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Importance of Quality for Construction Project Success

H. Mallawaarachchi^{1*}and S. Senaratne²

¹University of Moratuwa, Colombo, Sri Lanka ²Western Sydney University, Australia *E-Mail: hmallawarachchi@gmail.com, TP: +9471-2201158

Abstract: Construction projects are always expected to create a balance between cost, time and quality. It is possible to have high quality and low cost, but at the expense of time, and conversely to have high quality and a fast project, but at a cost. High quality is not always the primary objective for the client; however, it is extremely important to a successful project. An appropriate level of quality could be determined during all phases of the construction project. Specially, construction and commissioning are two critical phases where the project could impact by its operability, availability, reliability, and maintainability of a facility. Ultimately, a facility with a good construction quality program and minimal defects is more likely to have a smooth and trouble free transition into the commissioning and qualification phase of the project. This creates a great potential for quality improvements in construction projects, as the poor quality could negatively effect to project failures. Therefore, the purpose of this research is to investigate the importance of quality for construction project success. Accordingly, quality and related key literature were reviewed and a framework of quality for construction project success was developed.

Keywords: Quality, Construction Projects, Success, Importance

1. Introduction

Attainment of acceptable levels of quality in the construction industry has long been a problem. Great expenditures of time, money and resources, both human and material, are wasted each year because of inefficient or nonexistent quality management procedures [1]. During the last decades construction industry has been heavily criticized for its performance and productivity compared to other industries [2].

Poor quality in construction projects is a common phenomenon in the world [3]. Further, [4] stated that the satisfaction of quality level in the construction projects has not been achieved and, it is a serious problem. However, most of the countries have been evolved to implement quality standards to ensure construction quality. Therefore, it is necessary to investigate the importance of quality for construction project success. Hence, the purpose of this research is to determine the importance of quality for construction project success. The framework of quality for construction project success is developed accordingly.

2. Literature Review

2.1 Definitions to Quality

Quality can be defined as meeting the legal, aesthetic and functional requirements of a project. Requirements may be simple or complex, or they may be stated in terms of the end result required or as a detailed description of what is to be done. However, the quality is obtained if the stated requirements are adequate, and if the completed project conforms to the requirements [1]. Some design professionals believe that quality is measured by the aesthetics of the facilities they design. According to [5], this traditional definition of quality is based on such issues as how well a building blends into its surroundings, a building's psychological impacts on its inhabitants, the ability of a landscaping design to match the theme of adjacent structures, and the use of bold new design concepts that capture people's imaginations. Quality can also be defined from the view point of function, by how closely the project conforms to its requirements. The concept of quality management is to ensure efforts to achieve the required level of quality for the product which are well planned and organized. However, in the construction industry, quality can be defined as meeting the requirements of the designer, constructor and regulatory agencies as well as the owner [6].

2.2 Application of quality in construction industry

From the perspective of a construction company, quality management in construction projects should mean maintaining the quality of construction works at the required standard so as to obtain customers' satisfaction that would bring long term competitiveness and business survival for the companies [7]. Further, the adoption of quality in construction industry has been promoted in some literature [8; 9]. The application of ISO standards has received much attention from researchers. ISO certification is nowadays a trend in most industries including construction industry [10].

According to study by [11], for the implementation of quality management in project management, the concepts of quality planning (identification of quality standards), quality assurance (evaluation of overall project performance) and quality control (monitoring of specific project results) in the quality management processes are importance. Among those, quality assurance (QA) and quality control (QC) are mostly used in construction.

The quality control procedure in construction projects is based on tender documents, specifications, working drawings etc., therefore, the pre tender stage quality and standards of the work should be properly maintained. Therefore it is important to maintain quality control of the building projects from the inception of its design stage up to the completion of construction including the maintenance period [12]. Quality Assurance (QA) is a program covering activities necessary to provide quality in the work to meet the project requirements. QA involves establishing project related policies, procedures, standards, training, guidelines, and system necessary to produce quality. QA provides protection against quality problems through early warnings of trouble ahead. Such early warnings play an important role in the prevention of both internal and external problems". On the other hand Quality Control (QC) is the specific implementation of the QA program and related activities. Effective QC reduces the possibility of changes, mistakes

4.2 Factors affecting construction project quality

and omissions, which in turn result in fewer conflicts and disputes [11]. The design professionals and constructors are responsible for developing an appropriate program for each project to enhance the project quality.

3. Research methodology

Key research papers relating to quality, quality management, quality management procedures in construction industry were reviewed in order to determine the importance of quality for construction project success.

4. Findings and Discussion

4.1 Importance of quality for construction projects

A construction project in its life span goes through different phases. The main phases of a project can be described as: conceptual planning, feasibility study. design. procurement, construction, acceptance, operation and maintenance. Ouality is one of the critical factors in the success of construction projects. Quality of construction projects is linked with proper quality management in all the phases of project life cycle. Design and construction are the two important phases of project life cycle which affect the quality outcome of construction projects significantly [2]. Further, quality of construction projects can be regarded as the fulfillment of expectations of the project participants by optimizing their satisfaction. It is because, since the quality outcomes of the projects are not according to required standards, faulty construction takes place. Further, the errors on construction projects occur frequently and can be costly for the contractors and owners of constructed facilities. In fact, 6-15% of construction cost is found to be wasted due to rework of defective components detected late during construction and 5% of construction cost is due rework of defective wasted to components detected during maintenance [13]. Hence, quality has become one of the most important competitive strategic tools which many construction organisations have realized it as a key to develop their building products in supporting the continuing success [14].





