

A Study of Quality Management System In Construction Projects

Abhishek Dubey¹, Rakesh Sakale², Hirendra Pratap Singh³

¹Dept of Civil Engineering

²HOD & Guide, Dept of Civil Engineering

³Assistant Professor, Dept of Civil Engineering

^{1,2,3} SORT, People's University, Bhopal (M.P.)

Abstract- *The construction of a major project requires a vast amount of time, money, material and human resources. Proper coordination of these elements into an array of activities is crucial to the success of the project if it is to be built on time and within budget. As technology advances, the complexity of the project increases, however, the resources to build them remain finite, and therefore, the project manager must seek methods to improve control on the construction project.*

This Projects study provides an overall view of the relatively new and rapidly expanding field of Quality in engineering. Quality in engineering may be defined as that field of engineering practice where engineering judgment and experience are utilized in the application of science principles and techniques too.

Although this area has tremendous impact on the economics of private industries and the government, Quality control has usually underestimated. Virtually all decisions to construct a facility is based on economics, intern. Once management has committed itself to the project, Keeping main focus on construction of Residential projects, its quality and related parameters, in depth study is completed here.

I. INTRODUCTION

Rapid growth in India pushes a huge construction projects allover in different disciplines of civil construction work. Urbanization in India is also on its peak. Ever increasing demand in each department seen everywhere. It includes Housing, commercial spaces, infrastructure such as Highways, Railways, Ports, Airport, Power etc. obviously, the construction sector is one of the most important parts of countries economy.

The construction industry in all over the world face many challenges and problems, such as workmanship defects, delay and cost overrun in completing their projects . Since over the past three decades, the globalization and competition have been increasing (Neyestani and Juanzon, 2016). Thus, due to competition between construction companies it is important to improve and correct its system by using

management tools. As the results of the studies in 776 projects across the seven industries in different countries have successfully achieve their goals through planning, analysis and controlling by project management (Zwikael and Smyrk, 2011). Successful project management can be defined as if the project achieve its objectives as on time, quality and within cost to meet client's requirement (Kerzner, 2010). The most important factor in the success of the construction project is its Quality. But numerous reports have criticized the construction industry, especially in terms of productivity and quality system (Ali and Rahmat, 2010), and the majority of project mangers has emphasize on cost and time instead of quality for construction projects, but the scholars give more attention towards quality (Mane and Patil, 2015). Quality of construction project is a general philosophy by which a process are carried out in a total quality infrastructure (Alberto, 2011). The first, and one of the most important, is the quality system (Juran and Godfrey, 1999) as a business management tool. In 1987, the first edition of quality system was introduced by the International Organization for Standardization (ISO) to aim quality and customer's satisfaction improvement.

The efficiency and effectiveness of the sectors products determines the overhead costs paid for built infrastructure by the entire economy and this has a critical influence of the competitiveness of each nation. Many governments are actively promoting more efficient and effective local construction industries to improve resource utilization and productivity for the greater good of their local populations.

India's rise in recent years is a most prominent development in the world economy. India has re-emerged as one of the fastest growing economies in the world. India's growth, particularly in manufacturing and services, has boosted the sentiments, both within country and abroad. With an upsurge in investment and robust macroeconomic fundamentals, the future outlook for India is distinctly upbeat.

A decline in demand for construction services in the last decades of the previous millennium led to instability and

interconnected structural problems within the industry. In 2000 the India government enacted legislation that called for the establishment of construction industry development corporation (CIDC). The purpose of CIDC is to implement an integrated strategy for the reconstruction, growth and development of the construction industry in India.

