and Chew 1996). Kaplan and Cooper (1997) decompose the target costing process into four major steps: market-driven costing, product-level target costing, component-level target costing, and chained target costing. Cooper and Slagmulder (1999) also presented a target costing process that focuses on developing new and profitable products. Their proposed target costing process includes three main elements: market-driven costing, product-level target costing, and component-level target costing. Market-driven costing focuses on the competitive aspect of the marketplace and seeks to maximize allowable cost in the product development. Product-level target costing purpose is to meet the target cost of a product without reducing its functionality and quality and this is done by utilizing value engineering and other engineering based cost down tools. Component-level target costing working with component suppliers to maximize the competitive pressure of the market place in order to obtain the most cost-effective components available. Finally we can defined target costing as a strategic cost management tool that promotes the development of a high quality product at low cost to satisfied customers requirements.

Quality function deployment (QFD)

Basically Quality function deployment (QFD) is a tool to systematically take the customers' desires down to the level of detailed operations. The successful application of QFD in different circumstances and different functional areas has been highlighted by many researchers. Olhager and West (2002) described QFD method as an attempt to build a structured method to deploy flexibility related customer requirements in the features of various manufacturing systems. Hamilton and Selen (2004) used QFD in enabling the management of a real estate service chain through personalized web interfacing. Crowe and Cheng (1996) used QFD in developing strategic planning. Delano et al. (2000) combined QFD and decision analysis (DA) for use in research and development decision making. Karsak (2008) developed a decision model for robot selection based on QFD and fuzzy linear regression. Sakao (2007) presented a QFD centered design methodology for environmentally conscious product design. Lowe et al. (2000) presented a tool developed from the QFD technique. This tool is used to translate customer requirements into technical requirements. The QFD process transforms engineering characteristics into customer desires which provide a connection from customer desires to product development (Delano et al. 2000). Pearson et al. (2003) used QFD data for manpower planning. QFD can be defined as a procedure to incorporate customer needs into product features in product planning. QFD is a set of planning and activities that linking the marketing, design and manufacturing functions. QFD is a tool that used to understand customer requirements in terms of technical attributes. QFD shows the relationships among competitive offerings, customer requirements and technical attributes together. QFD has been used as a concurrent engineering tool to reduce product costs and to integrate customer requirements into the product features (Han et al. 2003, Hoque et al. 2005). Functionality and quality specification are well known parts of QFD. QFD analysis determines the level of quality and functionality needed (Cooper and Chew 1996). Cost, quality and functionality information can be gathered through surveys sent to customers and interviews with experts working on the design stage of the product. The QFD process contains four phases: product planning, parts deployment, process planning, and production planning (Hauser and Clausing, 1988). In the first product planning phase, customer requirements are linked up with corresponding engineering characteristics. In the second parts deployment phase (or product design phase), these engineering requirements are translated into parts characteristics. In the process planning phase the output of part

deployment phase translated into key process operations. In the last production planning phase, the key process operations are compared against the product requirements.

QFD-TC process

Both QFD and target costing approaches provide successful results in the area of cost management. As discussed in several articles, target costing is a totally different approach in the area of cost management; it starts from the market analysis and estimation of product price in the market. Customer requirements, product functions and cost are three important elements of the target costing process. While maximizing customer satisfaction is the philosophy of QFD and it directly affects sales and therefore maintains the current market and provides strong basis for increasing market share. Integration of target costing and QFD process (QFD-TC process) is a good cost management strategy for an organisation. In Figure 2, QFD-TC process is presented (Worthy 1991, Ansari and Bell 1997, Ellram 2006). The first step of QFD-TC process is determining the desired quality specifications and functionality, where customer requirements are focused into the process. In the second step, the target selling price is determined in accordance with competitive market conditions and customer needs. In the QFD-TC process QFD analysis is essential for gathering market and price information from customers to determine product specifications and the target price. QFD analysis involves activities for step one and helps in the determination of target price. In the third step, on the basis of organisations' profit policy selling price a profit margin is determined and with specified selling price the target cost is established. In the fourth step cost breakdown is done on cost drivers. Value engineering (VE) analysis is involved into the target costing in order to reduce the cost in the design phase of the product and is especially effective at this stage. The fifth step involves target costing through product design where it is integrated with other management functions, tools and techniques to obtain cost reduction and QFD analysis also helpful in this step. After this in the sixth step target cost is achieved and continuous improvement is suggested through the kaizen philosophy. VE is a proven management technique using a systemized approach to seek out the best functional balance between the cost, reliability and performance of a product or project (Zimmerman and Hart, 1982). It is a systematic approach for defining the required task and determining the most economical combination of functions to achieve the task. It is also helps manufacturers to

