

Total Quality Management & Construction Project Management in India, Andhra Pradesh

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Abstract— The construction industry has been heavily criticized in recent times for its performance and productivity in relation to other industries. With the turn of time, it appears that the construction industry is going through an intense period of introspection, which is worsened by increased technological and social change. These changes are altering the tempo of the environment within which construction operates. Besides, such changes significantly affect the way business is conducted. Many of the management practices used to support construction organizations are being challenged. The industry's clients are moving forward and demanding improved quality service, faster project delivery and innovations in technology. It is no accident that the construction industry has turned to the manufacturing sector as a point of reference and source of innovation. Quality Management has increasingly been adopted by construction companies as an initiative to solve quality problems and to meet the needs of the final customer. This research therefore aims at evaluating the Quality Management Practices of Indian Contractors with emphases on D1 K1 contractors registered with the ABC Steel company and to achieve this aim, three specific objectives were set for the study and they are to determine whether Indian contractors are committed to Quality Management Planning in the delivery of construction projects; to determine the challenges encountered by contractors while implementing quality assurance during the execution of projects and proposing measures for effective quality assurance practice.

Key words: Introspection, D1 K1 Contractors, Management Planning, Quality Assurance

I. INTRODUCTION

The concept of quality management is to ensure efforts to achieve the required level of quality for a product which is well planned and organized. 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 (Tan & Abdul-Rahman, 2005). Further to this, Olatunji et al (2012) also reiterated that the term quality management as used in the construction industry is all encompassing and embedded in the phenomenon itself and are concepts such as quality control, quality assurance, quality improvement, quality standards etc. The authors revealed that the earliest form of formal quality management practices in construction can be traced back to ancient Greece and Rome. In addition to the aforementioned, Harris and McCaffer, (2001) opined that quality management practices include all the means employed by managers in an effort to implement their quality

policies. These activities include quality planning, quality control, quality assurance and quality improvement.

Construction quality according to Battikha, (2002) is a critical factor in determining project acceptance and resultant contractual payment levels. This has made participants in the construction industry to become notably conscious of the role of quality as an essential means to achieve client satisfaction and gaining competitive advantage in the industry. It was revealed that acceptable quality levels in construction have long been a problem in attaining on time and within budget projects in a highly dynamic, complex, and competitive environment.

Naoum, (1994) cited in Olatunji et al (2012) indicated that performance on a global level represents results of activities undertaken. He proceeded further to explain that performance of a project is measured as its ability to deliver the building or structure at the right time, cost and quality as well as achieving a high level of client satisfaction. It therefore stands to reason that quality performance in construction is results oriented and seeks evidence of quality awareness within the operations and output of a building/construction team. Quality performance is also defined over the long term for the effect to be permanent Yasamis et al (2002). In other words, quality performance improvements are expected to increase the productivity and profitability of contractors as well as increasing client satisfaction.

A. Total Quality Management

Total quality management is a managerial approach at achieving quality in a broad sense. Today's environment urges total quality management (TQM) to be a managerial approach and style so as to achieve customer satisfaction and global competitiveness.

TQM is based on the following principles:

- 1) Quality integration,
- 2) Quality first,
- 3) Customer satisfaction,
- 4) Continuous improvement,
- 5) Prevention rather than inspection,
- 6) Factual-based decision,
- 7) Workforce involvement.

Quality management aims at conducting the inherent managerial elements of planning, control and improvement (Juran, 1992:14) based on total quality principles. The expected results of TQM are better organization performance, increased productivity, more effective and efficient process and more competitive products. However, the ultimate results of implementing TQM are achieved, management is required to invest in a quality programme by training people, establishing new infrastructure, delegating managerial duties to other and the implementation of quality concepts broadly, throughout the

organization, whereas planning, process and products are included as well as suppliers, employees and customers are considered in the whole quality programme. In the current research the focus is on TQM principles in broad terms and quality control in particular.

B. Factors of Total Quality Management & Organizational Performance

Factors	Mean Rank	Rank
Contract Documents	1.08***	1
Design Drawings	1.25***	2
Improved schedule performance	1.33***	3
Craftsmen Training	1.67**	4
Improved relationships with subcontractors	1.92	5

Table 1:

Based on an extensive literature review of conceptual as well as empirical studies (Flynn et al., 1994; Powell, 1995; Ahire et al., 1996; Black and Porter, 1996; Zeitz et al., 1997), Motwani (2001) has identified seven factors critical to TQM implementation and 45 measures of TQM performance. The seven factors include top management commitment; quality measurement and benchmarking; process management; product design; employee training and empowerment; vendor quality management; and customer involvement and satisfaction. The factors are briefly explained below in the form of excerpts from the work by Motwani (2001).

