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REDUCING DEFECTS IN CONSTRUCTION PROJECT: REVIEW

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ABSTRACT

Construction defect are always the key concern of the construction industry. Different constructed facilities generate different types of defects and demand different level & type of quality depending on function system types, and material used. Therefore, this study has been carried out to study the defect that happens in construction projects and identify the strategies in minimizing the defect in building construction project. The studies were carried out using the questionnaires which were distributed to contractor, consultant & clients. Finally the recommendation was made based on the findings. This study help to increase the awareness of contractor, consultant & clients towards managing and minimizing the defect works. By doing this, they will bring up there construction industry in to the next level managing construction project.

KEYWORDS: Construction defect, Quality.

1. INTRODUCTION

A construction defect is the shortcoming of the building, structure or components to be erected in a reasonably workman-like manner or to perform in the manner intended by the manufacturer or reasonably or expected by the buyer, which probably causes damage to the structure. Now a day's construction defects become common and often arising or seen in the construction project, especially in the project which has poor management or supervision in the construction site. Construction defect can be known as a problem in the construction industry that could cause the value of a building decrease eventually. Those defects incur a big cost & it is defined as the value of resource consumption for rework as a consequence of a defect. The causes of these construction defects are either because of poor design, or low quality workmanship, or because the building was not constructed according to the design, or because it has been subject to factors not allowed for in the design or poor supervision.. Construction defect can decrease and affect the value of the buildings. Defects are developments in construction that reduces the project`s value instead of adding to it. Other than reduces the project value, where the construction defect is apparent, it also can cause the project to delay which means not complete with in the period stated in the contract. Cost overrun can be known as one of the effect when the construction defects happen in the construction site. Construction defect will also affect society at large due to possible danger posed and result in direct and indirect cost in repairs, abnormally high maintenance dispute and possible loss of building.

So, the focus of this research was to investigate different types of construction defects in general and causes & effects of construction defects in particular and finally providing procedures which can reduce their occurrence.

1.1 Need of study

Construction defects can be arising due to inadequate design, poor workmanships in the construction and lack of maintenance. The defects that in the construction project can become worst and worst due to the reason of invisible defect that not discover by the builder or the occupants. Construction defect can be also bringing negative impact to the occupant, builder, and country. Therefore it may affect the appearance of the building, health and safety of the occupant, country economic, reputation and etc. Thus, this problem can cause occupant unhappy eventually.

2. LITERATURE REVIEW

There are a lot of defects to the houses purchased by house buyers especially in terms of material and workmanship. This study is conducted to identify types of building defect occur in building and to identify causes of building defect occur in building. Besides that, study on building defects which occur at case study area also has been done. The resident satisfactions level on their housing after defect liability period also being analyzed. The data are

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collected through questionnaire that had been distributed to the parties involved in construction and the house buyers at study area. Types and causes of building defect also can be identified according to survey that has been done to people that involve in construction industry. Failures and defects are common phenomena in construction industry. Failures and defects can cause unnecessary expenditure and delays. Therefore this study is aimed to identify contribution factors to building defect and failures, which frequently occur in construction project especially in near area in order to minimize time and cost involved. The data is collected from questionnaire from various players in construction industry. This study is succeeds in identifying the common contribution factors of structural defects and failures in construction project. Hopefully this study could improve the effectiveness of managing appraisal process of failures and defects in the future. As the defect impact on time and cost overrun, identification of defect at early stage of construction makes easy to complete project in stipulated timing. This data is also required for suggesting different selection of remedial measures for improving useful life of structure. The purpose of this study is to review various symptoms & causes of construction defects occurring in construction project.

It is important to identify the cost of quality so that one can determine the expenses associated with producing a quality product. The present paper aims at making a review associated with use of quality in construction industry. Data necessary to achieve the objective of the paper is collected from different projects in industry. The paper focus on construction defects on respective projects and poor quality cost measurement. It also shows that defective building construction not only contributes to added construction cost of the project but also the cost of maintenance, which can be substantial.

Quality workmanship is a comprehensive approach to bolster the durability, serviceability and safety aspects of the construction. Workmanship with higher standards is a positive and humanistic approach to productive management designed to bring together all levels of workforce and experience in an organization for setting standards of excellence and achieving better outcomes. The purpose of this study is to check the effectiveness of the quality work in view of improving quality, safety & reduction in wastage of resources in a construction project. This study reviews the implementation of quality circle and analyses the perspective of workmen and employees regarding quality of workmanship in construction process. This paper reports a case study of a residential building constructions of located in India and analyzing the extent of quality workmanship achieved.

The defects are further analyzed according to origin, type and position, as well as according to element of building and activity. Most defects could be ascribed to design and to production management. Common defect types were lack of coordinating design work, mistakes in production planning, erroneous workmanship and late deliveries.

3. METHODOLOGY

3.1 Research design

Two types of research strategies are used at studies, quantitative and qualitative research. Quantitative approach is used to gather factual data and to study relationships between facts and how such facts and relationships accord with theories and the findings of any research executed previously, but the qualitative approach seek to gain insights and to understand people's perception of "the world" whether as individuals or groups. The research strategies adapted for this research were both qualitative and quantitative research.

3.2 Data collection

Both primary and secondary data were included in this research. Primary data were gathered from observation, checklist and questionnaire with study participants such as consultants, contractors and client & users. Secondary data used include literatures, reference books, journals, previous studies etc. written on similar topic.

Check list, questionnaire used as a checklist for case study, was prepared to gather data for the most common types of construction defects and their causes. Questionnaire was developed and distributed to consultants, contractors, and client and building users. The questionnaire was close ended and general and were helpful as an additional guidance in the inspection process. The study has used the data sources to produce the following basic documents: respondent's documents and case study documents. The respondent's documents were collected using questionnaire from client and end users, contractors and consultants. Case study documents were mostly from both completed and active projects, in which site observation was done.

