CHAPTER 6

WEB-BASED QUALITY COSTING

6.1 INTRODUCTION

Due to the intensification of competition, companies are forced to shrink the profit margins of their products. In order to expand the profit margins, the top managements of organizations are searching for cost reduction strategies. Therefore, the exact information on product or service cost is vital for the top management of the organization for making strategic decisions (Chan and Lee 2003; Schiffauerova and Thomson 2006). At the same time, the intense market competition makes ‘quality’ as a primary requirement of the products, processes and services. In this background, it is worthwhile to note that, in the TQM arena, quality costing technique is used to highlight quality cost information (Gunasekaran 1999) to the top management effectively.

Many researchers see quality costing technique as an aid to help organizations to reduce manufacturing cost by identifying excessive cost, waste and non-value adding activities (Roden and Dale 2001; Dale and Wan 2002; Eldridge et al 2006). It is widely accepted that quality costs are the costs incurred by an organization to improve the quality of its product and reduce the non-value adding activities (Schiffauerova and Thomson 2006a) across various departments of the same organization or across the divisions of the same organization. Therefore, organizations in which information on
quality costs is readily available will be able to acquire competitive advantage.

Even after the increasing awareness on the importance of the implementation of quality costing system and its benefits, many organizations are reluctant to collect their quality costs (Eldridge et al 2006; Bamford and Land 2006). Even few international quality award winning organizations have not calculated their quality costs (Eldridge et al 2006). On reviewing the literature on quality costing, it was inferred that there are a number of challenges ahead in collecting, accounting and analyzing quality costs (McQuater et al 1995; Roden and Dale 2000; Roden and Dale 2001; Eldridge et al 2006). Among them the following are critical:

1. Lack of understanding and awareness about quality costing concept.
2. Company culture which ignores the need of any kind of costing principles
3. Inadequate data and information on quality costing
4. Generalization of the terms used in quality costing among different organizational levels.
5. Inefficiency of accounting and analyzing system.

The above challenges can be tackled by embedding quality costing technique with technologies which aid the gathering, transformation, processing and sharing of quality costs. These functions are the operational characteristics of IT especially, that of WE. Hence, internet and web-based engineering principles can be integrated with quality costing techniques to enhance its efficiency.
There are numerous quality costing models available in the quality costing literature (Dale and Wan 2002; Schiffauerova and Thomson 2006). Among all, the most commonly and successfully implemented framework is P-A-F model (Schiffauerova and Thomson 2006a). In line to this development, the potential benefits of integrating IT with PAF model of quality costing system were foreseen. Therefore, during a module of this research work, a technique named as Web-based Quality Costing system (WQCOST) was developed. The conventional framework of P-A-F model of quality costing system was suitably modified and linked with the web-based engineering principles to form the WQCOST model. The details of this module of research work are presented in this chapter.

6.2 DESIGN OF WQCOST

During the beginning stage of designing WQCOST, the features of P-A-F model were carefully studied. The difficulties in implementing a quality costing system in an organization were also studied. These studies revealed that WQCOST would be valuable and compatible in modern organizations only if its conceptual features are reinvented from that of the conventional model. This aspect is described here.

Literature on quality costing is not clear about the personnel who will be heading and managing the quality costing system. But these literatures report the essence of top management commitment for the successful deployment of quality costing system. Therefore, during the execution of WQCOST, the service of personnel who will be facilitating the relationship between the top management, expert and client is required. Hence, a provision for allowing a person with the designation ‘facilitator’ is incorporated in the organizational structure of WQCOST.
IT increases organization’s ability to communicate more easily (Dewhurst et al 1999; Dewhurst et al 2003; Martinez-Lorente et al 2004; Mjema et al 2005) and less expensively across geographic locations to the targeted individuals or groups (Andersen 2001). Hence the facility of accommodating external experts has also been incorporated in WQCOST. Using WQCOST, the suggestions are received from both internal and external experts about the application of quality costing in the organization.

