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Detail Study of Delay Analysis in Construction Projects due to Multiple Factors Using RII Method

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Abstract

In the construction industry, the occurrence of delay is a common issue which then, is responsible for the extension of the project time from its original deadline. This study investigates the causes of delay in construction industry due to multiple reasons which involves different factors along with its effect on the duration of the project, by conducting a survey and then questionnaire was prepared by consulting construction site personnel, which lists a number of causes. Study concludes that the most important five factors which were responsible for the delay and have the following RII values respectively- 0.60, 0.59, 0.52, 0.48 and the 5th rank has two factors whose RII value were same that is 0.43.

Keywords: Construction delays • Delay time • Construction management • RII method • Construction industry

Introduction

The occurrence of delay is a common issue. Significantly it is affected by numerous ways which is considered to be the most critical risk factor. Delay can be found in many ways like in the initial stage of any activity, end time or exceeding the limits of project float. Which then, is responsible for the extension of the project time from its original deadline? Construction industry is important for the country because it helps in economic growth and development of the country as well as it has multiple effects on the progress of the country. Many new technologies and machines have been introduced in the world of construction yet delay takes place in these projects which leads to major consequences and loss in the construction. So, to overcome from this pressing issue, cause and effects of the delay needs to be focused. Nevertheless, there are many challenges in the construction industry among which delay is one of the biggest challenges. It can be considered as one of the most repeated issue in the construction industry and can also be defined as a time over-run or late completion of work as compared to the planned date or schedule. Construction project works can delay due to many factors like, due to materials, equipment, manpower, consultants, contractors, labors, finance, weather conditions and many more. Consequently, it can give high effect on the owner, designer, contractors, temporary workers, clients and others. Delay can give a negative effect to accomplish the goal. However, if the delay occurs more time will be required to complete it that can lead to the expanding of the cost. So, delay is categorized as a serious problem in the world of construction that cannot be ignored.

Literature Review

Alaghbari wa'el on "The significant factors causing delay of building construction projects in Malaysia". In this research they distributed 450 questionnaire and then concluded that major factors responsible for the delay in construction industries of Malaysia were due to contractor, followed by consultant related factors then owner and finally there was some external factors which effected the time line of the construction project.

"Causes of delay in building construction projects in Egypt". In this paper the significant causes of delay were financing by contractor during construction, delays in contractor's payment by owner; design changes by owner or his agent during construction project work in Egypt [1,2].

"Causes of delay in large construction project". The paper depicts the reasons of delay in construction in Saudi Arabia, According to labour and contractor related causes are significant source of delay whereas, Contractor says owners and consultants are responsible for delay. Spearman's rank correlation shows highest degree of agreement is 72.5% between owner and consultants, while the lowest degree is 56.8% between owners and contractors [3,4].

"A survey of time-cost relationships in Hong Kong construction projects. Building Technology and Management." They said in their research that small issue such as, poor communication between the owner and client and also, lack of management is one of the reason because of which construction got hold [5,6].

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"Causes and effects of delays in Indian construction projects". In this thesis work, the researcher emphasized more to know the effects of delay in construction projects in India. He conducted his study via circulating questionnaire and he sum up by saying that inadequate contractor's work and their poor risk management, whereas the at second place reason is communication and coordination of participants through which proper information and knowledge cannot be shared between people present there, so it is also responsible for delay of construction works [7,8].

Methodology

In this research study questionnaire-based survey is conducted in which, data has been collected from various construction sites. The questionnaire designed in such a ways that respondents can give their answers based on their opinions and the next step in research methodology is analysis, for which RII method (relative important Index) is adopted in which the comparison is done between the views of respondents that are contractors, engineers and project manager on the basis of certain parameters. Finally, interpretation of findings is represented in a tabulated form which is easy to understand. Lastly, in this research we will be able to figure out the critical causes of the construction delay and present data into meaningful form that is in the descending order which depends upon their RII value.

Data collection

The target population included civil engineers, project managers, site engineers, and contractor. Various states of India were targeted for the survey. The detail of sites and various holders were collected through internet. Total ten questionnaire circulated through internet and manually as well, out of which seven questionnaire were received. The data collected from these questionnaires helped in calculating RII (relative importance index).

