

Investigation of delay and cost overrun in the construction project of building project methodology

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Abstract - The construction industry suffers from frequent delays in construction owing to multiple reasons making construction project expensive due to additional cost involved due to time value of money and opportunity cost loose. No public data is in place to estimate the accurate amount of loss in monetary and nonmonetary loss causing due to delay. However it is generally understood that the proper understanding of causes of delay through empirical study can help to a great extent in reducing the construction delay and subsequent implication to the detriment of the project. The study conducted as part of this project try to unravel the causes of delay in construction with the help of empirical study taking into consideration the firsthand experience of people working in construction industry and participating in different capacity such as supervisor, contractor, subcontractor, client, designer, consultant, and engineer. The data required to form a conclusive opinion regarding the topic is collected in the form of questioner and the response is mapped according to five point Likert scale. The computation of the parameter involved in the response sheet is proposed to be calculated by using the relative importance index thereby giving the clear picture of ranking of the issues the construction professional holds important in descending order of their contribution to delay.

Key Words: methodology, survey, delay

1. INTRODUCTION

The venture to collect data regarding the any project requires the determined focus on the methodology of research. The paper attempts to discuss the suitable methodology for the project attempting to understand the real tangible problem like delay in construction

2. Research methodology

Research methods tools and technique

There are various method in prevalence to carry out research over any subject under question. The selection of methodology may vary depending on the scope set up in

study and means available to adopt specific method some of which are mentioned below.

2.1 Quantitative methods:

Technique is associated with the gathering, analysis, interpretation, and presentation of numerical information in bulk and studying the relationship between them. Conclusions are conducted from scientific measuring techniques.

2.2 Qualitative methods:

Technique is associated with the gathering, analysis, interpretation, and presentation of narrative information. This research seeks insights on particular phenomena or thematic analysis. The results or conclusions from such research rely on the researcher recognizing patterns though small quantity of data is used the analysis may show quality results

2.3 Mixed method:

This involves the combination of both qualitative and quantitative method amalgamating the benefits of both and reducing shortcoming occurring on both accounts

3 Proposed research methodology

In this research, a combination of methods is proposed to be used. Quantitative methods are used to collect facts. The same is true for the literature search and the data collected for questionnaires. Conclusions are to be drawn from these sets of facts and data.

A questioner is prepared after surveying the existing literature on the subject under consideration and interview with industry expert conducted leading to refinement of the questioner and avoiding repetitive question and adding new questions relevant from expert point of view. The questioner containing the questions divided into various heads like client or owner, designer, consultant, contractor, labor, equipment, material and external factors and effect of delay providing total eight question regarding major parties were made.

Respondent in survey will be asked about their perception regarding various factors contributing to delay on Likert scale of one to five with increasing intensity of respective heads contribution in delay in the form of very low to very high with medium being intermediate

The mix methodology is adopted because of it containing the advantages of the both qualitative like bulk data for research and qualitative bringing the nuances and detail like gathering, analysis, interpretation, and presentation of narrative information. This research seeks insights on particular phenomena or thematic analysis. Hence the mixed methodology of research is preferred by many researchers so is for the research under consideration.

For any research study to have reasonable validity it is necessary that the common and conventional rules of research and enquiry be followed and these includes the wide data survey, studying the previous literature published on topic under consideration these however have limitation in a sense that though it may give credible knowledge to frame the problem statement but it cannot be construed as real research as literature survey and study previously published papers constitute only secondary source of knowledge. For a field of study as dynamic as construction industry the variable and parameter of study are subject to change from position to position according to the prevailing site conditions

For researcher looking to find out serious reasons behind the problem under consideration it becomes necessary to conduct the primary research on field to get the actual assessment of gravity of problem. The primary research brings the researcher into direct contact with the problem under consideration and helps him develop the hand on real understanding of problem so as to enable him to offer any serious solution to problem under consideration

There are various methods to conduct the primary research into the field of study this empirical study can be classified broadly as Qualitative study, Quantitative study, Mixed study i.e., mixture of both as has been discussed in the earlier chapter. The study utilizes the mixed method for research for the current study.