In the organizational structure of WQCOST, a personnel called ‘Client’ is incorporated to submit the different quality costs from different departments/divisions in the organization. In the WQCOST, the client is one who is authorized to account the quality costs against the well defined quality cost elements. These clients are already informed and educated through the WQCOST about their responsibilities by the facilitator.

IT has the ability to link and enable employees both within and across departments and divisions of an organization (Hedelin and Allwood 2002) through its various tools. Thus, the limitations of conventional quality costing, which are addressed as ‘Lack of understanding and awareness about quality costing concept’, ‘Company culture’ and ‘Inadequate data and information about quality costing’ (Eldridge et al 2006), are overcome by designing the WQCOST.

In the WQCOST, the facilitator defines and documents the quality cost categories, quality cost elements, departments and all other relevant background information. Hence the limitation addressed as ‘Generalization of the terms used in quality costing among different organizational levels’ (Eldridge et al 2006) is also overcome by designing the WQCOST. IT based inbuilt tools in the WQCOST are efficient enough to collect, account and analyze data, information and knowledge. Therefore, another limitation
addressed as ‘Inefficiency of accounting and analyzing system’ (Eldridge et al 2006) has also been overcome by designing the WQCOST.

WQCOST has been designed in such a way that, the security and privacy of client, expert and facilitator are ensured by providing individual user names and passwords. The communications between facilitator and experts, facilitator and clients are carried out using email. Thus an electronically controlled virtual team operates the WQCOST. These features are depicted in Figure 6.1. During the module of the research work being reported in this chapter, the WQCOST incorporated with these features has been developed using ASP.

Error!

![Figure 6.1 Framework of WQCOST](image)

6.3 WQCOST: FUNCTIONALITY

The functionality of WQCOST is depicted in Figure 6.2. The home page of WQCOST is shown in the Figure 6.3. As shown, this home page enables the user to invoke the links. In order to overview the principles of conventional P-A-F quality costing model, the user has to press the link
‘Quality Costing’. The functionality of WQCOST can be read on pressing the link ‘WQCOST’. ‘Registration’ link can be used to register the organization with WQCOST. Through ‘Feedback’ link, the user can furnish the suggestions regarding the usability of this site. As the name implies ‘Guidance’ link is used to guide users to use WQCOST.

Figure 6.2 Functionality of WQCOST
6.3.1 General Functions of the Facilitator

In the organization home page, by pressing the button ‘Members Area’, the facilitator can visit a screen called ‘member’s area’. This screen is shown in Figure 6.4. As shown, the name and details of the organizations registered with WQCOST are displayed in this screen.
On clicking the organization’s name, the project gateway screen shown in Figure 6.5 appears. The facilitator logs in WQCOST for registering new WQCOST project using the link ‘Facilitator, click here to register New Projects’ in the ‘project gate way’ screen. After this, the screen shown in Figure 6.6 appears which enables the facilitator to enter the data and password specific to the project in the respective text boxes. Then the facilitator logs out.
Figure 6.5  Project gateway screen

Figure 6.6  WQCOST project registration screen
Against any visit other than registering new projects into the WQCOST, the facilitator uses the link ‘Facilitator, click here to visit Old Projects’ in the project gateway screen. After logging in, the facilitator views the facilitator home page screen shown in Figure 6.7.

![Facilitator home page screen](image)

**Figure 6.7 Facilitator home page screen**

On clicking the button ‘Define Quality Cost Element’ in this screen, the screen shown in Figure 6.8 appears. This screen enables the facilitator to define the quality cost elements under each quality cost category. On pressing the button ‘Define Quality Cost Department’, the screen shown in Figure 6.9 appears. This screen enables the facilitator to register departments in the organization associated with quality costs.
Figure 6.8 Quality cost element registration screen

Figure 6.9 Screen enabling the registration of departments
6.3.2 Client Related Functions

For registering the clients in the WQCOST, the facilitator uses the button ‘Client Registration’ on the facilitator home page. On pressing the button, the screen shown in Figure 6.10 appears. This screen enables the facilitator to register the details about each client and allot an user name and password to each client. By using this user name and password, the client can visit the WQCOST to submit the quality cost from his department. On clicking the button ‘Email message to clients’ an email message screen appears. By using this screen, the facilitator communicates to the clients.