1) Top Management Commitment

The degree of visibility and support that management takes in implementing a total quality environment is critical to the success of TQM implementation. Four distinctive ways that management can support TQM implementation: allocating budgets and resources; control through visibility; monitoring progress; and planning for change. There should be a focus on transferring management support to the shop floor. Management should plan to reduce traditionally structured operational levels and unnecessary positions. Simplifying the organization will lead to the establishment of an infrastructure of integrated business functions participating as a team and supporting the strategic vision of the company.

2) Quality Measurement & Benchmarking

A company must embrace strong acceptance and maintenance of a total quality measurement and benchmarking plan. Quality programs should measure the percentage or the number of parts that deviate from the acceptable in order to prevent the recurrence of a defect. The cost of quality could include relevant changes in market share, warranty costs, and inspection, reworks, and scrap costs. The cost of nonconforming raw materials could include lost revenue or productivity costs and would aid in vendor selection and certification.

3) Process Management

This factor emphasizes adding value to processes, increasing quality levels, and raising productivity per employee. However, there were varied tactics emphasized to accomplish this factor. The list contains: improving work center methods and installing operator-controlled processes that lead to a lower unit cost, embracing kaizen (continuous improvement) philosophies, reducing the operator material handling duties,

promoting a design for a manufacturing program, and achieving a compact process flow.

4) Product Design

Design practices provide an ideal starting point for the study of quality performance. A wide range of possible choices exist till designs are finalized. Organizations should consider the factors when planning for the product design processes: understand fully the customer product and service requirements; emphasize fitness of use, clarity of specifications and producibility; involve all affected departments in the design reviews; and avoid frequent redesigns.

5) Employee Training & Empowerment

Employees must be oriented to a company's philosophy of commitment to never-ending improvement, be informed of company goals, and be made to feel a part of the team. Proper training includes explanation of overall company operations and product quality specifications. Specific measures for evaluating training include: the time and money spent by organizations in training employees and management in quality principles, problem solving skills, and teamwork. On the other hand, specific measures of employee empowerment include: the degree to which cross-departmental and work teams are used, the extent of employee autonomy in decision making, the extent of employee interaction with customers, and the extent to which employee suggestion systems are being used.

6) Vendor Quality Management

Many companies now support, at least in theory, the need to work more closely with their suppliers. Partnerships with suppliers have the greatest appeal to most companies due to the shared risks associated with the development of new products. Vendor partnerships should be based on a quality program and accepted documentation of progress towards continuous improvement in quality.

7) Customer Involvement & Satisfaction

Customer service should be addressed from two main areas: internal customer service and external customer assurance. Components of an internal customer service plan should include providing timely and dependable deliveries, presenting improvements or cost saving suggestions to management and authorizing employees to self-implement solutions, cross-training employees for mastery of more than one job and providing adequate technical training. An external customer service program should include providing customers with timely information and quick responsiveness to complaints, and maintaining a corporate goal to reduce the quantity of questions or complaints while recognizing all successful efforts by employees in providing outstanding service. Measures need to be those which show where improvement has been made and where improvement is possible, rather than merely monitoring people's work.

Factors which are critical to success or failure of TQM may be classified as soft and hard. Nofal et al. (2005) explains the soft factors as those which are intangible and difficult to measure. Such factors are related to leadership and employee involvement and include commitment and involvement of senior executives; comprehensive policy development and effective deployment of goals; entire workforce commitment to quality goals of the organisation; supervisors, unit heads and divisional managers assume

active new roles; empowerment; effective communication; internal customersupplier concept; teamwork; system for recognition and appreciation of quality efforts; and training and education. On the other hand, systems and quality tools and techniques are referred to as the hard factors of quality. Benchmarking, performance measurement, quality control tools, cost of quality, supplier and customer management, and quality management systems are included in the hard category of factors. Combining various soft and hard factors, Al-Nofal et al. (2005) have proposed 19 elements of TQM. The elements include leadership; employee involvement and empowerment; middle management role; training and education; rewards and recognition; teamwork; role of employee unions; policy and strategy; resources management; communicating management; managing suppliers; accredited quality management system; organizing for quality; managing by process; benchmarking; self-assessment; cost of quality; quality control techniques; and measuring customer wants and satisfaction. They have examined the impact of such factors on the success of TQM implementation in different geographical contexts. They have found that top management commitment, maximising employee commitment; involvement and empowerment, managing by customer-driven systems and processes, and continuous improvement, are most essential and fundamental to effective and successful implementation of TQM.

