ISSN: 2277-9655
Impact Factor: 4.116

IJESRT

INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH TECHNOLOGY

POOR QUALITY IN BUILDING PROJECTS

Mahajan Ganesh S*
* Post graduate student, Department of Civil Engineering, Maharashtra Institute of Technology, Pune (Maharashtra, India)

DOI: 10.5281/zenodo.58634

ABSTRACT

The cost of quality are cost associated with the prevention, discovery, and resolving of defects. These costs can arise whether the product is in design stages, manufacturing plants, or in customer's hand. 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.

KEYWORDS: Building defect, Quality, Cost of quality, Quality Outputs.

INTRODUCTION

Quality has become one of the essential elements in recent years due to conceptual changes in the construction industry. In any industry the product should be manufactured according to the required standard which provides the worth of money and satisfaction of the customers. Quality is nothing but the satisfaction of the customer with the performance, appearance, and reliability of the project for the valuable cost range. In all the phases of the project life cycle quality of construction project is linked with proper quality management. Because of the poor quality management systems lots of failures where occurred. Quality has become one of the most important competitive strategic tools which many organizations have realized it as a key to develop products and services in supporting continuing success. Quality system is designed to set a clear view for organization to follow, enabling understanding and involvement of employees proceeding towards common goal. In the cycle of never ending improvement, quality measurement plays an important role. The measurement is considered as a trigger for the improvement .No improvement could be achieved if no measurement is applied and analyzed in order to assist in identifying opportunities for improvement.

Defects within new buildings are areas of non-compliance with the Building Code of India, various Indian Standards and published acceptable tolerances and standards. Defective building construction not only contributes to the final cost of the product but also to the cost of maintenance, which can be substantial. Defective construction may lead to the complete failure of a structure.

NEED OF QUALITY IN CONSTRUCTION INDUSTRY

Errors on construction sites occur frequently and can be costly for the contractors and owners of constructed facilities. In fact, 6-15% of construction cost is found to be wasted due to rework of defective components detected late during construction and 5% of construction cost is wasted due to rework of defective components detected during maintenance.[1] The nature of these errors is quit diverse. 20-40% of all site defects have their roots in errors arising during the construction phase [2], 54% of the construction defects can be attributed to human factors like unskilled workers or insufficient supervision of construction work. Furthermore, 12% of the construction defects are based on material and system failures [1]. These observations suggest that a thorough inspection of construction sites is needed and that current site inspection approaches need to be improved in identifying defects on construction sites effectively.

Since the main causes of construction errors, e.g. human involvement in the construction process and changing environmental conditions resulting in discrepancies in material behavior are uncontrollable, it is critical to improve the inspection and assessment of the quality of construction projects.

OBJECTIVE OF STUDY

In order to achieve the research aim, specific objectives were required:

1. Identify the defects in construction at early stage i.e. at RCC work.
2. Its cost implication.
3. Remedies to minimize defect by improving quality.

The achievement of these objectives would result in identifying some actions that may contribute to quality improvement in the construction industry.

RESEARCH METHODOLOGY

To meet the requirements of the objectives set above, the following approach was devised :
The initial stage of this research involved a literature review to confirm the research objectives. The need to develop a performance improvement and evaluation technique construction industry was identified. The first methodology of the research is the literature review carried out and directed towards the research aim and objectives, the literature review should include different views and previous researches' findings from relevant books, journals and previous reports which had studied the topic, and this will be as starting point of the research.

Second step will be collecting data about defects in construction in concreting etc. causes of defects in concreting. How to repair the defects Cost of material and labor required to repair.

LITERATURE REVIEW

In recent decades, due to the competitiveness in the market places worldwide companies have realized that a good product quality is a key area for the commercial success and its development. Even when approved plans exist, the developers/owners refuse to follow standards and specifications as contained in the plan and cut corners probably because quality assurance is not always a cost effective activity though it is essential if fitness for purpose is the measure of performance and where the satisfaction of the client or customer is to be placed first and foremost. Quality assurance is firmly dependent upon clients knowing their specific needs and communicating these unambiguously to the designer, upon the designer accurately representing these requirements in the design concept, upon the contractor faithfully reproducing these requirements in the work on site, and taking quality assurance to its end, upon the occupier using the building correctly to achieve maximum performance (Griffith, 1990).

quality assurance system is developed to address the public concern, safety, durability and functionality. The identified major problems where inadequate budgetary allocation for quality control, non-enforcement of quality control clauses by authorized agencies, insufficient quality control laboratories. So addressing these problems will greatly improve the level of quality assurance in the industry (Y.A. Abdul Kareem 2006). The factors affecting the quality performance in construction projects where conflicts among project participants, hostile socio-economic environment, bad climatic conditions, project manager's ignorance, faulty project conceptualization and aggressive competition during tendering. So to rectify the factors possible remedial measures has been suggested to improve the quality (K.N. Jha 2006).

