Defects A Critical Issue In Construction

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Abstract: Project success depends upon the construction performance but due to defects quality may be reduced. Defective construction not only increases the cost but also increase the maintenance cost. A proper planning, communication and coordination is important for better construction. With the help of proper construction management from planning to maintenance of building, defects will reduce and constructability will improve. This study is focus on causes of defect in construction and also suggested that defects reduction strategy and framework for management which is help to minimize the construction defects and improve the process and performance of construction.

Index Terms: Building, Construction, Defect Causes, Framework, Management, Reduction, Strate

1 INTRODUCTION

The legal definition of the term "building defects" varies from state to state. Generally speaking, the word "building defect" is more comprehensive than mere manufacturing defects. Building defects are often described as defects in the design, process, equipment, or technology used in the project, caused by personal or property damage due to failure of the building or structural element and causing damage to the person or property and usually causing financial harm to the owner. This is a straightforward question with a hard response, one of the most prevalent causes of conflicts and litigation in the building sector is now the defects in construction. There are usually arguments when it comes to defining what a building defect is and because of those who ask the question and/or make the determination from different points of view. Defects which are categorized into two parts i.e. technical defects and defects in management so we can easily find out which department is responsible for defects. We can also find out the root causes of the problem and try to solve that problem with proper coordination.

2 LITERATURE REVIEW

Researcher suggested that two area of managerial First, strong prosecution of communication in all areas of research suggests that a comprehensive review of communication in the construction industry is outdated. Second, the emphasis on the manager's characteristics revealed by important connections between performance and individual organizational characteristics in the statistical study which indicates that further thorough research on what makes a successful manager pay dividends, be it education, training, age or other (Atkinson R. Andrew ,1999). There are three principal strategies to reduce the costs of human errors, the first strategy is to avoid errors, the second strategy is to avoid repetition of old errors by learning from them, this paper deals with the third strategy, which is to reduce the consequences of errors by early detection and correction (Josephson .P.E & Larsson's 2001).

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3 OBJECTIVE OF STUDY

The aim of this study is to identify the causes of defect in construction and suggest defect reduction strategy. To suggest proper management system to minimize defects.

4 CAUSES OF DEFECT

In this research work all the data has been collected from construction site. While collection of data it is found that there are various type of defects occur in building construction and these defects are categorized in two parts. Technical Defects Defects in Management

4.1 Technical Defects

Technical shortcomings relate to the structural and functional elements of the construction process. If this system is not properly maintained, problems with the system may occur. It contains the following parts.

i. Defective Material:

In some cases the use of materials may cause disadvantages but in others it is sufficient to be used. When the building defect is perceived to be defect in the material, there is a proposal that the material was faulty in the conditions in which it was to be utilized. Each material has its own features, which can be used under various circumstances.

ii. Design Too Hard To Construct Well:

The degree to which relies upon the contractual worker's involvement and the quality and accessibility of its development assets, some construction subtleties are harder to build well than others.

iii. Bad Site Practice and Lack of Supervision:

The contractor's bad construction methods such as the utilization of bad formwork and early evacuation, deficient concrete curing, inability to remove entrapped water and poor execution of waterproof layer could cause defects in the finished structure.

iv. Bad Site Condition:

The circumstances of the site include variables such as the soil situation, the climate condition and the measure of space accessible on the building site. All of these would directly influence the techniques of building to be used and the capacity to store and prevent damage to materials.