![Figure 6.10 Client registration screen](image)

By using the username and password, the client visits the WQCOST, to register the quality costs dealt by him/her. After logging in, the client views a screen shown in Figure 6.11. In this screen, on the left frame, all the quality cost elements under each category related to this organization.
are displayed. From that the client has to select suitable quality cost element against which he/she would enter the quality cost data. If no relevant quality cost element is available in the list, then the client has to select ‘others’.

Figure 6.11 Client’s entry screen

On clicking any quality cost element displayed in the left frame, the form shown in Figure 6.12 appears on the right frame. In this form, the selected quality cost category and element are displayed. If the client selects ‘others’ from that list, then in that form the client has to enter the quality cost element. Then by using the combo box, the client has to select the type of quality cost source. Using this facility, the client has to indicate whether the quality cost is related to the product, process, customer, supplier or any other type. Next the client has to enter the quality cost amount in the respective text box of the screen.
Figure 6.12  Client quality cost claim entry form screen

Different text boxes are provided to enter various forms of quality costs like energy cost, equipment cost, employee and labor cost, and overhead and other cost. Finally the client has to select the suitable department displayed in the form to indicate that the quality cost is related to that department. On clicking the ‘save’ button, the entered data will be stored. Then the client logs out.

When the facilitator visits the WQ COST, on clicking the button ‘Client’s Quality Cost Claim and Approval’ in the facilitator home page screen, he/she can view a screen shown in the Figure 6.13. In this screen, on the left frame, the clients’ names are displayed. On clicking the name of a client, on the right frame the quality cost claims submitted by that expert is displayed in the ‘Cost category and Element’ with ‘Date’ format. This screen is shown in Figure 6.14.
Figure 6.13 Screen displaying the quality cost client list

Figure 6.14 Screen for viewing the quality cost claim
On clicking a cost category and element link, on the left frame, the quality cost claim form corresponding to that client is displayed. This screen is shown in Figure 6.15. Here the WQCOST offers rights to the facilitator to edit any data provided by the client. Finally if the facilitator clicks the button ‘Approve’, the data in the form will be accepted, lest the claim provided by the client will be ignored by the WQCOST.

![Figure 6.15 Quality cost claim approval screen](image)

### 6.3.3 Quality Cost Analysis

In the facilitator home page, on clicking the button ‘Quality cost elements under each category’, the screen shown in Figure 6.16 appears. In this screen the facilitator selects the quality cost categories like Prevention, Appraisal, Internal failure, External failure and Total cost and money value conditions like >, < and = using the combo box facility. After pressing the
‘submit’ button, in the same screen all the quality cost elements under the selected category and money value condition are displayed as a table.

Figure 6.16 Screen displaying the quality cost elements under each category

The button ‘Quality cost elements associated with a department’ in the facilitator home page enables the facilitator to view the quality cost elements and corresponding quality costs under the selected quality cost category, money value condition and department. He/She also views the summation of these quality costs. This screen is shown in Figure 6.17.
Figure 6.17  Screen displaying the quality cost elements associated with a department

The button ‘Quality cost elements associated with a Source’ in the facilitator home page enables the facilitator to view the quality cost elements and corresponding quality costs associated with the selected source. He/She also views the summation of these quality costs. This screen is shown in Figure 6.18. The button ‘Quality costs for a period’ in the facilitator home page enables the facilitator to view the quality costs incurred during a certain period under the selected quality cost category. This screen is shown in Figure 6.19.
Figure 6.18  Screen displaying the quality cost elements associated with source