Seetharaman et al. (2006) have investigated why TQM fails in many organizations despite the proven fact that it is an approach which leads to improvement in various dimensions of organisational performance. The research points out that, though most organizations start TQM efforts for their success, they are frequently exposed to the factors which may cause their TQM efforts to delay or even fail. TQM is a sure bet to reverse poor performance, but when it did not yield the expected results, it was deemed a failure. The review has been done to identify the common problems that lead to the failure of TQM implementation in the organization and has pointed out the critical success factors of TQM. Nevertheless, the overall results of this research imply that the understanding of the elements that cause failure to the TQM implementation can provide needed help for companies involved in long-term continuous improvement efforts. If the advanced TQM approach is properly followed, it will help the companies to achieve organizational excellence.

C. Approach to Data Collection

According to Naoum (2007) there are two approaches to data collection namely, fieldwork (primary data collection) and desk study (secondary data collection). Patton (2002) noted that using more than one data collection instrument strengthens and gives credibility to the study. The researcher used multiple sources of data because of the added benefits (such as the validity of the data gathered) associated with multiple sources (Owusu, et al., 2007).

The approach for collecting data in this study was divided into two main parts desk survey and field survey.

1) Desk Survey

The desk survey (literature review) forms an essential aspect of the research since it sets the pace for the development of field survey instruments using questionnaires, and interview

(Fadhley, 1991 and Owusu, 2008). Secondary sources of information were identified and collected in books, articles, technical journals and from databases. The secondary source of information for this research was collected from two sources; mainly internal and external sources.

2) Internal Secondary Sources

These are published within companies or organizations, such as annual reports, information booklets, brochures, magazines, financial information memoranda, financial reports, plant and equipment registers. This type of internal secondary source of information for the research was collected from the selected consultancy firms.

3) External Secondary Sources

External secondary source of data gathering was described by Wahab (1996) as a primary literature source. Accordingly, it is the most accurate source of information as it contains the original research. Alternative sources of external secondary sources of information include textbooks, technical journals, newspapers, magazines and internet sources.

II. DATA COLLECTION INSTRUMENT

A. Questionnaire

A questionnaire is a printed self-report form designed to elicit information that can be obtained through written responses of the subjects. The information obtained through a questionnaire is similar to that obtained by an interview, but the questions tend to have less depth (Burn et al., 1993). Questionnaires were developed because of the following: They offered possibility of anonymity because subjects' names were not required on the completed questionnaires. There was less opportunity for bias as they were presented in a consistent manner. Most of the items in the questionnaires were closed, which made it easier to compare the responses to each item. They required less time and energy to administer.

B. Content of Questionnaires

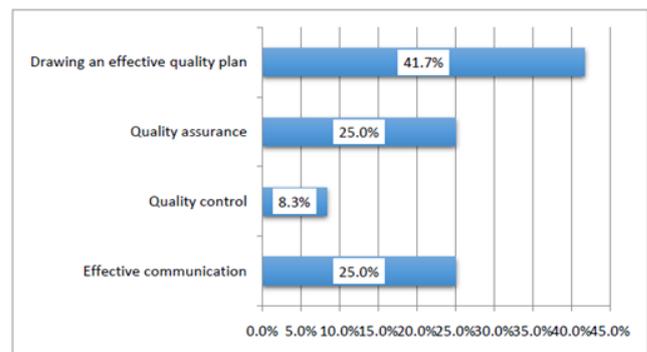


Fig. 1:

Generally, the questionnaire was designed to collect data from contractors registered with the ABC steel company in India. These questions were grouped in categories to collect data on knowledge in quality management and its effects on project performance. Part one solicited personal and general information from the construction firms on their commitment to quality management practices in the specific area of quality assurance using interviews.

Part two solicited information on firm's management philosophy towards quality. It also seeks to

determine whether the construction companies are committed to ensuring quality in their deliveries. In Part three, the researcher seeks to find out whether the contractors encounter challenges while implementing Quality Assurance. The final part of the questionnaire was designed to solicit the views of the respondents on measures for effective Quality Assurance Practices.

C. Questionnaire Administration

The research questions were developed by the researcher and were reviewed by some experts in academia and in construction project practice. Subsequently, a pilot test of the questionnaire and interview was conducted for five (5) contractors to identify and eliminate potential ambiguity in the questionnaire. Some questions were reviewed as a result of non-response from the respondents of the pilot study. This was done to improve the reliability and validity of the questionnaire. The questionnaires were self-administered on one-to-one basis. To improve the response rate, a number of follow-up procedures and strategies were considered, such as sending reminder surveys or notices to non-respondents. However, this was not considered to be viable, as Schneider (1985; cited in Dunn and Huss, 2004) observed that increasing the response rate may negatively affect the reliability of the information obtained. That study further states that increased pressure by a researcher on subjects to respond will result in more uninformed responses.