4.2 Defects in Management

The administration system alludes to operational and the management procedures of the project system. Building deformities can emerge if this framework isn't appropriately maintained. It contains the following components.

i. Flawed Documentation:

Documentation may be inaccurate either because the data in it is incorrect or because it is insufficient or completely lacking. Inaccurate and ambiguous designs that contain conflicting data and inadequate references are an important wellspring of flawed documentation that could prompt structure imperfections and mistake.

ii. Poor Communication:

Poor communication may happen in the construction procedur e in various ways between different parties. It emerges when one gathering expects learning and involvement in the other and in this manner does not attract adequate regard for specific subtleties that may be basic for appropriate development.

iii. Lack of Training and Capabilities:

The lack of training and skills development has an impact on operators ' operational abilities in a manner that reduces workmanship quality and can lead to more construction errors and faults. This could be aggravated by the expanding multifaceted nature of the developments, which has brought about an ascent in the measure of expert contractual workers offering to supply and introduce certain parts of the development work. While these experts may possess outstanding technical knowledge in their respective areas, the people who work in the field are not familiar with the special requirements of the manufacturers' installation advice.

iv. Lack of Motivation:

Negligence or ‘‘the lack of care’’ is the most frequently used label to describe human error in the cause of defects. The person needs to discover motivation to behave and to carry out his job properly and with the correct quantity of care and accountability. This would directly affect the nature of workmanship and measure of development errors made resulting in defects.

v. Obliviousness and Lack of Knowledge:

Ignorance can exist as not comprehending what to do or not knowing why it is done in a specific way. The rapid development of technology and the complexity of construction mean that this industry can be affected by such perceived differences. When large numbers of new materials are introduced a few years later, new devices and new technologies mean that the demands of this industry meant to educate their participant's constantly their characteristics and proper methods of use to avoid wrong applications that could cause defects.

5. Result and Discussion

The result and discussion are based on the data collection and whatever observed in investigation of data collection. Frameworks for defect minimization and defect reduction strategies have been suggested in this study. Figure 1 shows that a framework for defect minimization which may effectively work within an organization. Based on the causes of defect, defect reduction strategies have been suggested shows in table 1.

5.1 Framework for Defects Minimization

5.1.1 Technical:

It includes three components dealing directly with works procurement and later on-site planning, implementation and control. It includes tendering, contract management, buying, alternative design development, work scheduling, resource planning, site design, material handling and storage, equipment management, value engineering, job process control and inspection, protection of finished works and handing over. Procedures for these functions have been broadly documented and incorporated into the company's quality system documents. The following three sections will describe the key characteristics of each feature.

i. Project Planning:

Planning for all construction works undertaken by the company follows comprehensive processes in which the project manager and managing director is personally involved. Even before the confirmation of the award of a contract, extensive preparatory work is done to ensure that all issues relating to site conditions and actual construction are discussed and due consideration given. The site is visited to assess the need for any special requirements in terms of equipment, manpower and preliminary ground works. The time available for execution is considered alongside these findings and any constraints detected are discussed before deciding if they should be reflected to the consultants. Possible alternative proposals are tabled for the client's consideration. Any discrepancies discovered in the contract documents are noted and due feedback given. The full construction program is prepared and resource availability determined. Weans to make up for any shortfall are ascertained and pursued upon confirmation of the contract. Project-specific quality plans are created by the project manager with the help of the site manager, it is required to submit to client or not. Relevant information for any new process or equipment to be utilized is gathered and included into the document for subsequent reference.

ii. Design:

The choice of bidding for a project is entirely within the top management, and the contract manager provides expert advice. When made, the tendering procedure is guided by a lot of recorded methodology that are set up to guarantee that the final product accomplishes high level of quality within the time and cost constraints specified.
As stated explicitly in the corporate mission statement. The Company's policy is to fully address the customer's needs for the project, to provide high quality material and process construction, reliability, efficiency and high added value safety features.
Key to this is their active involvement in developing different d esign proposals for all projects, to the extent permitted in the a greement Rather than having the design capabilities needed for such operations, we are entering into strategic alliances with construction and engineering consultants to propose alternatives to the initial bid requirements and try to overcome this obstacle.

iii. Construction:

