

## **Quality Management in Architectural Projects: Imperatives on Architecture/Construction Community**

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### **Abstract**

Architectural projects are complex and so is the issue of quality in them. Involvement of several participants with varied interests and heterogeneity of construction process are major factors that impede quality of a constructed project. The globalisation of business activities has significantly altered the quality norms in architectural and construction projects. Today, the clients and developers are better informed of international quality standards. The challenge before the architecture/construction community is to rise to the expectations of their clients by adopting the business practices that can deliver quality. Though, architecture/construction community in India has demonstrated their capabilities to deliver quality, there are areas for improvement and need for a structured formal approach to quality.

This paper is an attempt to investigate in to the various activities and processes during design development phase that influence the quality of a constructed project. The authors have undertaken the study of design development processes in twenty architectural firms in India with an objective to assess the adequacy of the prevailing practices in meeting the quality needs of the clients and to identify areas where architecture/construction community needs to focus to overcome the causes that impede the project quality.

### **Keywords**

Quality, Quality management, Customer satisfaction, Design verification, Design audit

### **1. Introduction**

The building construction industry has attained a status of an important industrial segment that provides vital service to the society. It not only provides value to their customers but also acts as an instrument in creating millions of jobs and wealth for the nation. With upward growth of construction sector, new architecture/construction projects are plentiful, however the clients and developers are now more selective about their architects and contractor than they have been in past. Quality is the force that attracts the clients (read as customers) and drives the business in the prevailing highly competitive business environment. The customers are conscious of quality and expect the best return on the money they invest on any project. Therefore, it is crucial for the architecture/construction Community to evolve their business strategies around the philosophy of quality which means "*meeting or exceeding the needs and expectations of the customers*" (Juran, 1974).

## 2. Quality in Architectural Projects

Quality from the client's perspective can be defined as "*meeting or exceeding customer's expectations*". Defining expectations of a client in architectural projects is a complex exercise that requires a clear understanding of the various aspects of quality associated with customer's requirements. These aspects could be tangible or intangible. The tangible aspects of quality include structural and time-oriented characteristics whereas intangible aspects comprise of sensory and ethical characteristics of quality (Mitra, 2002). An architectural project requires fulfilling the client's expectations on both the aspects. The structural characteristics of the project are defined by the clients'/users' requirements, functional requirements, compliance with codes and standards etc. whereas, the time-oriented characteristics include factors such as reliability, maintenance, scope for future expansion etc. The intangible quality aspects of an architectural project comprise of sensory characteristics viz. form, colour, appearance, overall spatial qualities of the built project. The satisfaction of a client can be ensured only if all these aspects of quality are effectively integrated into the project.

The quality of a built architectural project is a product of quality of architectural design and the quality of construction. In context of the design, the ISO definition of quality "the degree to which a set of inherent characteristics fulfils requirements" (ISO 9000, 2005) can be modified as "*the degree to which a design fulfils customer's requirements*". The degree of quality achieved in design will finally have a significant bearing on the quality of a constructed project. In context of the construction, the quality can be defined as "*the degree to which the products of a construction process fulfil the implied requirements of the project participants*". The project participants include all stakeholders i.e. client, users, architect, promoters, regulatory agencies etc.

## 3. Need for Quality Management in Architectural/Construction Organisations

In an open economic scenario, the players in building industry have begun to appreciate the significance of quality. In a situation where industry is open to multinationals, quality is a mantra to survive. Nelson (2006) identifies various reasons that an organisation may have to implement a formal quality program. Accordingly, two most compelling factors for architecture/construction community to implement a quality program are;

- i. External Imperatives
- ii. Internal Imperatives

The need to embrace a quality program may arise due to external factors. An organisation with quality system in place stands better chances to bag projects. The international clients now insist on quality certification. Hence, the presence of quality system in the organisation may give an extra edge over the competitors.

The ambition of the top management to create a niche for the company in the market and distinguish it from the competitors can be the driving internal imperatives for implementing a quality program. These objectives can be achieved through customer focused business practices, greater efficiency, continuous improvement etc.

## 4. Purpose of the Study

The size of the construction industry in India is estimated to be around US\$ 12 billion. The industry has witnessed a growth at a pace of 30% for last few years. About 80% of real estate developed in India, is residential space and the rest comprise office, Malls, hotels and hospitals According to an estimate the Information Technology industry will require 66 million square feet of space over next five years (Federation of Indian Chambers of Commerce and Industry, 2007). The rise of Indian middle class and

liberal financing policies of public sector banks are two major factors that have contributed to the phenomenal growth of the building construction sector. In a significant move the Union Government has also allowed Foreign Direct Investment in construction sector. The architectural and construction organisations in India have been the natural beneficiaries of these developments. In a simultaneous development several multinational architectural and construction companies have moved their operations to India to take advantage the prevailing conducive business environment. The globalisation has exposed the clients and developers to international quality standards and they expect local architecture/construction community to match the same.