Establishing project requirements at the project inception stage could affect the quality of completed project. As [1] mentioned that, quality of any construction project is meeting the requirements of the designer, constructor and regulatory agencies as well as the owner. The following Figure 1 illustrates the project requirements of the designer, constructor, regulatory agencies and the owner, that could be meet by enhancing the project quality as found in key literature.

Accordingly, a careful balance between the owner's requirements of the project costs and schedule, desired operating characteristics, materials of construction, etc. and the design professional's need for adequate time and budget to meet those requirements during the design process is essential. Owners balance their requirements against economic considerations and, in some cases, against chance of failure [6]. The design professional is obligated to protect public health and safety in the context of the final completed project.

The constructor is responsible for the means, methods, techniques, sequences, and procedures of construction, as well as safety precautions and programs during the construction process [6; 15]. The completion of project in accordance with the project requirements could be assured by the quality of its construction. Project requirements are the key main factors influencing construction project quality. However, it can be influenced by many factors.

According to a study by [16], management commitment and leadership in construction organizations could affect construction quality. It is because, the poor management practices directly and indirectly lead to decline of construction productivity and ultimately affect on project quality. In construction terms, cost, schedule, and possibly quality goals are established for each project. Project managers are rewarded on the basis of meeting these goals [17]. Further, the quality teams provide companies with the structured environment necessary for successfully implementing and continuously applying the quality in construction [16]. As [16] further stated, extent of teamwork of parties participating in the design phase was found to be the most important factor that affects quality teamwork among parties such as Structural Engineers, Electrical Engineers, Environmental Engineers, Civil Engineers, Architects, and owners is essential to reach the quality goals for design. Further, in the construction phase, extent of teamwork of parties participating in the construction process was found to be very important.

4.3 Cost of poor quality

Construction projects are always expected to create a balance between cost, time and quality. Even though, improving quality is not always the major objective of the project; the poor quality could create cost to organisation. The cost of poor quality refers to the costs associated with providing poor quality product or service. The cost due to failure, appraisal and prevention are three major cost categories that could be directed by poor quality [18]. As [18] further mentioned, failure cost could be occurred as internal and external failures. Internal failure cost includes rework, crap, reinspection. re-testing, redesign, material review etc whilst external failure cost includes processing customer complaints, customer returns, warranty claims and repair costs, product liability and product recalls. Further, appraisal cost could incur while performing measuring, evaluating, or auditing to assure the quality conformance. These costs include first time inspection, checking, testing, process or service audits, calibration of measuring and test equipment, supplier surveillance, receipt inspection etc. The prevention cost include the costs related to all activities of preventing defects from occurring and to keep appraisal and failure to a minimum, such as, new product review, quality planning, supplier surveys, process reviews, quality improvement teams, education and training etc [14].

Hence, it creates a necessity to enhance the quality of construction projects to lead them towards successful completion. As per the extant literature, adopting quality into building process is therefore utmost important. In construction. failure can result from malfunction on the part of constructor. designer, or even owner. In most cases however, it is the result of a combination of actions by several or all of these parties. previous According to researches. the construction organisation must, therefore, have the ability to deal effectively with all parties involved to make the project success with high project quality. The implementation of quality management plan therefore could start at the project inspection stage and should continue throughout the whole life cycle phases.

Enhancing the quality of drawings, and specifications could be done at the early stages that could affect the quality in design and construction phases and, ultimately the quality of constructed facility. Drawings are the only documents given to the constructor that show the design concept, size and scope of the job. It is critical that drawings and specifications be clear, concise, and uniform. Further, constructability of the design could improve as it affects the quality of design.

The design should be reviewed for effectiveness and compatibility with local requirements, including both the initial construction and post construction operations. Both the initial design constructability and the completed operational design should also be reviewed.

Providing quality training for construction related professionals who have engaged in construction could also effect to enhance project quality. Here, the awareness and training of quality management aspects relating to whole phases is essential. In addition to that, all the parties should be work together as a team in the quality management process to achieve certain quality goals. Partnering arrangements between those parties will enhance the total quality.

The Figure 2 illustrates the importance of enhancing the project quality for construction project success where, the quality drawings, standards, constructability of design, management commitment, training and awareness and the team working of all parties involved in the building process may lead to enhance construction project quality. Accordingly, it may reduce the unnecessary cost of poor quality whilst meeting project requirements by satisfying all the parties involved in the construction process.



Figure 2: Framework of quality for construction project success

5. Conclusions

Directing a construction project towards quality with low cost and time is a greater concern today. It is because quality is required to meet project requirements of the owners, constructors and other parties involved with a greater satisfaction. Moreover, poor quality could lead to unnecessary cost to the organization where it could create costs due to failure, appraisal and prevention. Hence, it creates a necessity to introduce the concept 'quality' into building process throughout its whole life phases. Implementing proper quality management plan is important at the project inception where, quality drawings, quality standards and constructability of design may lead to enhance the project quality. However, the commitment and the support of the management are important to continue the process. The awareness and training provides a base to collaborate all parties into the process, in which the collaboration of such all parties in quality management process is essential to lead towards construction project success.

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