Questionnaire Discussion: Total 10 questionnaires were distributed which consists of 55 questions. Questionnaire was mainly divided into 4 groups namely equipment, materials, manpower and money and factors related to that which are responsible for the delay in construction. These four major groups affect the progress of construction work. The questionnaire also shows the reasons behind delay in a construction of a site. The groups were further divided into various factors such as transportation of materials, lack of manpower, unskilled labours, due to bad weather, fund problems, sudden breakdown of equipment and many more. The questions in this questionnaire were to be answered in a degree of severity. The severity was categorized in a five-point scale as follows: substantial impact, high impact, average impact, low impact and minor impact [9].

Relative Importance Index Technique: This technique is adopted to determine the relative importance of various causes and effects of delays in construction industry. The same method is followed in this study within the four groups namely, materials, manpower, equipment and money.

$$RII = \Sigma W / (A \times N)$$

Where, W is the weighting given to each factor by the respondents, A is the highest weight (i.e. substantial in this case), and N is the total number of respondents. The factor with the highest weight has RII=whereas the next factor with lower weight has RII=2 and same as moving further lower the value of weight RII value will be 3, basically higher the value of RII, more important was the cause of delays.

Reponses were adopted and transformed to Relative importance Index for each factors of all the four groups [10-12].

Results and Discussion

The relative importance index, RII, was computed for each cause to distinguish the most critical causes.

The causes were ranked based on RII values, here are top ten factors which are demonstrated in the tabular form below.

After the analysis using RII method, it can be seen as first two major factors which are responsible for delay in construction are from material category under which are handling and the procurement of material.

Moving further, there are four causes which are affecting the timeline are from equipment, three other causes are due to manpower.

Whereas, money has very less impact as compare to all the other factors Table 1.

Table 1: Critical factor responsible for Delay of Construction using RII method

No.	Groups	Major Factors	RII	Rank
1	Materials	Handling of materials	0.6	1
2	Materials	Delay in procurement of materials	0.59	2
3	Equipment	Efficiency of equipment	0.52	3
4	Equipment	Sudden breakdown	0.48	4
5	Equipment	Accidents	0.43	5
6	Money	Money	0.43	5
7	Equipment	Operators efficiency	0.41	7
8	Manpower	Communication	0.41	7
9	Manpower	Unqualified workforce	0.4	9
10	Manpower	Training	0.38	10

The bar graph below, Relative important index RII calculated for affecting factor on the timeline of the construction project and identified the responsible factor for delay in construction project. Here, the chart represented the top 10 factors extracted from the four groups with their RII value. It helps in identifying most affected factor of delay in construction among all the factors of different category Figure 1.

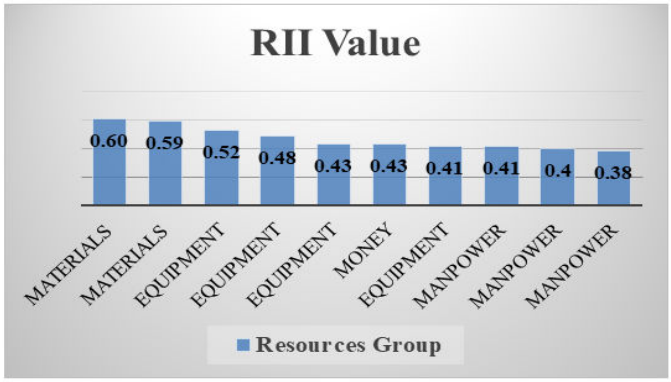

Figure 1: Top ten factors result from Data Analysis by RII method

The pie chart represented below depicts the percentage of each category namely, material, equipment, manpower and money on which the questionnaire was based. The top 10 factors which were identified from all the four groups, through RII method from that 30 percent is from category of manpower, highest percentage which is 40 percent is from equipment category whereas, materials holds just half percentage of equipment category and last, the lowest factor responsible for delay in construction due to money Figure 2.