QMS is included organized approach, documentation, guidance, and audit that can be a part of every project management processes from the moment the project initiates to the final steps in the project closure phase as well (Aized, 2012). As ISO 9001 can improve the competence of the processes of the organizations by general guidance and documentations, and persistent improvement through “Plan-Do-Check-Act” (PDCA) methodology to achieve successfully the satisfaction of customer and successfully achieve the objectives of the quality. Unfortunately, most construction companies in developing countries consider QMS is just wasting of time and money for consultancy, training, periodical internal and external audit, and certification fee, without any advantage, and it is just useful to have its certification as a market tool. Therefore, the managers often focus on the certification as the primary objective and requirement more than value in the projects, and this kind of the notion can cause ineffective operation and lack of an efficient QMS. That is why the most project managers do not usually take a wide enough view of what feature constitutes as QMS, and also a measure how the project can add value to the client in short and long term (Madsen, 2013). Few studies showed that lack of support from the Top management is the main reason to implement QMS in the construction industry (khattak, and Arshad, 2015). Also, the lack of enough facts concerning how QMS actually affects on organizational practices and performance (lack of attentiveness in benefits of QMS) is a big problem to motive owners and managers of construction companies in implementing QMS. Thus, this study was done with the aim to evaluate the impact of QMS implementation on the main elements of construction projects (cost, time, and quality/scope) in selected construction companies at Bhopal Madhya Pradesh.

1.1 Scope of study

We observed that even methodology of work is almost same; way of carrying out work is different. Here we find the scope to study by observing the different construction Projects on various parameters and collecting the data. Then analyze the projects and find out what best for the projects and needed to be implemented. While doing the analysis we have to focus on various parameters so that in different phases of

work, some points may vary and then we are in a position to exactly pinpoint the key issues.

Along with this we will have to study how advantages to implement the new technology in India to overcome various issues and complete analysis to identify the gains from the new technology. For doing this first find out recent international technology adopted in last one or two decades before. And its Indian version really found advantageous in various parameters or not. While doing this we consider overall project and its all phases.

We will have to find out whether any recent different approach to India requires from international to overcome the recent scenario. Related expert view and technology and its actual implementation also very important.

The fundamental concept of quality in construction encompasses the following:

1. Establish and maintain quality in construction
2. Creating an awareness of importance and benefits of quality in construction
3. Compliance of codes and specifications leading to total quality in construction

II. LITERATURE REVIEW

The literature review first broadly considers the Quality, key aspects of quality and the impacts of quality. Then quality in the construction industry is discussed in more detail. Finally a number best practice that may be appropriate to quality management of engineering in construction is reviewed and discussed. The terms engineering and design are used synonymously throughout.

The construction industry can be defined as “the broad conglomeration of industries and sectors which add value in the creation and maintenance of fixed assets within the built environment”. Construction works can be defined as “the provision of a combination of goods and services for the development, extension, installation, repair, maintenance, renewal, removal, renovation, alteration, dismantling or demolition of a fixed asset including building and engineering infrastructure”.

QUALITY

The word ‘quality’ has different meanings under different circumstances. The Quality of a product may have greater or lesser significance depending on the need and

requirement of the user. The easiest way to define quality would be “the degree to be a product meets the requirements of a customer”. Or simply “the fitness of the product or service for its intended use”.

Quality control includes all efforts to manage quality and maintain assurance of continued high quality of products or service. Thus, Quality control conveys an idea about determining and maintaining that quality of the product or service which will satisfy the customer by its performance, cost and delivery. An item, even if produced to a level of quality higher than that demanded by the customer will not be appreciated if its cost is too high or if it is delivered to late.

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). Quality system was introduced by ISO on 15, March 1987. ISO is well suited with proprietary approaches to quality management such as those recommended by Deming, Juran, Crosby, and non-proprietary approaches such as TQM, Lean Six Sigma, FMEA, COQ, and other continuous improvement techniques (PMI, 2008). Successful implementation of QMS is to take it as a strategic decision for the organization. The purpose of quality management system can be namely such as reducing possible errors all phases of projects by proper control, finding faults/errors soon, measuring to avoid recurring mistakes, and determining and initiating remedial measures (Aized, 2012). According to the latest survey of ISO (2014), 1,609,294 ISO certificates were issued, and the greater part of them were belonged to QMS standard or 1,138,155 ISO 9001 certificates issued that met the requirements of QMS under external audit of third-party or Certification Body (UNIDO, 2012).

The main purpose of ISO 9001:2008 is to elucidate existing requirements and to improve uniformity of approach with other management standards like EMSs. Recently, ISO 9001:2015 (5th ed.) was published in Sep. 2015. The latest edition is generated a essential change in thinking based on the identification of risk and risk control, structure with 10 clauses. Furthermore, this version can be incorporated much better with other management standards (ISO, 2015d). The ISO 9000 family for QMS is included (ISO, 2010):

- ISO 9000 – Quality management systems — Fundamentals and vocabulary;

Successful implementation of QMS is required to take a planned decision for the organization. The main purpose of QMS is reducing possible errors all phases of projects by proper control, finding faults/errors soon, measuring to avoid. The purpose of quality management

system can be namely such as reducing possible errors all phases of projects by proper control, finding faults/errors soon, measuring to avoid repeated mistakes, and determining and initiating remedial measures (Aized, 2012).