Upon confirmation of a contract, initial plans are reviewed and changes made when necessary. Mobilization takes place under a systematic checklist that the project manager will use to ensure nothing is left out and all requests and submissions made with the necessary lead-time for timely response. Should the project be executed by more than one contractor, proper phasing and co-ordination is carried out to ensure the smooth and efficient taking over of the premises. Thorough documented processes and under oversight, ordering, receiving delivery, handling, motion and storage of materials are carried out to guarantee that adequate care is provided and damage is prevented. Storage locations are determined by reference to the workflow using just-in-time (JIT) concepts as well as the amount of potential damage from ongoing activities. In any case, the company discourages the practice of site storage and minimizes it wherever possible due to the use of JIT concepts as described above. This significantly decreases the risk of material damage. Protection against damage is finally given upon installation and maintain until final completion and delivery of project. Work is carried out by a pool of multi-skilled and skilled workers, resulting from the company's policy of direct employment and continual preparation of abilities. Another significant feature that results from the willingness of the company to take as much control of the work as possible and to better guarantee the quality of the work is to avoid subcontracting unless absolutely necessary.

5.1.2 Management

This system deals with functions concerning the development of the employee's skills level and proficiency, individual knowledge of procedures and systems and staff inspiration and support, the methods of effective communication, control of documents and proliferation of knowledge Several policies are being practiced in the company that caters to these needs.

i. Human Resource:

It is divided into three part i.e. recruitment, Development and motivation & support.

a. Recruitment:

The company's recruitment method is based on the doctrine of pre-outsourcing in-sourcing. Whenever there is a need for certain an ability to be recruited, the immediate action is to perform a search within the organization to determine whether there is a individual who can be adequately educated, promoted or transferred to meet the need. Its top management believes in the concept of creating multi-skills in a person, which, in addition to creating sound financial sense, also enhances the individual's abilities and knowledge level, thereby increasing his value to the company and to the industry. Only when no one can be found appropriate will they embark on a recruitment drive choice of applicants is based on a set of specified processes and the interview method includes the use of forms that will evaluate the individual's skills and suitability for the job in a comprehensive way. These forms are incorporated within the quality procedures and they provide an organized outline for one to carry out interviews effectively.

b. Development:

Training and growth of personnel is one of the main measures that the managing director himself has commonly emphasized. Personally, he thinks in the significance of continuous training and knowledge improvement to challenge and extend one to reach its complete potential. This program in the business begins with identifying the training requirements that both the superiors and the person can accomplish. There will be a consultation with the superiors that will determine the sort of training and the best delivery method. In-house training sessions are performed on a monthly basis by the company's own senior employees and sometimes by external advisors. They may also be sent for gaining expertise and building skills in that region on occasional lessons appropriate to their scope of job. This involves global conferences and seminars on the recent building technology and leadership trends. In the past also arranged educational journeys abroad to learn from big multinational companies. Participants are needed to provide feedback on their quality and usefulness at the end of such training sessions using prescribed forms discovered within the quality processes of the company. This enables management to assess the efficiency of training and, if required, to make adjustments.

c. Motivation & Support:

Procedures for such programs can be discovered in the quality system records of the company. They address the need to orient fresh employees to their positions and duties, provide advice when the need arises and also allow them to use prescribed ways to express their opinions or suggestions on any problems related to their job. Social activities at the company level are also regularly organized to allow interactions between employees and their families and to create closer relationships with each other.

ii. Document Control:

This requires a set of flowcharts to depict comprehensive processes for a broad spectrum of operations. To guarantee that the processes are applicable, effective and practical, the individual directly involved in that process are the ones drawing out the workflow sequence, with all the required factors to be taken into account, for use by the department. More importantly, these processes are constantly reviewed and evaluated. The reason, as highlighted by the QA\QC, is that the fluidity and uncertainty of building operations, particularly on site, generates the need for constant change to current processes. By using a checklist, defects can be identified, a better job sequence can be found, or at times an established method can be so onerous that it is better off without certain measures. The processes can only stay applicable and conducive to use by the individual concerned through active feedback and continual refinement. To this end, the company's QA\QC office is constantly tracking those processes and checklists that are widely used across the business. The current ones cover procedures such as transfer of papers from and to headquarters, project sites, customers, officials, consultants, subcontractors and vendors. Any change that comes through from any of the parties involved will be in like manner recorded, existing ones refreshed and new ones moved to the gathering included.