The purpose of this study was to investigate into the prevailing practices in architectural/construction organisations to assess their adequacy to deliver quality to customers and to identify the areas where architecture/construction community needs to improve the quality oriented processes.

## **5. Methodology**

A sixteen point questionnaire (Ref. Appendix) was circulated among the executives of 20 randomly selected architectural firms from different cities in India. The size of firms varied from small with 10 employees to large having 400 employees. A carefully worded questionnaire was aimed at drawing the necessary information to examine the adequacy of design development process from the perspective of quality. The information/data were analysed to evaluate important processes involved in design development phase. The authors attempted to relate the inferences from analysis to some of the principal aspects of quality management viz. customer's requirements, design verification and validation, customer satisfaction, continuous improvement and the role of top executives.

## **6. Quantifying Client's Requirements**

Meeting the client's requirements is fundamental to the concept of quality. The first step in meeting client's expectations is to quantify the client's requirements. Hence, it is crucial for the success of a project that the architect in consultation with the client enumerates and quantifies the project requirements in no ambiguous terms. The study reveals that about 40% clients lack the clear understanding of project requirements. These clients, if not guided by the architect would part dissatisfied customers. It was also found that about 50% clients seek architect's advice in finalising the project requirements. It is important for the architect to determine if the expectations of a client can be exceeded, else it would be wise to advise the client to make his requirements reasonable and achievable.

### **6.1 Requirements of Internal Customers**

The project architect assumes the role of an internal customer in his own organisation when he assigns roles to his team of designers and consultants to work on various aspects of the project. The project architect must be explicit in communicating the project requirements and his own ideas on the project to his team. This can be effectively done by providing a project brief to everyone who is associated with the project. The study reveals that only 40% firms have a good practice of circulating the project brief. In absence of an authenticated document on client's requirements, the subordinate teams may either overlook or misinterpret the project requirements. In both cases the quality of the project will be compromised.

## **7. Process Approach in Design Development**

Any product is a result of certain process or set of processes, it is therefore important that the processes that have bearing on quality are correctly identified and implemented. The design phase in architectural/construction projects ends with design output documents that conform to client's requirements, architect's design intent, specifications and regulatory requirements. Hence, it is crucial that

the design development processes include the activities that will ensure accuracy in design output documents. The authors attempted to assess the adequacy of some activities that may affect the quality of a constructed project. Design verification is one of the critical activities during design development phase that can either enhance or lower the project quality.

## **7.1 Design Verification**

Design verification is an independent evaluation of design by qualified professionals to evaluate the adequacy of design. The authors have attempted to examine some of the sub-activities of design verification process performed during design development phase which include constructability reviews, design audits and error checking process.

### **7.1.1 Constructability review**

The study reveals that the constructability reviews in most firms are informal in nature and no structured process is followed. It was found that about 60% of firms follow an in-house constructability review of designs whereas, in remaining 40% cases such reviews are not performed. The architecture/construction Community needs to appreciate the significance of constructability review since it is the most effective measure to avoid deviations and non-conformity during the construction phase. The reason for absence of constructability reviews can be attributed to the project delivery system. In most projects the design and construction are two separate contracts undertaken by two different organisations. It is common to appoint the constructor only after the design output document is ready with the client/promoter.

### **7.1.2 Design audit**

Constructability review of design takes care of only one aspect of design execution. Successful integration of other systems such as structural, mechanical, electrical, fire safety, sanitation etc. into the design and construction, requires coordinated inputs from the consultants from the respective fields. A comprehensive evaluation of design by the combined team of consultants is crucial to avoid any conflict during the installation or functioning of these systems. The study reveals that a formal design audit takes place in about 50% organisations. In 40% organisations, the audit is informal as the design is referred separately to each consultant. In 10% organisations, the auditing depends on the scale of the project.

### **7.1.3 Error checking process**

It is extremely important that the design output documents are completely error free. Hence, it is necessary that the design output documents are thoroughly checked against any error that may be graphical, technical or grammatical. The job of error checking may appear to be mundane but it requires a great deal of expertise and skill. The process of uncovering the errors should be formal and structured. The errors must be properly documented to eliminate the possibility of any omission during the revision of the documents. About 70% of firm lack the formal system of error checking.

It is significant to note that in case of about 70% firms, the released drawings are referred back to the design firm for reworking. It only reveals the inadequacies of constructability reviews, design auditing and error checking processes.