There are seven generic ways (in addition to the cost of quality) in which the quality outputs can be measured:

1) Defects (work not to specification)
2) Rework (work requiring correction)
3) Scrap (work thrown away)
4) Lost items (work done again)
5) Backlogs (work behind schedule)
6) Late deliveries (work after agreed time)
7) Surplus items (work not required)

The above measurements apply to 'outputs' (such as defects left in concreting, Inadequate prestressing of girders, scrap in form of steel bars, work repeated because of wrong technique used etc.) as well as to the outputs of finished structure (such as leaking slabs, pots and ruts on bitumen concrete roads, cracks in the concrete pavements etc.).

DATA COLLECTION

Data collection focused on quantity of work done by mason, time required to complete that particular work after slab concrete cycle completed and also documented factors that may affect the work. Records were made once daily at the end of the workday.

The data were collected from building project in Mahalakshmi, Mumbai.

In order to evaluate construction site performance on-site quality outputs is most important for which 2 months (December and January) data were collected in work sheet.

S.N	Project Name	Type of Project	Location
1	Raheja Vivarea	Residential building basement + stilt + 45 floors) and podium including basement.	Mahalakshmi, Mumbai.

Table (1) - Details of site

Sr.no	Description	Time	M/C	M/S	Breaker	Chiper	Grinder	Material
1	Column Bulging Breaking							
2	Column Bulging Repair							
3	Column & chajja groove cutting							
4	Column & chajja groove Repairing							
5	Honey comb repair							
6	Wall tie cutting							
7	Tie rod cutting							
8	Uneven surface grinding							
9	Upstand pardi repair							
10	Tie rod hole filling							
11	wall tie hole filling							
12	Tie patti cover removing							
13	Tie rod cone removing							

TABLE (2) – WORK SHEET

ISSN: 2277-9655
Impact Factor: 4.116

Description of activities:

All activities are categorized in measurements apply to quality outputs.

Quality Outputs	Description	Rectification duration in Days	Material cost	Labour cost	Total cost
Defects	Uneven surface grinding				
	Column Bulging Breaking				
	Column Bulging Repair	3	3900	9243	13143
Rework	Honey comb repair				
	construction joint repairing				
	Upstand pardi repair	5	5900	15326	21226
Lost items	Column & chajja groove cutting				
	Column & chajja groove Repairing	2	4000	8162	12162
Backlogs	Tie patti cover removing				
	Tie rod cone removing				
	Tie rod hole filling				
	wall tie hole filling	2	2149	7162	9311
late Deliveries	Beam pipe sleeve removing				
	Duct cutout removing	1	0	3181	3181
surplus items	Wall tie cutting				
	Tie rod cutting	1	0	3151	3151

TABLE (3) : 14TH FLOOR EXTRA COST IN ADDITION TO COST OF QUALITY

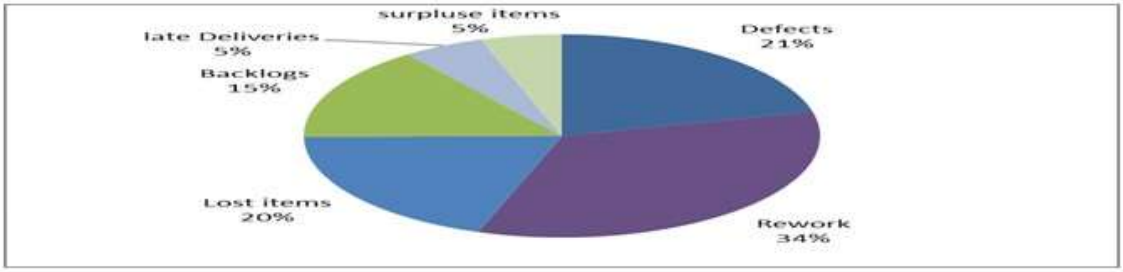

CHART 1: 14TH FLOOR EXTRA COST IN ADDITION TO COST OF QUALITY

Quality Outputs	Description	Rectification duration in Days	Material cost	Labour cost	Total cost
Defects	Uneven surface grinding				
	Column Bulging Breaking				
	Column Bulging Repair	7	5708	20225	25933
Rework	Honey comb repair				
	construction joint repairing				
	Upstand pardi repair	8	6522	25686	32208
Lost items	Column & chajja groove cutting				
	Column & chajja groove Repairing	4	4262	10843	15105
Backlogs	Tie patti cover removing				
	Tie rod cone removing				
	Tie rod hole filling				
	wall tie hole filling	4	2262	7162	9424
late Deliveries	Beam pipe sleeve removing				
	Duct cutout removing	2	0	4181	4181
surpluse items	Wall tie cutting				
	Tie rod cutting	2	0	3265	3265