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3.3 Sampling method

To generalize validity of the findings from a sample to all area of the research, samples were drawn from the Residential Building Projects in Sangli. For case study seven building were investigated. Method of sampling used was random sampling. Samples were categorized to two based on status, completed and under construction, because defects are manifested as age of building increase four buildings were randomly selected from completed buildings and the remaining three buildings were randomly selected from under construction buildings.

For the second part of the study, survey study, questionnaires were developed and distributed to all consultants, contractors, clients and users engaged on Residential buildings were addressed and to assure the quality of data only professionals which have engineering knowledge were included.

3.4 Questionnaire used in the research

The methodology used for this study was using case study and questionnaire. For case study checklist having 74 factors, 70 types of construction defects and 4 causes of construction defect, was developed. Then thorough site visit was done on selected seven building. For survey study a questionnaire of 91 factors was carefully designed from literatures conducted in building construction projects. It was organized in the form of a priority scaling (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree and 1 = not important, 2 = less important, 3 = moderately important, 4 = important, and 5 = very significant).

3.5 Questionnaire approach

A questionnaire was developed to assess the perceptions of client and end users, consultants, and contractors due to the importance index of causes and effects of construction defects in Residential Building Projects in Sangli. Types, causes, effects & reducing measures of construction defects in building construction projects in general were first examined and identified through a relevant literature review and then by preparing questionnaire the case was assessed in Residential Building Projects in Sangli.

3.6 Questionnaire design

From literature review it has been discussed about types, causes, effects & reducing measures of construction defects in building projects in various city around the country and at intervals of time, but not all of these types, causes, effects & reducing measures of construction defects in Residential Building Projects in Sangli, so it has been selected factors that has an impact in Sangli projects.

The questionnaire questions 70 types of construction defect, 4 causes of construction defect, 8 effects of construction defect and 13 defect reducing measures. The respondents were asked to fill the questionnaire and they were assured that the information will be confidential and used only for research purpose only.

The questionnaire included four parts that are related to types, causes, effects & reducing measures of construction defects in Residential construction projects, these parts are respondent profile, types and cause of construction defect, effect of construction defect and defect reducing measures.

Table 3.2: - Scales that represent level of agreement

Chances of occurrence	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Scale	5	4	3	2	1

Table 3.3: - Scales that represent level importance

Chances of occurre	Very Important	Important	Moderately Important	Less Important	Not Important
Scale	5	4	3	2	1

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3.7 Analysis and interpretation

Analysis of data collected using check list, questionnaire and reports was done. Based on the analysis there were in depth discussions on the analysis and then finally conclusions were made from the discussion made in the research and recommendations are given for reducing construction defects. In addition some areas of further research were suggested.

For case study four completed & three under construction a total of Seven Residential buildings in Sangli were surveyed, method of sampling was addressed in chapter three (their profile is attached in appendix B). Case study was done by developing checklist to gather data on types and causes of construction defects. During the case study thorough site observation of each building was done and besides to that start of construction, method of construction, completion time and schedule of maintenance of each project was investigated. These were done because construction defects are manifested with age of building, defective method of construction and poor maintenance.
For survey parts of the research questionnaire was developed and distributed to all clients, contractors, consultants & end users of Residential Building Projects were included. Their experiences in area of construction defect were investigated. Finally comparison was done between case study & survey study.

3.8 Result and analysis of the case study

Case study analysis showed that 52.10% of the defects were attributed by poor workmanship, 15.23% of the defects were caused by design error. The remaining 30.67% and 3.03% of the defects were attributed by defective material & improper usage respectively.

Table 4.1: - Summary of construction defect from case study

Observed defect	Frequency	Rank
Water seepage from external wall, window, roof, or from ceiling	7	1
Non-structural cracks	7	1
Broken or loose tiles on floors or wall at toilet.	5	2
Broken or leaking fixtures	4	3
Defective damp proofing at the roof	4	3
Poor window frame finish	4	3
Defective floor drains at toilet	3	4
Broken Turkish toilet basin	3	4
Defective skirting	3	4
Water leakage from lift case	3	4
Defective waste water drainage system	3	4
Defective floor finishing	3	4
Defective & Honeycombing concrete	3	4
Uneven Floor	2	5
Improper electric conduit installation	2	5
Improper installed drainage down pipe	2	5
Electrical system break down	1	6
Defective fire system equipment	1	6
Defective water pump	1	6
Lack of gate valve that control each toilet room	1	6
Broken gutter	1	6
Improper junction box location	1	6

Some of the defects, which is important to be explained and respective causes are described below the remaining defects with sources, causes and symptoms of them are summarized.

3.8 Results of questionnaire analysis

The types, causes, effects & proposed measure to reduce building defects from the questionnaire survey were identified based on respondent's response on each type of construction defects. Construction defects identified in different books & research outputs, as indicated in the literature review part of this thesis, might not be the types of

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construction defect occurred in Residential building projects, hence it is important to ask the respondents for their agreement on each types of building defects, then this was accompanied by identification of causes of construction defects based on their occurrence. Finally effects of construction defect & measures should be adapted to reduce the impact of construction defect were identified based on respondent response rate.

4. CONCLUSION

From reviewing literatures and research done on construction defect and site observation the extent of construction defect was assessed. So, construction defect is a shortcoming in the function, performance, statutory or user requirements of a building, and might manifest itself within the structure, fabric, services or other facilities of the affected building. It is observed that maximum defect was happen by poor workmanship. So it is needful to give training for worker for minimizing construction defects.

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