ELSEVIER

Information & Management 40 (2003) 649–661

INFORMATION & MANAGEMENT

www.elsevier.com/locate/dsw

A project management quality cost information system for the construction industry

Peter E.D. Love[a,*], Zahir Irani[b]

[a]We-B Centre, School of Management Information Systems, Edith Cowan University, Churchlands, Perth, WA 6018, Australia
[b]Department of Information Systems and Computing, Brunel University, Uxbridge, Middlesex UB8 3PH, UK

Received 2 June 2002; accepted 21 August 2002

Abstract

A prototype Project Management Quality Cost System (PROMQACS) was developed to determine quality costs in construction projects. The structure and information requirements that are needed to provide a classification system of quality costs were identified and discussed. The developed system was tested and implemented in two case study construction projects to determine the information and management issues needed to develop PROMQACS into a software program. In addition, the system was used to determine the cost and causes of rework that occurred in the projects. It is suggested that project participants can use the information in PROMQACS to identify shortcomings in their project-related activities and therefore take the appropriate action to improve their management practices in future projects. The benefits and limitations of PROMQACS are identified.
© 2002 Published by Elsevier Science B.V.

Keywords: Quality costs; Rework; Project management; Information system; Prototype

1. Introduction

In construction projects, activities are typically divided into functional areas, which are performed by different disciplines (e.g. architects, engineers, and contractors) and that therefore operate independently. Invariably, each discipline makes decisions without considering its impact on others [23]. Moreover, these functional disciplines often develop their own objectives, goals, and value systems. As a result, each discipline has become dedicated to the optimisation of its own function with little regard to, or understanding of, its effects on the performance of the project with which they are involved. In fact, the interfaces that exist between functional disciplines have become a potential barrier for effective and efficient communication and co-ordination in projects [19,22]. When a breakdown in communication is identified, the source of the problem can be typically traced back along the supply chain and it often becomes evident that there were 'informational flow mishaps' in the process. This is linked to information sharing and channelling.

Information that is inaccurate or delayed is seldom filtered and delegated to specified parameters. Consequently, quality failures may occur as a result of ineffective decision-making [16]. This is often exacerbated by the absence of an integrated and systematic information system (IS) to support quality

* Corresponding author. Tel.: +61-8-9273-8125; fax: +61-8-9273-8222.
E-mail address: p.love@ecu.edu.au (P.E.D. Love).

0378-7206/$ – see front matter © 2002 Published by Elsevier Science B.V.
PII: S0378-7206(02)00094-0

management (QM) activities in construction projects. Moreover, the absence of such a system has caused many organisations to develop local insular ways to maintain control over their own domains of responsibility. Thus, information gathering, reporting, and management in a project become uncoordinated and multiple re-drawing and re-keying of information must be undertaken. Ultimately, this leads to time waste, unnecessary costs, increased errors, and misunderstanding, and thus rework, which has been found to be the primary factor of time and cost overruns in construction projects [30]. Furthermore, the ineffective use of information technology (IT) in managing and communicating information exacerbates the amount of rework that occurs in a project [24,29]. There is therefore a need for an IS that can be used to manage quality so that the performance of organisations can be monitored and quality costs determined. This will enable organisations to determine their quality failure costs (in particular rework) and therefore implement strategies for preventing it. The design and development of quality costing systems for construction projects has been limited, to date, because of the complexity associated with having to manage information from a number of organisations with different approaches to managing quality.

2. Quality costs

To acquire knowledge and learn about quality costs, a project quality IS should form an integral part of an organisation's approach to managing its construction projects [1,3,6,7,24,25,31,32,33,35]. To do so, it is necessary to collect, measure, and analyse quality. However, this is complex and problematic, because of the sheer number of activities and organisations involved with procurement. Moreover, organisations vary in size and technological capabilities, and this makes it difficult to manage project-related information, particularly data about quality costs. In fact, many construction organisations have no system in place or even collect quality cost data.

A project management IS with quality costing added could provide the project team members and clients with information about quality failures and the activities that need to be designed to prevent their future occurrence. This can then be used to suggest quality improvement initiatives directed at achieving significant cost savings and quality breakthroughs. Quality-related costs have been found to range from 5 to 25% of an organisation's annual turnover or operating costs [13]. Of this, 90% is expended on appraisal and failure costs [14]. According to Dale and Plunkett [10] quality costs can be reduced by a third when a cost-effective QM system is implemented.

2.1. Calculating quality costs

There are numerous methods for calculating quality costs. For example, costs can be classified as either cost of conformance or non-conformance. Conformance costs include: training, indoctrination, verification, validation, testing, inspection, maintenance, and audits. Non-conforming costs include: rework, material waste, and warranty repairs. However, the most widely accepted method of determining quality costs in construction is the traditional prevention–appraisal–failure (PAF) model, which classifies costs as follows:

- *Prevention*—all amounts spent or invested to prevent or reduce errors or defects, that is, to finance activities aimed at eliminating the causes of defects;
- *Appraisal*—the detection of errors or defects by measuring conformity to the required level of quality: issued architectural and structural drawings, work in progress, incoming and completed material inspection (e.g. reinforcement, door hardware, etc.);
- *Internal failures*—due to scrapping or reworking defective product or compensation for delays in delivery; and
- *External failures*—after the delivery of a product to the customer: costs of repairs, returns, dealing with complaints, and compensation.

These relate only to preventing and correcting errors of a poor product/service quality. In fact, they only represent the direct, tangible, and visible portion of the costs. Some quality costs can be estimated with a high degree of precision, while others can be only estimated. Examples of prevention and appraisal techniques used in construction are shown in Table 1.

As Banks [2] points out, costs will rise as more time is spent on prevention. As processes improve, appraisal

دریافت فوری ← متن کامل مقاله

ISIArticles
مرجع مقالات تخصصی ایران

✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
✓ امکان دانلود نسخه ترجمه شده مقالات
✓ پذیرش سفارش ترجمه تخصصی
✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
✓ دانلود فوری مقاله پس از پرداخت آنلاین
✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات