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## **Poor Construction Techniques in Small Construction Works: A Case Study in The Valley of Kashmir**

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### **ABSTRACT**

*The construction of a building structure entails extremely complex tasks. It necessitates a trained staff during the design, approval, supervision, and construction stages. One of the major difficulties confronting the workforce is the inability to recognize and use correct construction methods and procedures following quality control assurance for building projects. This research looked at some of the construction players that were involved in the construction of projects in Anantnag Area of J&K. It concentrated on examining and investigating bad workmanship on the quality of projects such as concreting works and reinforcement detailing to accessible active building sites around the research region. It entailed analyzing the root cause of poor workmanship and identifying factors that would greatly reduce difficulties while increasing client satisfaction. The study included five construction locations where different questionnaires were gathered. The information gathered is connected to the difficulties confronting the building sector as well as concrete quality. During the research deficiencies were pointed out. As a result, it advocates paying particular attention to construction management variables such as supervision, training, incentive, and excellent communication on-site to reduce the cost and impacts of bad workmanship while executing building projects*

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**Keywords:** Supervision, Quality Control, Specifications, Construction Management, Skill, Bad Workmanship

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### **1. Introduction**

In today's world construction owners/contractors are under growing pressure to enhance project performance, complete projects more quickly, and lower the cost of running their construction works. Construction is a wide and active industry that is the backbone of the global economy. As per Make In India Website Infrastructure plays a huge role in propelling other industries and India's overall development. The government, therefore, focuses on the development of infrastructure and construction services through focused policies such as open FDI norms, large budget allocation to the infrastructure sector, smart cities mission, etc. Investment of about INR 2 lakh cr has been proposed by 99 cities under the Smart City initiative. Apart from this in the last five

years, the construction sector, as a part of manufacturing contributed an average of 8 per cent to the overall Gross Value Added (GVA). The Construction industry in India consists of the Real estate as well as the urban development segment. The Real estate segment covers residential, office, retail, hotels and leisure parks, among others. While urban development segment broadly consists of sub-segments such as Water supply, Sanitation, Urban transport, Schools, and Healthcare. FDI in the construction development sector (townships, housing, built up infrastructure and construction development projects) and construction (infrastructure) activities stood at \$26.16 bn and \$25.95 bn, respectively, between April 2000 and September 2021. The construction work should be executed as per the engineering standards and specifications need to be followed. But in most of the small construction works there is lack of supervision and there is no provision for checking the quality of the works. There are a number of reasons behind it.

## 2. Study Area

Various undergoing projects in the Anantnag area of UT of J&K were selected. Most of the projects were running under the supervision of J&K PWD R&B, KPDCCL and PHE (now Jal Shakti Department). The projects were chosen randomly.



*Fig 1 (Map of Anantnag)*

## 3. Literature Review

According to previous research conducted by the Building Research Establishment (BRE), 90% of building failures are due to problems in the design and construction stages.<sup>1</sup> These problems include poor communication, inadequate information, inability to check information, inadequate check and controls, lack of technical expertise and skills, and insufficient feedback leading to recurring errors. Most defects in construction projects are due to human error. It means we can say that human error happened due to poor performance in workmanship during the construction of a building. One of the issues of this condition is due to poor quality of workmanship during a construction project.

## 4. Research Methodology and Experimental Work

During the course of research first of all a set of questionnaire was framed and subsequently was distributed among the Engineers, Supervisors, Contractors, Skilled, Unskilled Labours. Meanwhile visual screening tests

were also done to find out the quality of the work. The whole process was divided into a number of parts and faults were recored accordingly. The whole sequence of the research is summed as follows.