ISO (technical committee ISO/TC 176) has been published five editions for ISO 9000 certification. The ISO 9000:1987 was included three standards for quality assurance: ISO 9001, ISO 9002, and ISO 9003 for being a model for quality assurance in only final inspection and testing. The first version of QMS standard or ISO 9000:1994 emphasized on quality assurance via preventive actions added. ISO 9001:2000 was integrated ISO 9001, 9002 and 9003 into one standard or ISO 9001 and making new standard, its main aim was to shift from “quality assurance” to “quality management” (UNIDO, 2012). Accordingly, it made a radical change in thinking based on process approach, structure (8 clauses), and customer satisfaction. The third version was published in Nov. 2008 with minimal changes made from the 2000 version but greater emphasis on customer focus and satisfaction (ISO, 2010).

ISO 9001 or “quality management certification” is a standard that sets out the requirements that are generic and are intended to be appropriate to all organizations, regardless of their type, size and product provided for quality management system, technical committee of ISO which is TC-176 formulates all the standards of ISO 9001 (khattak, and Arshad, 2015). In ISO 9001:2008, the standard emphasizes more on customer satisfaction through fulfillment of its requirements (Kuen and Zailani, 2007). As can be seen in Table 1, the process approach in ISO 9001:2008 incorporates the PDCA cycle and preventive action-based under the identification and elimination of the root causes of the problems (e.g. errors, defects, lack of adequate process controls) (ISO, 2008), whereas ISO 9001:2015 incorporates the PDCA cycle and “risk-based thinking” (ISO, 2015d). Consequently, the main changes within the ISO 9001:2015 in comparison with ISO 9001:2008 are as follows (IAF, 2015):

- 1) “The adoption of the HLS as set out in Annex SL;
- 2) An explicit requirement for risk-based thinking to understanding better process approach;
- 3) Less emphasis on documents, and fewer prescribed requirements;
- 4) Increased emphasis on organizational context (Environment);
- 5) Increased leadership requirements, and;
- 6) Greater emphasis on achieving desired outcomes to improve customer satisfaction”.

Table-1 The interpretation of PDCA methodology in ISO 9001:2008 & 2015

Version	ISO 9001:2008 (ISO, 2012)	ISO 9001:2015 (ISO, 2015d)
Plan	Establish the objectives and processes necessary to convey results in accordance with customer requirements and the organization's policies.	Set the objectives of the system and processes to deliver results ("What to do" and "how to do it").
Do	Execute the processes.	Execute and control what was planned.
Check	Monitor and measure processes and product against policies, objectives and requirements for the product and report the results.	Monitor and measure processes and results against policies, objectives and requirements and report results.
Act	Take actions to continually improve process performance.	Take actions to improve processes performance.

Furthermore, ISO 9001:2008 and 2015 have roughly the same requirements. Table 2 depicts the clauses of two different versions of ISO 9001. The first three clauses of ISO 9001:2008 and 2015 are not applicable in process approach; these clauses just give some vital information related to the requirements of QMS execution.

Table-2 The comparison between the clauses of ISO 9001:2008 & 2015

Clause	ISO 9001:2008	ISO 9001:2015
1	Scope	Scope
2	Normative references	Normative references
3	Terms and definitions	Terms and definitions
4	Management Responsibility	Leadership
5	Quality Management System	Context (Environment) of the organization
6	Resource Management	Planning
7	Product Realization	Support
8	Measurement, Analysis and Improvement	Operation
9	Evaluation	Improvement
10		Evaluation

As demonstrated in Figure 1, the framework of ISO 9001:2008 is based on clauses 4 to 8, while ISO 9001:2015 with its unique structure (Annex SL) is begun from 4 to 10 clause. These models also show all the requirements of the International Standard ISO 9001:2008 and 2015, but their frameworks do not determine processes at a detailed level for

the organizations. There are five sections in the ISO 9001:2008 indicating activities that need to be considered when the organizations implement the quality management system, such as:

- Overall requirements for the quality management system and documentation (Clause 4);
- Management responsibility, focus, policy, planning and objectives (Clause 5);
- Resource management and allocation (Clause 6);
- Product realization and process management (Clause 7), and;
- Measurement, monitoring, analysis and improvement (Clause 8).