Figure 6.19  Screen displaying the quality cost for a period
On clicking the button ‘Download analysis tool’ in the facilitator home page screen of Figure 6.7, the visual basic based analysis tool will be downloaded to the ‘C’ drive of the working computer. Then on clicking the icon of the QC tool, the screen shown in Figure 6.20 is displayed. In this screen on clicking the button ‘pie chart’, the screen shown in Figure 6.21 appears. The contribution of different categories of quality cost is shown in the pie chart. On pressing the button ‘Pareto chart- Cost Element’, the screen shown in Figure 6.22 appears. This screen displays a Pareto chart, which shows the values of different quality cost elements under a quality cost category for a period. On clicking the button ‘Pareto chart – Cost Source’, another Pareto chart, displaying quality costs associated with different sources under a quality cost category, appears on this screen.

![Figure 6.20 Analysis tool screen](image-url)
Figure 6.21 Screen displaying the Pie chart

Figure 6.22 Screen displaying the Pareto chart - Cost element
On clicking the button ‘Trend analysis- (Cost Category)’, the screen shown in Figure 6.23 appears. This screen displays a graph of different quality cost categories for the selected period. On pressing the button ‘Trend analysis- (Total cost)’, the screen shown in Figure 6.24 appears. This screen shows a graph of total quality cost incurred during the selected period.

Figure 6.23 Screen displaying the trend analysis - Cost category
6.3.4 Expert Related Functions

On clicking the button ‘Expert Registration’ in the facilitator home page, the screen shown in Figure 6.25 appears. This screen enables the facilitator to enter the details of the expert and allot user names and passwords to them. After saving, the same screen will appear for enabling the new expert to get registered with the WQCOST. This interaction will continue till all the experts register with WQCOST. By using the link, ‘Invite Experts’ in the facilitator home page screen, the facilitator communicates to the experts. The facilitator can invite the experts to visit the WQCOST to provide suggestions and opinions about the quality cost trend in the organization.
On logging in the WQ COST by the expert, the Expert home page screen shown in Figure 6.26 appears. This screen contains the following buttons which are similar to that of the facilitator home page.

1. Quality cost elements under each category
2. Quality cost elements associated with a department
3. Quality cost elements associated with a source
4. Quality costs for a period
5. Download quality cost analysis tool
The expert can also use all the above buttons. Using these buttons the expert can analyze the quality cost trend in the organization. After viewing all the above screens, the expert can register his/her opinion and suggestion about the trend of quality costs in the organization in the text box provided in the expert opinion screen. This screen will appear on pressing the button ‘Expert opinion’ in the expert home page screen.

6.3.5 Facilitator Report

On pressing the button ‘Expert opinion’ in the facilitator home page, the screen shown in Figure 6.27 appears. In this screen, on the left frame, the list of expert’s names is displayed as a table. On clicking an expert’s name, his/her opinion appears on the screen. After viewing expert’s opinions and his/her own analysis, the facilitator registers his/ her opinion and suggestions in the WQTCOST. In the facilitator home page, on pressing the button ‘Facilitator report’, the screen shown in Figure 6.28 appears.
Figure 6.27 Screen for viewing experts’ opinion

Figure 6.28 Facilitator report screen
This screen enables the facilitator to register his/her opinion in the text box provided. This screen also enables the facilitator to view his/her own previous reports.

6.4 CONCLUSION

Even after the intense efforts made by researchers and practitioners to increase the awareness about the importance and benefits of quality costing, the results in terms of enhanced quality at reduced cost have not been visible in organizations (Eldridge et al 2006). In fact, many leading organizations are reluctant to collect, account and analyze their quality related costs. An overview on the literature would indicate that IT tools are efficient in collecting, recording, accounting, analyzing data and information and knowledge (Andersen 2001), and also effective in changing the culture of people. Therefore the WQCOST was developed during the module of research work reported in this chapter by integrating IT tools with P-A-F quality costing model. In WQCOST, quality cost categories, elements and operating procedures are clearly defined. Therefore it eases the quality cost data collection and reporting them.