TABLE (4) : 15TH FLOOR EXTRA COST IN ADDITION TO COST OF QUALITY

ISSN: 2277-9655
Impact Factor: 4.116

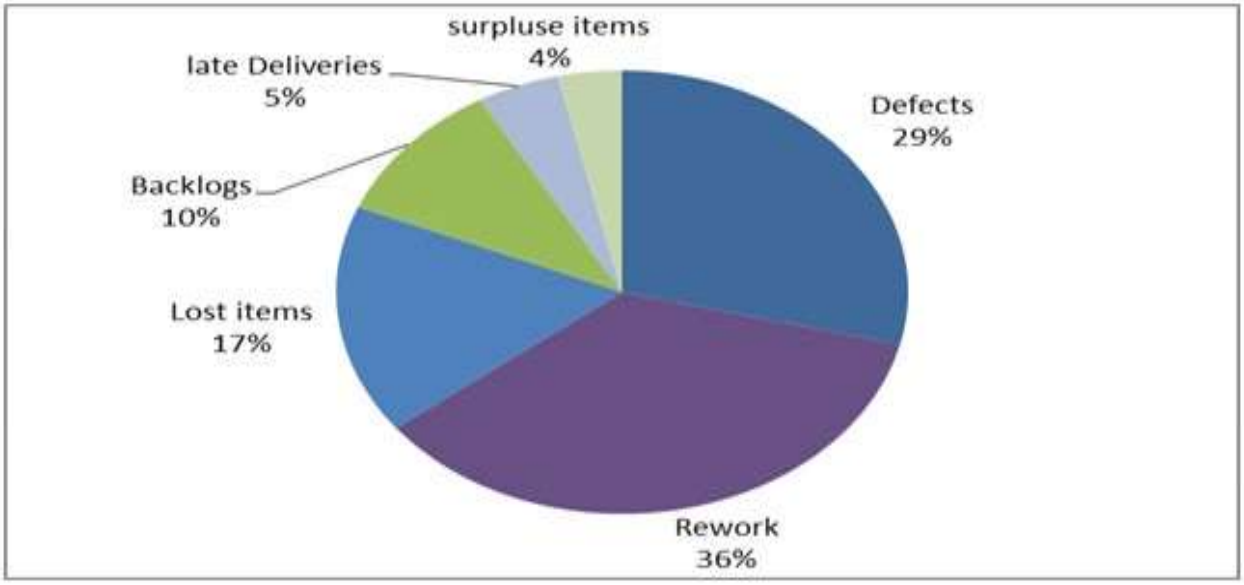

CHART (2) : 15TH FLOOR EXTRA COST IN ADDITION TO COST OF QUALITY

Quality Outputs	Description	Rectification duration in Days	Material cost	Labour cost	Total cost
Defects	Uneven surface grinding				
	Column Bulging Breaking				
	Column Bulging Repair	5	6057	20178	26235
Rework	Honey comb repair				
	construction joint repairing				
	Upstand pardi repair	3	4833	12107	16940
Lost items	Column & chajja groove cutting				
	Column & chajja groove Repairing	2	3220	9070	12290
Backlogs	Tie patti cover removing				
	Tie rod cone removing				
	Tie rod hole filling				
	wall tie hole filling	2	2005	8070	10075
late Deliveries	Beam pipe sleeve removing				
	Duct cutout removing	1	0	3120	3120
surpluse items	Wall tie cutting				
	Tie rod cutting	1	0	3955	3955