Extended model of a process-based quality management according to ISO 9001:2008.

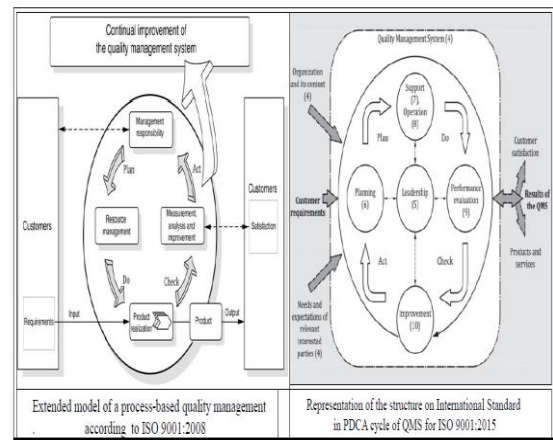


Figure-1 QMS Framework in 2008 and 2015 version

Factors Affecting Construction Organization

According to Chew and Chai (1996), there are three main factors affecting the construction quality management system. The factors are as follows:

- 1- Lack of Management Commitment**
- 2-Inconclusive Interpretation of Standard Requirements**
- 3-Training Policies**

These three factors are leading in the management of usual construction projects (Proust, 2011). Doubtlessly, iron triangle is more significant, due to their significant effect on obtained results for being successful in project management that the project quality is maximized while the cost and time of the project is minimized (Hajiagha et al., 2015). Also, the critical success processes (CSPs) research model is explained the success project can be affected by: overrun of the cost and schedule, project performance, and funder's satisfaction

(Zwikael and Smyrk, 2011; Neverauskas et al., 2013). Accordingly, the vital elements of the projects can be defined as the organization objectives (Internal factors), and business objectives (external factors) that are related to client's satisfaction (customer's satisfaction) and market, as illustrated in Figure-1

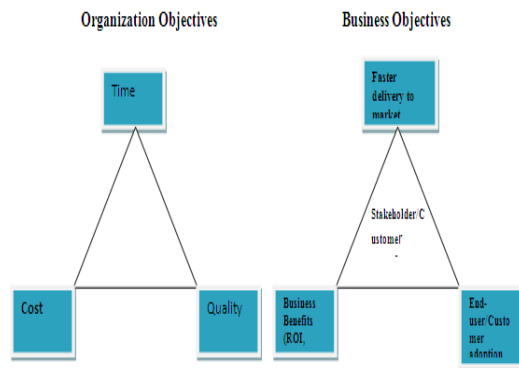


Figure-2 The Reflection of the organization objectives on business objectives (Duggal, 2010)

Impact of QMS on construction industry

The QMS is widely used by the organizations for achieving operational and market benefits, to upgrade and promote the companies and project performance by the use of this optimized standard. But the studies revealed that this objectives are not always achieved. However, the successful implementation of the ISO 9001 (QMS) standard depends on how the standard is professed by the companies. As a results, the impact of QMS on previous studies revealed that the majority of the scholars found the positive effect of QMS on projects (Manders, 2015). For example, a survey by UNIDO (2012) in the Philippines and few countries in Asia, showed that the most of the respondents believed QMS can make excellent (57%) and good (22%) persuade on the organizations, and the only 3% stated the negative impacts of QMS on the firms. Likewise, over 54% had internally motivated reasons (including internal improvement and corporate or top management objective), whilst 39% had externally motivated reasons (customers, markets or governments pressure) to implement QMS in their organizations. Without doubt, QMS provides the reliability and satisfaction in terms of methods, materials, equipment, etc. in the firms, which can cause they meet the requirements of their customers, and achieve organizational targets in the projects (Aized, 2012), as illustrated in Figure-3.