- a. **Excavation Works:** Almost in 70 % sites it was found by visual screening that the excavation was not done as per the specifications. The Labour and their supervisor was not aware of theIS 3764-1992. The pits were narrow and it was cumbersome for labours to fit the shuttering in them. The stakeholders viz labours had no idea of the working space. The Incharge Site supervisor confessed the same but later expressed vested interests of other stakeholders in the same.
- b. **P.C.C Works:** Same was the case with PCC Concreting. Drawing clearly mentioned the grade of concrete to be used, but in reality no such protocol was followed. Moreover the specified depth of the concrete was also violated by the executing agency.
- c. **Foundation Works:** First of all the steel for the foundation was not cut as per the IS:456 2000. No proper hooks were provided and alos 90° bends were provided, neither in the column base nor in the colum block side reinforcement. Concrete Mix was very lean. Upon enquiring with the labours the mix of concrete to be used for column foundation block was very lean.
- d. **Reinforcement Detailing:** The steel was not cut and used as per the specifications. No proper hooks were provided in the ties. Apart from this spacing between two ties was also more.
- e. **Workability:** Labours were adding excess water to the concrete to increase its workability so that it would be easy for them to carry and place the same. Water Cement Ratio Law was clearly violated and labours were too arrogant to listen to the Incharge.
- f. **Placing of Concrete:** The labours were dropping concrete from a height of 3 m. Thus the concrete segregation was clearly visible. Upon enquiring the labours didn't paid heed to the same. At one of the site, site supervisor was not aware of this that dropping concrete from a height of more than 1.5 m leads to segregation
- g. **Mixing of Concrete:** As per the rule the ingredients of the concrete are to be mixed dry, then water has to be added. But here in 90% cases the water was first poured in the mixer along with the cement followed by coarse and fine aggregates making fun of Civil Engineering. This led to improper mixing and excessive water in the concrete which directly affected the strength of concrete.
- h. **Batching of Concrete:** The volumetric batching of concrete was not less than a joke at most of the sites. There was a sheer violation of the same.
- i. **Vibrating of Concrete:** The concrete was being vibrated after around 1 feet depth which also resulted in the improper impaction of the concrete and ultimately affected the strength of concrete and also formation of honey combs was visible
- j. **Plum Concreting:** The amount of plums to be used was more than 30% and also the grade of concrete to be used was very lean.
- k. **Curing of Concrete:** During visual screening it was found that concrete has developed some cracks due to shrinkage. On enquiring it got revealed that concreteworks were not cured as the theschedule.



*Fig 2 (Segregation of Concrete) Fig 3 (Excessive Plums in Concrete)*



*Fig 4 (Segregation of Concrete)*



*Fig 5 (Dropping Concrete from High Levels)*



*Fig 6 (Honeycombing)*



*Fig 7 (Honeycombing)*



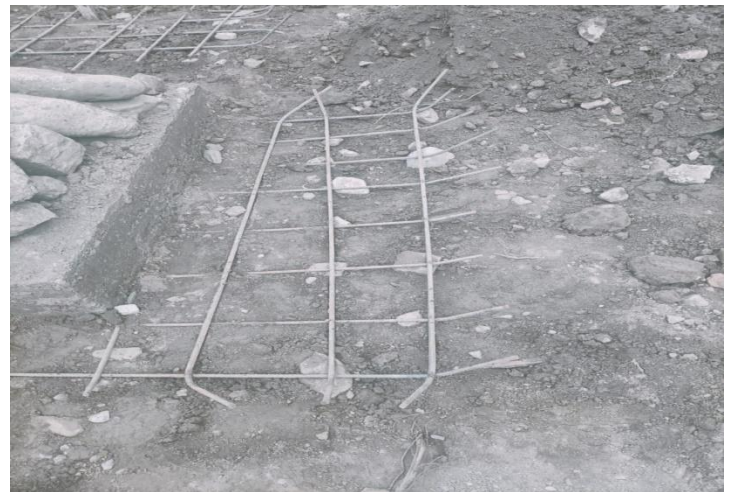
*Fig 8 (Improper Reinforcement)*



*Fig 9 (Reinforcement Bar outside Ring)*



*Fig 10 (No Bend provided in Reinforcement)*



*Fig 11 (Large Gaps in Reinforcement)*

#### 4.2 Questionnaire Reports

The questionnaire was prepared and was distributed among the different parties to record their response regarding the work. The questionnaire