identify high cost areas in the design stage of product. i.e. items that are at a higher cost than on other similar facilities (Tufty 1982).

Kaizen costing (KC) means continuous cost reduction. Target costing requires continuity in improvements of cost management and when a target cost is achieved efforts for continuous improvement should be provided to maintain the profitability and market position of the product. While target costing provides cost management in design and development the kaizen costing philosophy supports target costing in continuous improvement in the manufacturing phase of the product (Modarress et al. 2005). The QFD–TC process has significantly changed the traditional roles of the marketing, operations and accounting departments for production of a product. This process overcomes the divisions' problems of functional areas by establishing a multi-functional team. In the QFD–TC process members from the operations, marketing, and accounting and procurement departments making decisions based on desired functionality, quality and the market price for the product with a view of a design for manufacture and assembly. Engineers and designers from the manufacturing department in this team are expected to design a product in accordance with the desired quality and functionality by the customers on a predetermined target cost. In the traditional costing method the process starts with the product design and the manufacturing department alone is responsible for design and manufacture in accordance with quality standards then accounting and procurement departments determine the cost of the products using actual costing method according to the design specifications and manufacturing requirements. After determining the actual cost of the product the selling price is determined by adding a profit margin in the cost. A change in the mind set of members from cost plus pricing to QFD–TC process is not simple. During implementation of QFD–TC process several difficulties like implementation issues, technical and managerial difficulties have been raised. QFD–TC process requires a multi functional team of different departments' members, such as accounting, finance, operations and procurement. The main difficulty of QFD–TC process for the company is the resistance to change by members. Manufacturing departments demonstrated a strong resistance to change because QFD–TC process puts pressure on engineers and designers to design in accordance with predetermined cost, quality and functionality constraints. So engineers and designers are faced practical and technical difficulties in the QFD–TC process implementation. Other difficulty is the lack of cost information and cost database which creates problems in the use of the target costing module.

Another department that has some degree of resistance to change is marketing department because marketing research has been conducted by this department independently and according to marketing department managers the QFD-TC process is excessively time consuming. To overcome the problems of resistance to change in this QFD-TC process the roles of the departments should be explained to all departments before the implementation of QFD-TC process. The Company has gained a number of advantages by implementation of QFD-TC Process. First, the Company realised a considerable cost reduction for the product. Second the Company has started to produce products of the same quality and functionality at lower cost. Third, QFD-TC process has simplified the pricing decision and has provided a comprehensive model for integrating customer needs and requirements with technical design requirements and costing and pricing decisions. Fourth, the QFD-TC process helps to eliminate the non value added functions of products and also helpful in pricing and costing decisions and design improvement decisions.

Conclusion

Integration of both QFD and target costing is an effective strategy to any organisation to produce high quality and functionality products at low cost. The manufacturers that cannot use appropriate cost management strategy will be forced out of the market. QFD-TC is an effective strategy because it focuses on customers' requirements, cost, quality and functionality of products which are the survival factors for any company in market. However, initial design and applications of QFD-TC is a time consuming process but with the proper implementation of QFD-TC process significant cost reduction can be obtained without sacrificing quality and functionality. This study shows that QFD-TC process is a dynamic tool, which continuously enhances product development and aims to balance cost, quality and functionality of the products. QFD-TC process is an essential cost management tool and strategy which reduces costs of product without sacrificing its quality and functionality.

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