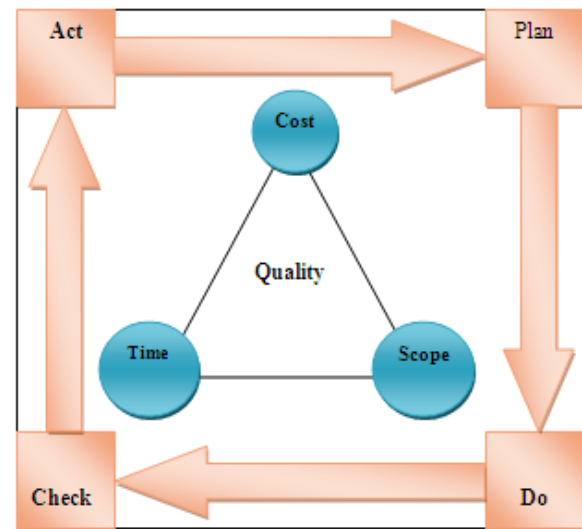


Figure-3 Schematic QMS on organizational targets of projects (iron triangle) (Aized, 2012)

III. RESEARCH METHODOLOGY

Research Design

As a descriptive study, this research was designed to estimate effectiveness of QMS implementation in the construction projects based on descriptive methods. Thus, the literature review was first carried out to understanding the topic, and the concepts of the study, in order to develop an suitable survey questionnaire for obtaining data from the construction projects. The questions were designed on the basis of preliminary studies and literature review. Then the questionnaires were at random distributed among the respondents working in ISO 9000-certified construction companies.

Data Collection

The data sources were categorized to prime sources, and secondary sources. Prime sources provide original data for this research. The purposive and easiness sampling method was used in choosing the respondents. Participants in the study were managers in different areas, levels and specialists within the construction companies. Totally, 55 number questionnaires were distributed and the 42 number usable questionnaires were collected, and used in the statistical analysis. The secondary sources were from journals, articles, journals and books published, to identify data about the research topic, and likewise to conduct study for further details in the research.

Questionnaire survey

The questionnaire was used for collecting data as the primary tool. Using the questionnaire can help the researcher's to collect data faster and cheaper than any other instrument. In this study, the survey questionnaire was divided into two main parts: Part I is related to the general information (demographic characteristics) of the respondents. Part II is focused on the evaluation of the effectiveness of QMS implementation on vital factors of construction projects, this part including the four sections, and each section regarding the effectiveness of QMS implementation on one of the vital element in the construction project (time, cost, quality/scope, and customer's satisfaction). The questions asked were closed-ended questions with a five point Likert rating scale. Furthermore, the questionnaires were personally distributed and retrieve by the researcher to target respondents. The completed questionnaires were collected from them. Also, the confidentiality and ambiguity of the participants were protected, for this matter their names were not required on the questionnaires.

Data analysis

The data was analyzed based on descriptive statistics, the designed questionnaire could let the respondents give their responses corresponding their personal experiences and opinions, to the different variables by point Likert scale (e.g. a scale from 1 to 5, strongly disagreement= 1, to Strongly agreement= 5). Likert scales are proper and widely used in opinion measurement with scale ranging. The results of the questionnaires being analyzed in this study by using statistical formulae.

Managing client Expectation

Managing the quality of services and specifically professional services warrants a special approach. The expectations of the customer are a key component of how service quality is measured. Ojaslo argues that in the case of professional services especially where long term relationships are at stake, expectation management pays off. Steps should be taken to make unclear expectation precise, implicit expectation explicit and unrealistic expectation realistic.

Design Management

Ahire & Dreyfus define design management as: "Design of product and process quality through advanced managerial and technical practices." The authors argue that design management forms part of TQM and shows that design management improves both internal and external quality in the

manufacturing industry. They also stress the importance of training in design management for the practice to be effective.

In a study specific to the construction industry, smith, O'Keeffe, Georgiou and Love argue that due to fragmented nature of the construction project value chain, the once off nature projects, the use of separate highly specialized design professionals and several other factors, design management is warranted in the construction industry.

3.5 Design Effectiveness

The construction industry institute developed a systematic process for the evaluation of design effectiveness. They argue that design effectiveness is much more appropriate than purely attempting to measure design productivity measures are difficult to identify. Furthermore, real indications of design effectiveness are only found at later stages during construction, start-up and operation of the facility. The method requires that seven criteria be evaluation after the completion of construction.