## **8. Customer Satisfaction**

Customer satisfaction is one of the important yardsticks in measuring the quality of a service or product. The popular theory that “a satisfied customer will always come back” may not be applicable to architectural/construction projects since for many clients it may be a one-time endeavour. The organisation should evaluate its own performance by seeking clients’ feedback on the quality of services rendered. It is an effective tool to know the organisations strengths and weaknesses. In fact clients’ feedback should be treated as one of the important inputs in deciding the organisations business policies and practices. The study reveals that about 75% of firms do not have any formal feedback system in place

and remaining 25% firms do it in an informal way without any documentation. It implies that the organisations may not have a documented proof of having satisfied the clients' quality expectations.

## **9. Continuous Quality Improvement**

Pursuit for quality is a never-ending task and no organisation can afford to be complacent on its achievement on quality. The only way to remain relevant to the market is to strive for benchmarks higher than the previous ones. Continuous improvement is an integral part of quality policy of an organisation. It requires the people, processes, and system to improve continuously so that the quality of service and product can match customers' quality expectations. The architecture/construction organisations need to analyse the gap between the levels of quality delivered and the quality expected. Clients' feedback is one important tool that can point at organisations capabilities to deliver quality. Post Occupancy Evaluation (POE) and Quality Improvement Program (QIP) are other two important measures that can be adopted for continuous improvement.

### **9.1 Post Occupancy Evaluation**

Post Occupancy Evaluation of recently constructed projects could be a very effective tool to evaluate the capabilities of entire organisation to deliver quality. It is a fruitful exercise that can help establishing the future course of action to capitalise on the strengths of the organisation for raising the quality benchmark, at the same time it may expose the inadequacies in the organisation's capabilities with regard to the quality. These findings can serve as a basis for the continuous improvement of quality system in the organisation. The study reveals the absence of Post Occupancy Evaluation system in most firms.

### **9.2 Quality Improvement Program**

In a rapidly changing business and technological scenario, it is important that the knowledge and skills of people in the organisation are continuously upgraded since obsolescence has no place in the concept of quality. The study shows that the formal training and skill enhancement programs were completely lacking in most organisations. However, there are regular presentations on new products by vendors which are no substitute to a focused and well defined quality improvement programs on part of the organisation. Apparently the lack of loyalty and large turn over of employees discourage the organisations from implementing such programs.

## **10. Management of Project Quality**

Role of the senior executives and the structure of organization are crucial to the success of quality program. The senior executives need to directly involve in quality related issues and should lay down the quality policy for the organisation. It is also important that human resource in the organisation is hierarchically structured with regard to roles and responsibilities.

Documentation is an important activity in managing the quality in any organisation. Architectural and construction organisations should standardise all the practices and procedures involved in delivering a project. These guidelines should be published as a practice manual and be made available to the people employed on the projects. The objective of documentation is also to make every activity and process effective in delivering the quality. The important activities that demand formal and detail documentation may include client/project requirements, design changes, outcome of constructability reviews and design audits, revision of design output documents and customer feedback. The authors during their study found that only about 30% organisations have a written practice manual and follow a practice of formal documentation of various processes.

Interestingly, the study also reveals that in about 60% of the firms surveyed, the system of management was informal that lacked the clarity on the roles to be played by different individuals. Most executives from the sample organisations appreciated the need for quality management in architectural/construction projects but at the same time a written quality policy was due to be evolved in their respective firms. The study also reveals that the concept of formal systems of quality management such as ISO, TQM etc. is yet to acquire recognition in architectural/construction organisations in India.

## 11. Conclusions

The architecture/construction community in India in recent decades have successfully demonstrated their capabilities to deliver quality to its customers despite lack of formal quality programs in these organisations. The organisations need not embrace a particular brand of quality system i.e. TQM or ISO etc. but fundamentals to quality such as customer satisfaction, process approach to design/construction projects, continuous improvement of knowledge and skills of people and commitment of senior management, will remain relevant any system. The study suggests that architecture/construction community needs to focus on these factors which are vital in delivering the quality. A quality program can be tailored to suit the culture of an architecture/construction organisation.

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## Appendix:

### Questionnaire: Approach to Quality in Architectural/Construction Organisations

1. Does organization have a written quality policy?
2. Does organization have a formal system of management in place?
3. Does organization have a formally structured written practice manual?
4. How many clients (approximate percentage) would have a clear understanding of project requirements?
5. How many clients (approximate percentage) would seek architects advice on project requirements formulation?
6. Is there a practice in place to make written project brief available to all role players?
7. Does design development process involve constructability review?
8. Does organization have a formal system of design audit to evaluate the compatibility of design with other systems?
9. Does organization have an effective and formal system of error checking and error omission?
10. What is the frequency of reworking on drawings after the release of final design output?
11. Do design changes occur after the commencement of construction phase?
12. Do structural design changes occur after the commencement of construction phase?
13. Does organization seek clients' feedback after the completion/occupancy?
14. Does organization have a post occupancy evaluation system to evaluate architectural and functional aspects of the constructed project?
15. Does organization have a formal project documentation system?
16. Does organization have a skill enhancement program for its employees?