iii. Communication:

This is a significant move and used by the business to guarantee efficiency and understanding of the accessibility of data that is essential to their scope of work among all employees. In a manner, it improves understanding of certain significant problems within the business as well as outside

parties who need to learn just as much to carry out their job efficiently. A notice board shall be established and maintained within the head office and on all project locations and shall contain important data appropriate to the task concerned. At the same time, each department and each site is responsible for maintaining an up-to-date copy of the quality system documents of the company that include the manual, procedures and work instructions. This should be made known to all employees and subcontractors alike and easily accessible for reference when necessary. The auditor conducting the exercise will consult the department employees on these papers during inner audits. The entire aim is to make sure the individual understands where to get some data whenever it requires. One project manager says: "If necessary, we need to make them accessible first, and then we're proud of the way we get things done right, whether it's meeting the difficulty of using it or not.

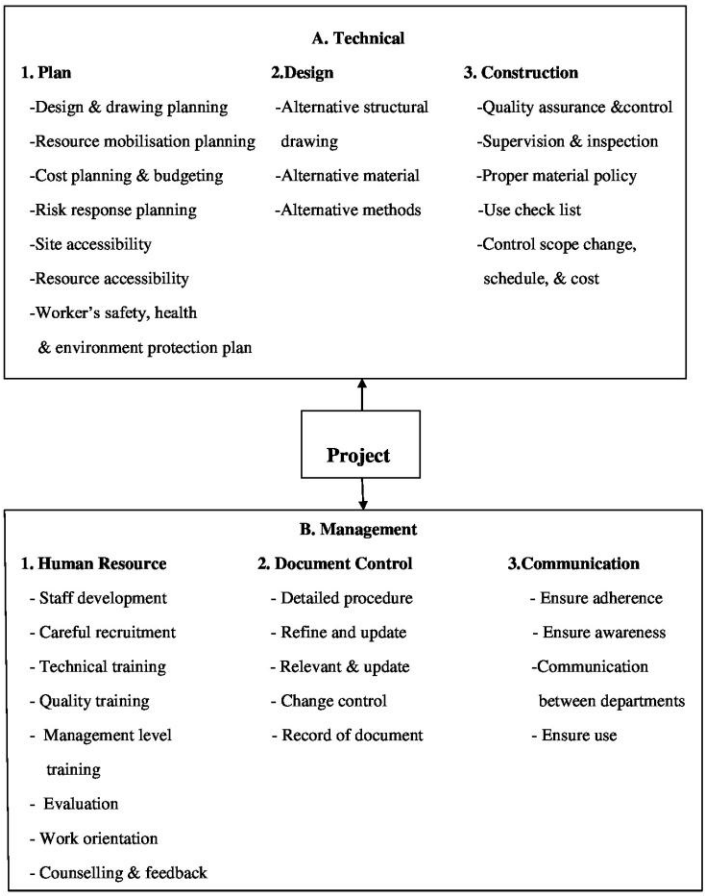

Fig 1: *Framework for defect minimization*

TABLE 1 *Causes of Defect and Defect reduction strategies*

Sr. No	Causes of defect	Defects reduction strategies
1	Defective Material	Well defined material specification
2	Design too hard to build well	Proper design
3	Poor site practice and lack of supervision	Proper planning, execution and close process control
4	Bad Site Condition	Comprehensive assessment of site before construction
5	Defective documentation	Proper documentation and document control
6	Poor communication	Effective communication
7	Lack of training and skills	Human resource planning and development
8	Lack of motivation	Staff support and motivation
9	Ignorance and lack of knowledge	Effective proliferation

4. CONCLUSION

For construction organization who wishes to increase the final constructed quality of its project by reducing the amount defects with the help of framework which may be used as a tool in organizations. Framework covers both technical and managerial part from the start to end of every project which effectively improves the organizational performance. Causes of defect and defect reduction strategies have been recommended in this study which is used to minimize the defects.

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