Contractor selection

The contractor responsible for the engineering of a construction project has a major impact on the eventual outcome, but typically the fees paid for the engineering is a small percentage of the overall project cost. Therefore the International federation of Consulting Engineers (FIDIC) recommends that selection of consultants or contractors to perform this engineering be based on quality criteria rather than price. FIDIC such as contractor competence, experience, managerial ability, availability of resources, integrity and other quality factors. Contractors still have to bid within a price range determined by estimation prior to the bidding phase, but the final appointment is based in quality criteria alone.

IV. DATA COLLECTION AND ANALYSIS

The important topic of the study is skills or competency and its shortage. Every company has its own strength and weaknesses. Skills and their proper utilization are very important to achieve success. During project study, we discovered few facts which are crucial one in any company success. Selection of competent resources to match project complexity is also important. Training emphasis is also much important. Retention of staff through some techniques such as training and development, remuneration, graduate program, technical mentoring and accelerated leadership development programs.

Requirements

Various requirements at project level are discussed herewith. Understanding client's requirements and its impact. Alignment meetings are also important for any project, which include bid- clarification meetings, pre- construction meetings, internal and external alignment meetings, review and project meetings. Detailed review of requirements is essential. Importance of client's perceptions and making sure that expectations are realistic to be seen.

Schedule and planning

Improper schedule and planning puts negative impacts of quality and engineering planning too. Engineers must understand schedule and move accordingly. Current fast track projects environment, many engineering decisions are based on assumptions. Also there is a tendency to put project schedules under pressure; this ultimately has negative effect on engineering quality.

Quality systems

For any projects quality systems are very important. Either it is based on TQM. Use of quality plans, where all quality activities are planned and documented in advance of a project phase is also suggested. Converting most of the procedures to flow chart based to promote ease of understanding is found helpful. Construction industry focus is mainly in heavy inspection, rather than a system and processes focus.

Teams- Relationships

Good team relationships prove better in any project. Contractor and client team inter-relationship is must for satisfactory output on various parameters. Through our study, we observed possibility of improvement.

Continuous improvement

To achieve Continuous improvement management reviews must be quality focused. Though it is a process, separate efforts needed. Feedback also plays very important role. Identifying the critical parameters for success and then identifying key measurements that will be indicative of these parameters.

Accountability

Engineering contractor must clearly be made accountable for the outcome of engineering. It is also noted

that roles and responsibilities must be clearly specified. It was also suggested that contracts often are not effective in allocating such accountabilities, and that relying on long term relationships between client and contractor might be more effective.

V. DISCUSSION

Skills

The single most prevalent topic that arose from the study was skills and competence and the shortage thereof. This is supported by the academic literature in the form of Tan & Lu's model of engineering design quality which lists quality manpower as one of the input quality criteria for engineering design projects. Study of rework in engineering by loveshown that error proneness inversely proportional to the experience of the engineering resources.

The comment that the best systems and tools will not deliver quality if you do not have competent resources to drive them is significant. Considering present and planned construction activities it is clear that construction industry will come under pressure. The observation that good standards and specifications alone will not ensure quality. Retention strategies such as training and development, remuneration, Graduate Programs, technical monitoring and coaching and accelerated leadership development programs are an important at an individual company level.

Requirements

Considering that quality is often defined as conformance requirements the emphasis on understanding of and alignment to requirements is appropriate. Tan and lu's model lists conformance to client requirements and codes and standards as input quality criteria, with clarity and reasonableness of owner requirements being a primary impacting factor. Conformance to client requirements and conformance to codes and standards were ranked in the top three quality criteria by both owner and contracting firms.

The alignment and understanding will be more difficult to obtain where the client and contractor or supplier have not previously worked together. This should be taken into account as a selection criterion during appointment of such suppliers or contractors. Additional time and resources should be allocated to allow for proper alignment in such cases. Clients should also avoid the trap of over – specification to compensate for possible misinterpretation and non-compliance. Efforts will be much better spent on specifying the appropriate requirements and then spending time to ensure alignment and understanding of requirements.

Schedule and Planning

It is observed that increasing schedule pressure negatively impacts on engineering quality. The importance of planning is addressing the issue of schedule pressure is supported by positive response by study on integrated Design planning. A key observation noticed that in the modern fast track project environment, many engineering decisions are based on assumptions, this improves project schedule, but can ultimately lead to quality problems and reworks.