To overcome that, a range of measures to improve the response rate based on established principles of reciprocity, social proof, and legitimacy and authority as recommended by Bednaret al., (2006) were incorporated within the survey. These included measures such as having a shorter questionnaire two pages each in part one and two, and one page in part three. To reciprocate their gesture, some respondents were promised a summary report of the results of the study. The primary data collected was reviewed by the researcher to ensure maximum accuracy, legibility, completeness, consistency and to reduce ambiguity.

III. RESEARCH POPULATION & SAMPLING TECHNIQUE

A. Research Population

A research population can be defined as the totality of a well-defined collection of individuals or objects that have a common, binding characteristics or traits (Polit et al., 2006). Burns et al., 1993 added that a population is defined as all elements (individuals, objects and events) that meet the sample criteria for inclusion in a study. The research covers a population of Fifteen (15) respondents made up of construction firms based in Accra. The main reason for using this category of firms is that their activities directly or indirectly have a bearing on quality management in the execution of projects. The criteria for inclusion or exclusion of the respondents are stated below.

B. Inclusion Criteria

Inclusion criteria are the characteristics that the respondents must have in order to be included in the study (Burns et al., 2001). The respondents included in this study were D1 K1 contractors registered with the ABC Steel company in India.

C. Exclusion Criteria

Exclusion criteria are the characteristic that the respondents lack in order not to be included in the study (Burns et al., 2001). In this study the respondents not willing to participate in the study and contractors who were not registered with the ABC Steel company in India.

D. Sampling

Sampling is a process of selecting a portion of the population to represent the total population and the findings from the sample represents the rest of the group (Burns et al., 2001). The advantage of selecting a sample is that it is less costly and time saving than collecting information from a large group of respondents. The selected sample should therefore, have similar characteristics to the population under study to allow generalisability of the results to represent the population (Burns et al., 2001, Polit et al., 2006). There are two types of sampling, namely probability and non-probability sampling (Burns et al., 2006). In this study non-probability sampling is used.

IV. CONCLUSIONS

From this study the following conclusions were made

- 1) The study evaluated the Quality Management Practices of Indian Contractors with emphases on D1 K1 contractors registered with the ABC Steel company and the objectives set for this purpose were to determine whether Indian contractors are committed to Quality Management Planning in the delivery of construction projects, determine the challenges encountered by contractors while implementing Quality Assurance during the execution of projects and proposing measures for effective quality assurance practice leading to a higher levels of satisfaction in the Construction Industry.
- 2) The main findings of the study revealed that meeting project deadline and quality were the two key factors considered to be the most relevant in project performance measurement.
- 3) In addition, indicators for Quality were discovered as getting more jobs as a result of previous good works done, management commitment to quality and the overall client or customer satisfaction.
- 4) The findings further revealed some challenges encountered during the implementation of Quality management and these are; lack of effective supervision, lack of effective communication, lack of management's commitment to quality assurance, lack of proper equipment available for use and lack of a quality assurance team to lead.
- 5) Quality Management practices remain optimum for achieving effective project performance in all types of infrastructural development, both in developed and developing countries.
- 6) To this end, the commendations submitted in this research would assist Ghanaian contractors in

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REFERENCES

- [1] Arditi, D. and Gunaydin, H. M. (1997). Total quality management in the Construction Process. *International Journal of Project Management*, Vol 15 No.14, pp 235-243.
- [2] K.N. Jha, K.C. Iyer, Critical Factors Affecting Quality Performance in Construction Projects, *Total Quality Management*, 17(9) (2006), pp. 1155-1170.
- [3] Enhassi et al. (2007). Factors Affecting Labour Productivity In Building Projects in the Gaza Strip. *Journal of Civil Engineering and Management*, Vol. XIII, No. 4.
- [4] Tari J. J. (2005). Components of successful Total Quality management. *The TQM Magazine*, Vol. 17 No. 2, pp. 182-194.
- [5] Harrington, J.H., & Voehl, F. (2012). Applying TQM to the Construction Industry. *The TQM Journal*, Vol. 24 No.4, pp 352-362.
- [6] Jung, J.Y. and Yong, J. W. (2006). Relationship between total quality management (TQM) and continuous improvement of international project management (CIIPM). *Technovation* 26 pp 716–722.