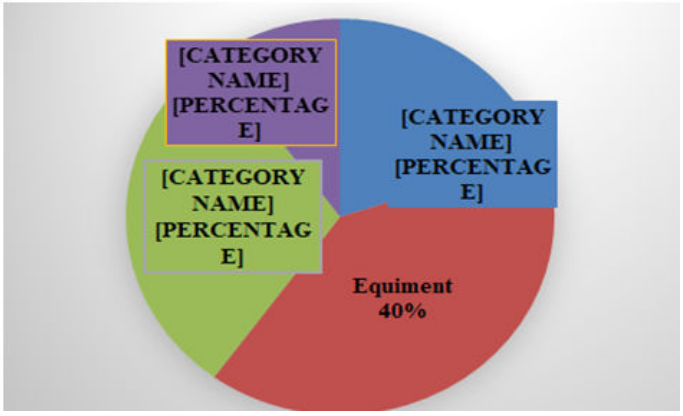

Figure 2: Categories responsible for delay in construction

Note: Material Equipment Manpower Money

Conclusion

By this vigorous research on different papers which are responsible for the delay in construction projects it can be observed that the issue mostly occurs due to the irresponsibility of contractor, engineers, mangers and clients, poor communication between the owner and client and other factors such as weather condition, operator inefficiency and many more. The above work is framed in a questionnaire in which questions were designed which could be easily recognized and answerable by different people involved in the activities at the site from which many other major reasons are discovered apart from that mentioned above, namely materials, equipment, manpower and money. One group among all of the four groups which was prominent in delaying process is equipment group. The paper tended to the most huge factors and groups to cause delays.

According to the findings in this research paper, following points are recommended in order to minimize the delay in construction projects:

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References

1. Abdul-Rahman, H, Mohammed Ali Berawi, AR Berawi, and O Mohamed, et al. "Delay Mitigation in the Malaysian Construction Industry." *J Constr Eng Manag* 132 (2006): 125-133.
2. Abd El-Razek, M E, H A Bassioni, and A M Mobarak ."Causes Of Delay In Building Construction Projects In Egypt". *J Constr Eng Manag* 134 (2008).
3. Aibinu, Ajibade Ayodeji, and Henry Agboola Odeyinka. "Construction Delays and their Causative Factors in Nigeria." *J Constr Eng Manag* 132 (2006): 667-677.
4. Assaf, Sadi A, Mohammed Al-Khalil, and Muhammad Al-Hazmi. "Causes of Delay in Large Building Construction Projects." *J Manage Eng* 11 (1995): 45-50.
5. Aibinu, AA, and GO Jagboro. "The Effects of Construction Delays on Project Delivery in Nigerian Construction Industry." *Int J Proj Manag* 20 (2002): 593-599.
6. Chan, DWM, and MM Kumaraswamy. "A Survey of Time-Cost Relationships in Hong Kong Construction Projects." *Build Tech and manag* (1982).
7. Kumar, Dinesh. "Causes and Effects of Delays in Indian Construction Projects." *Int J Eng Res* 3 (2016): 1831-1837.
8. Haseeb, M, Aneesa Bibi, and Wahab Rabbani. "Problems of Projects and Effects of Delays in the Construction Industry of Pakistan." *AJBMR* 1 (2011): 41-50.
9. Al-Khalil, Mohammed I, and Mohammed A. "Important Causes of Delay in Public Utility Projects in Saudi Arabia." *Constr Manag Econ* 17 (1999): 647-655.
10. Rajgor, Matama, Chauhan Paresh, Patel Dhruv, and Panchal Chirag. "RII & IMPI: Effective Techniques for Finding Delay in Construction Project." *Int J. Eng Res Technol* 3 (2016): 1173-1177.
11. Shabbab Al Hammadi, M. "Study of Delay Factors in Construction Projects." *Int adv res j sci eng technol* 3 (2016): 87-93.
12. Hamzah, N, MA Khoiry, I Arshad, and W H W Badaruzzaman, et al. "Identification of the Causes of Construction Delay in Malaysia." *World acad eng techno* 72 (2012): 312-317.

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