In the modern project work environment, engineers need to understand this phenomenon and put mechanisms in place to manage these assumptions and to minimize the negative impact of such assumptions. This would carefully scrutinizing assumptions to ensure to minimize the potential for rework.

Quality Systems

The emphasis placed by study on quality systems is not surprising as both contractor and client involved in the study have ISO accredited or ISO based quality systems. The only way to avoid quality issues of normal error is to use practices such as squad checks etc. Each project is unique and many have different set of client requirements, having a customizable quality system that can be set up for each individual project allows contractors to address such client specific requirements.

The opinion of a quality consultant that the construction industry has heavy inspection focus is supported by the cost of quality. And consideration given towards emphasis on prevention costs.

Demand side

On the demand side most discussed approach was the use of atomization and productivity tools. This is in line with masters suggestion that professional service firms have three type of worker, procedural, brain, grey hair and that each of these types of resources should be applied where they are most effective.

Automated systems allow companies to free up the time of their valuable brain and grey hair resources to focus on the critical few activities where they can add the most value. This does create a potential problem, procedural and mechanistic work that young engineers typically did as part of their training to obtain a deeper insight in engineering falls away as automation increases.

Team – Relationships

Team work is considered a secondary impacting factor of input engineering quality. Team building, which can be done as part of alignment sessions, is important to create and develop teams that will work together, thereby impacting engineering quality. Teams tend to aligned and this assists in improving mutual understanding if requirements and reduces later conflicts. The relationship between project managers and the environment they create is critical.

Building relationships and becoming less confrontational supports the recommendation for industry co-operation for training. It is also aligned with the supply chain management concept that received a very positive responsive. The suggestion of making more integrated teams is consistent responses. Integrated teams also potentially improve communication and alignment between parties.

Accountability

The suggestion that contracts are not always effective in allocating accountabilities and that greater reliance should be placed on relationships. The relationship between client and contractor is important and that partnerships and alliances should be considered. However such relationships will not achieve this end if accountabilities are not clearly and explicitly assigned.

Cost

Conformance to cost requirements is one of the criteria of design process quality. Skills shortages further puts pressure on projects costs. Therefore no surprise but our study suggested that cost pressures are impacting negatively on quality. Techniques like Quality Based Selection or similar that gives more weight to quality aspect than cost should be considered for adoption. Client companies will do well to take into account that contractors are unable to produce quality engineering if clients are not prepared to pay for fair value.

Audits

The suggestion of disciplined audits in addition to normal audits can be considered as a form of independent peer review and can add much value in terms of checking deliverable content. Quality system audits will typically only check conformance to system and procedures, while discipline audits will check the content of selected deliverables to establish conformance to requirements.

VI. CONCLUSIONS

In this research, unearthed that the implementation of QMS can be an effective technique to achieve the objectives of projects successfully through process approach, which is based on “PDCA” methodology towards the optimization of project performance, and problem solving. From literature review, it was revealed that project success is the most efficient key to assess projects in construction industry, and the customer's satisfaction as business objectives, and iron triangle (cost, time, quality) are the most significant elements in success of construction projects according to scholars.

1. Furthermore, the results of the thesis from the responses of 42 top, middle and bottom level managers, have been identified that QMS can be affected mostly on customer's satisfaction. It may be justified that the impact of QMS on customer's satisfaction is more than other vital criteria in construction projects, because process approach of QMS is considered and prioritized the customer's requirements and satisfaction, as its input and output in the organizations.
2. Likewise, QMS can affect directly and indirectly on cost and time in the projects, while the lowest impact of QMS is on quality/scope.
3. Unfortunately, the results reported that the most of the managers emphasized on implementing QMS certification (ISO 9001 certification) only, and often neglect to use other standards of QMS. While the implementation of all standards of QMS can even improve incrementally quality/scope, reduce the cost and time length of the construction projects, and promote customer's satisfaction.
4. However, the thesis work concluded that QMS is an appropriate quality management and marketing tools for developing and improving organization performance. In this context it is suggested to implement QMS standard in the projects to improve organization performance.
5. For future research, the study suggests to identify the best ways for the sustainable development of construction projects from the perspective of implementation of a QMS.

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