Type of Work	Question	Answer	Remarks
Mixing of Concrete	Do you know first of all the ingredients of concrete have to be mixed dry?	NO (50/50) 100 %	Out of 50 stakeholders on site nobody knew this!!!!
Mixing of Concrete	Do you know that adding more water to concrete decreases its strength?	NO (50/50) 100 %	Out of 50 stakeholders on site nobody knew this!!!!
Placing of Concrete	Do you know that dropping concrete over a height of more than 1.5 m leads to segregation?	NO (50/50) 100 %	Out of 50 stakeholders on site nobody knew this!!!!
Reinforcement Detailing	Do you know about the importance of Clear Cover?	NO (5/5)	Out of 5 Bar benders none knew the reason and violate the same
Reinforcement Detailing	Do you know that we can't overlap reinforcement of a beam at middle part and in column at top and bottom?	NO (5/5)	Out of 5 bar benders none knew the reason and violate the same
Reinforcement Detailing	Do you know that we have to provide development length in beams and columns?	NO (5/5)	Out of 5 bar benders none knew the reason and violate the same
Mixing of Concrete	Do you know that in case of manual/hand mixing one has to add more cement to concrete (Around 10% more)?	NO (50/50) 100 %	
Plum Concreting	Do you know that in case of plum concreting the plums should be maximum 30-40% and rest must be concrete?	NO (50/50) 100 %	Out of 50 stakeholders on site nobody knew this!!!!

## 5. Results and Conclusion

From the study it was found that there is clear lack of knowledge among the construction works which may prove fatal. From simple mixing of the concrete to the laying and curing no engineering practices were followed. Even the reinforcement details were not as the Indian Codes. Following points can be concluded from the research:

1. There is lack of knowledge among the workers and same needs to be catered. Camps must be organized at each site and engineer in charge must guide the labours accordingly. Even supervisors and skilled labours are not aware of the basic engineering practices which was a shameful moment.
2. It was found that in case of construction sites of KPDCL (an organization employed in UT of J&K for Power supply). They have employed electrical engineers to supervise civil works which is a complete blunder.
3. The bossy nature of masons adds fuel to the fire. They are too arrogant to learn the proper engineering practices.
4. In many cases contractors also play various tactics to cut the costing and force their labours to compromise on the work.
5. Apart from lack of knowledge, corruption in the various departments also leads to compromises over the quality of work.

## 6. Recommendations and Future Scope

From the results obtained from the respondents and from visual screening, the primary reasons for poor workmanship are:

- i. Lack of training and experience from workers
- ii. Lack of motivation for workers,
- iii. Lack of proper supervision and management skill.
- iv. Lack of care when concreting
- v. Lack of proper tools and equipment
- vi. Lack of clarity in drawing and specifications

*The result indicated further that poor workmanship is also resulting from the contractor's speedy construction and shortcuts in construction.* Subcontracting has been noted to have less impact on workmanship. However, all respondents acknowledge a lack of supervision as the significant cause of poor workmanship. The second objective established the relationship between the quality management factors (supervision, training, experience, availability of proper tools and equipment), and workmanship. The third objective was to identify the responsible authorities' measures in ensuring a good quality of work. From the study's findings and analysis, it can be concluded that the quality of workmanship on construction sites is relatively poor.

The study has summarized all the causes of poor workmanship, that is, quality management factors. All these elements have a positive influence on the level of workmanship. The finding implies that a low level of workmanship on construction projects will continue unless the quality management factors are enhanced (supervision, training, availability of proper tools, and equipment, among others). Therefore, to reverse the trend, all efforts should be aimed at providing and improving the content and context of these factors to enable acceptable quality of works on sites.

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