3.1 Mixed study

3.1.1 Structured questioner

Based on the literature review the problem identified it were better understood and the list of reason for the causes of delay and the consequences arising out of that where found out these finding then where discussed with industry experts and industry expert provided much needed recommendation to include the hitherto excluded questions based on their experience these insights from

industry expert where helpful in farming wholesome questionnaire to be distributed among other industry expert and parties in construction to get their response

this forms the part of data collection exercise which forms our primary data for this research

The questioner is designed includes the 96 question proposition that contribute to delay in construction and categorized into owner related, contractor related, consultant related, designer related, labor related, equipment related, material related and external related. Etc. the consequences of delay were categorized into 8 prominent consequence found out during the literature review and discussion with industry expert

The Likert scale from 0 to 5 was used to categorize the response where 1 represent the very low effect 2-low effect 3-medium effect 4- high effect 5- very high effect of the forth mentioned issue on the delay in construction and same goes with the effect of delay on project the respondent were instructed to mark the bracket of their perceived response against the cause or effect under consideration

The questioner design is intended to gather information from a group of participants in a standard form. A sample of participants is formed and respondents will be asked to give their answers to a standardized line of questioning. Since people's evaluation, understanding, and opinions vary, there is always a limitation in fetching data through questioner. In spite of that, it is expected that the line of questioning, as a whole, can give both a good indication and information regarding the subject, and can therefore give a meaningful result related to the subject.

The questioner's structure was designed based on the results of information that was collected during the literature review, and the goal was to further the knowledge on the research questions asked. The data collected by the literature review will be compared to the data collected from the questioner response to see how far the literature aligns with the collected data and what learning can be drawn from the new data.

3.1.2 Sample of respondents for response to questioner

The sample participant Where are to be chosen based on the availability of time and willingness to respond almost all parties involved in construction like client, supervisor, engineer, designer, consultant, contractor, labourer, and labourer contractor, equipment contractor will be requested to participate in in exercise

however this number of sample collection is likely to be affected owing to the constraint on the moment imposed by Corona induce pandemic thereby bringing in limitations on face to face interview by researcher to with the participant however this can be made up by sending questionnaire through email and the questionnaire design electronically and sent to various parties it can be said that the collected data will

be of high quality owing to the limited and enthusiastic participant.

Although the sampling method has some advantages, it is not flawless. Convenience sampling can cause a number of biases and is not likely to be representative of the population as a whole, and, due to that, caution should be used when interpreting the nature of the results

3.1.3 Conducting interviews

The interviews will be conducted on site in one-on-one sessions by the author. All participants will be contacted prior to the meeting either by email or a phone call, where the study was shortly presented and the potential participants will be asked to devote time for the interview. The timing of the total interview, and to gain feedback on what could be done better it is likely to take the interviews generally between 15 and 25 minutes to conduct

3.1.4 Analysing data

All the results will be collected using printed questioner specially designed by the author. The data then transferred to a spread sheet can be analysed further using Microsoft Excel and its statistical functions, such as tables and graphs. The sample size is not large, but nonetheless it is large enough to give a reasonable indication of how matters stand in the small

3.1.5 The questioner list

The list of questioner is mentioned as under

Owner

1. Delay in progress payments
2. Delay to furnish and deliver the site
3. Change in orders (plan/design) & extra orders by owner during construction
4. Late in revising and approving design documents
5. Delay in approving shop and sample materials
6. Slowness in decision-making process
7. Conflicts between joint-ownership of the project
8. Owners lack of experience and involvement
9. Bureaucracy in client's organisation
10. Unavailability of professional construction management (i.e. consultant)
11. Failure to give right of access to site within time stated in the contract
12. Inflexibility in accepting the contractor's staff

Contractor

13. Difficulties in financing project/insolvency
14. Conflicts of sub-contractors' in execution of project
15. Rework due to errors during construction
16. Conflicts between contractor and other participants
17. Poor site management and supervision by contractor

18. Poor communication and coordination by contractor with other parties
19. Ineffective planning and scheduling of project execution by contractor
20. Improper or ineffective construction methods implemented by contractor
21. Inadequate contractor's work & experience & also poor risk management and ignorance
22. Delays in sub-contractor's work
23. Inadequate qualifications of the contractor's technical staff
24. Poor estimation of project time and quantities of material required before contracting
25. Unsafe working condition due to improper safety management by the contractor
26. Fraudulent practices and kickbacks

Consultant

27. Poor qualification & Inadequate experience of consultant's engineering staff
28. Lack of communication and cooperation by consultants
29. Delays in performing inspections and tests
30. Inaccurate estimates by consultant
31. Slow decision making process
32. Delay in reviewing and approving design documents
33. Delay in approving changes in the scope of work