TABLE (5) : FIRST FIRECHECK FLOOR EXTRA COST IN ADDITION TO COST OF QUALITY

ISSN: 2277-9655
Impact Factor: 4.116

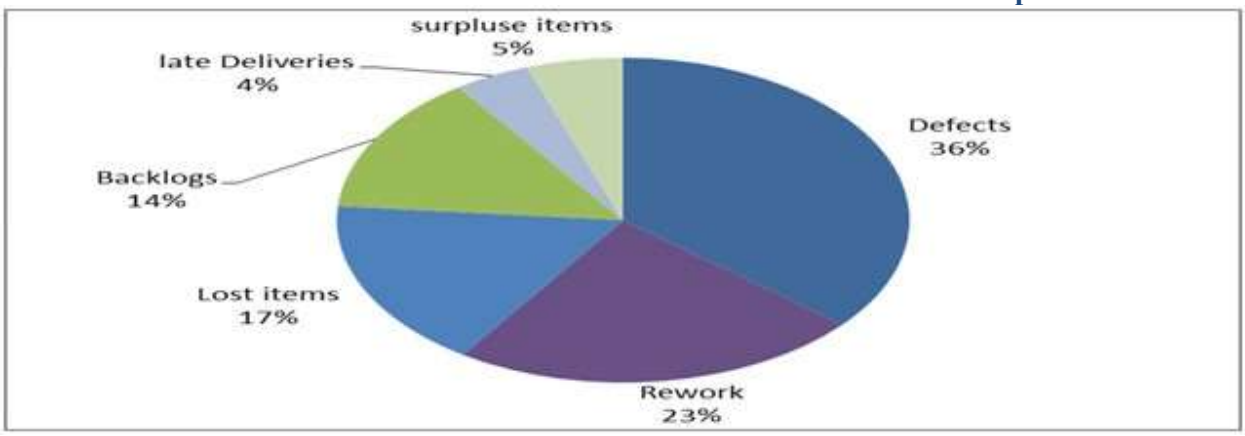

CHART (3) : FIRST FIRE CHECK FLOOR EXTRA COST IN ADDITION TO COST OF QUALIT

RESULTS AND DISCUSSION

Repairing Material Consumption / Manpower Summery:

Sr No.	Floor	Material cost	Labour cost	Total cost
1	14th	Rs. 15,949.00	Rs. 46,225.00	**Rs. 62,174.00**
2	15th	Rs. 18,754.00	Rs. 71,362.00	**Rs. 90,116.00**
3	Fire Floor	Rs. 16,115.00	Rs. 56,500.00	**Rs. 72,615.00**

TABLE (6) : SUMMERY

Major Causes Of Inferior Quality :

Skill Labour absenteeism :

- Skill Labour absenteeism is one of the major factor affecting onsite labour productivity.
- It one of the major problem contractor had faced during the execution of the project.

Material shortage :

- Material like cement, gypsum, screened sand, blocks ,tiles.
- Lack of Material management.

Rework :

- Rework change order.
- Rework design error.
- Improper instructions to labours.

Poor supervision.

- Negligence of supervisor on labours and their activities.

CONCLUSION

This research proposed to study variability extra cost/work occur after the concrete cycle. The data were collected using standardized data collection procedures.

- It is clearly understood that quality doesn't happen by chance, it has to be managed at every stage of the product
- quality of work can be achieved by proper quality control process at a minor cost when compared with the total cost of the project.

- Better the construction specification in similar project to be executed in future should be modified based on lessons learnt during quality control exercised on previous projects.
- Quality of work largely depends upon the quality of materials to be used and workmanship. The relevant specification in respect of materials/ workmanship given in various IS codes be strictly adhered to for accomplishment of quality assurance/quality control.
- Quality control should be exercised at different levels such as pre-construction, during construction and post-construction

Most significantly, this study made its most important contribution in the application of a methodology that reliably quantifies comparable measures of additional cost of quality. The strength of this approach lies in its ability to compare productivity level and the impacts of contributing factors among projects.

REFERENCES

[1] Jha K. N., & Iyer K. C.,(2006). " Critical Factors affecting Quality Performance in construction projects". Total Quality Management, 17(9), 1155-1170.
[2] Tom S. Ramsey, M. ASCE "QUALITY CONTROL A NECESSITY NOT AN OPTION"ASCE, Issue in journal of construction engineering and management 1984
[3] David Arditi and H. Murat Gunaydin "FACTORS THAT AFFECT PROCESS QUALITY IN THE LIFE CYCLE OF BUILDING PROJECTS", journal of construction engineering and management /May/ June 1998
[4] David Arditi, Member, ASCE, and H. Murat Gunaydin, Student Member, ASCE "Perceptions Of Process Quality In Building Projects", journal of management in engineering / march/ april 1999..
[5] Robert D. Miller and John P. Hribar, Fellow, ASCE "Quality Through Project Peer Reviews", journal of professional issues in engineering, vol.115, no. 1, January, 1989.
[6] Jerome S. B. Lffland, Fellow, ASCE "ETHICS AND QUALITY IN THE CONSTRUCTED PROJECT", Journal of Professional Issues in Engineering Education And Practice, Vol. 120, No.1, January, 1994
[7] Linda A. Newton, A.M.ASCE1; and John Christian2, "Impact of Quality on Building Costs". Journal of Infrastructure Systems, Vol. 12, No. 4, December 1, 2006.
[8] James W. Johnson, " CONSTRUCTION QUALITY ASSURANCE UNDER CHANGE CONDITIONS" journal of architectural engineering / December 2000.
[9] Rumane A.R (2008), " Quality tools for managing construction projects" pg no. 26-45.
[10] R.Savitha, "Importance of quality assurance of materials for construction work". pg no. 26-45.
[11] Vishal Vasant Waje, Vishal Patil "Cost of poor Quality in Construction" IOSR Journal of Mechanical and Civil Engineering.
[12] "Construction Management: Latest Trends and Development". pg no. 299.