Designer

34. Mistakes and discrepancies in design documents
35. Insufficient data collection and survey before design
36. Unclear details in drawings
37. Inadequate design-team experience
38. & delay in producing design documents
39. Unclear and inadequate details in drawings and also slow response on doubts arising from the drawings
40. Misunderstanding of owner's requirements
41. Complexity of project conception & designing

Labour

42. Shortage of labors
43. Low skilled/productivity level or unqualified labors
44. Personal conflicts among labors
45. High labor wages compelling to hire low amount of labors
46. Labor strikes at site
47. Labor Safety & health problems when working in hazardous conditions and their absenteeism
48. Nationality and language of labors
49. Lack of motivation

Materials

50. Shortage of construction materials in
51. market
52. Late procurement of materials/late ordering
53. Delay in material delivery especially while importing
54. Damage of sorted material due to improper storage of materials
55. Changes in material types during construction
56. lack of adequate space for storing materials in site
57. Price fluctuation/inflation in material prices

EQUIPMENT

58. Equipment breakdown
59. Shortage of equipment when needed
60. Low level of equipment-operator's skill
61. Low productivity and efficiency of equipment
62. Wrong kind or verity of equipment/selection
63. Lack of hi-tech, advanced and special equipment
64. Complication of hiring and transporting to the site
65. Limited mechanization due to cheap labor cost in the locality

External factors

66. Effects of unforeseen subsurface and changing ground condition (e.g. Soil, high water table) factors
67. Weather, climate (hot or cold) & rain effects on construction activities
68. Heavy traffic, over-crowd & other restrictions at site
69. Accident during construction
70. Changes in government regulations and laws
71. Unavailability/poor temporary facility of utilities in site (such as water, electricity, telephone, etc.)
72. Civil unrest/public strikes
73. Bureaucracy restriction by government agencies
74. Slow site clearance due to restrictions
75. Litigation b/w various parties in the mid of construction
76. Poor government judicial system for construction dispute settlement
77. Effects of social and cultural factors
78. Original contract duration is too short – Unrealistic time schedule imposed in contract
79. Lack of motivation for contractors for early finish and ineffective delay penalties
80. Types of construction contract (Turnkey or design/construction only)
81. Land acquisition
82. Faulty soil investigation report
83. Delay in finalisation of rates for extra items
84. Problem with neighbours
85. Lack of database and experience for estimating activity duration and resources required in a new type of construction project

86. Poor communication and coordination b/w the participants of the construction project
87. Mismatch between the location of infrastructure services with what was
88. approved in the tender and provided in
89. drawings by the owner of the services

The questioner related with the effects of delay to be assessed by participants is as follow
Time overrun

90. Reduction in profit for the contractor due to cost overrun
91. Productivity loss for the owner due to extended construction phase
92. Distrust with contractor and damage for the company's reputation
93. Distrust insists the owner to delay the progress payment which leads to contractor's cash-flow problem
94. Dispute, Arbitration or Litigation b/w the participants of the project
95. Abandonment of project
96. Difficult in improving the market value of the contractor's company

These are the questions that are supposed to be asked through questioner along with the information like roll of respondent in construction site, name and experience etc.

3. CONCLUSIONS

The questioner designed above is though all inclusive regarding inquiry into the causes of delay and the effect but is not exhaustive given the sheer volume of the problem and complex task involved and the presence of numerous stakeholder parties involved in construction however it is estimated that the questioner should suffice the requirement of the study to investigate the causes of delay and the implication thereof thereby enabling the surveyor to collect data for analysis and make solid conclusion out of analysis and make recommendation to avoid the follies of delay and cost escalation.

REFERENCES

- Aftab Hameed Memon, Ismail Abdul Rahman, Ade Asmi Abdul Azis , (2011), Preliminary Study on Causative Factors Leading to Construction Cost Overrun, *International Journal of Sustainable Construction Engineering & Technology Vol 2, Issue 1, June 2011*
- Anant Narayan Shete,, Vaibhav Durwas Kothawade (2016), An Analysis of Cost Overruns and Time Overruns of Construction Projects in India, *International Journal of Engineering Trends and Technology (IJETT) – Volume-41 Number-1 - November 2016*

- Chidambaram Ramanathan, SP Narayanan and Arazi B Idrus (2012), Construction Delays Causing Risks on Time and Cost - a Critical Review, *Australasian Journal of Construction Economics and Building*, 12 (1) 37-57
- Desai madhura .c, Prof.s.v.desale (2013), Study factors affecting of delay in residential construction projects for Nashik city, *International Journal of Latest Trends in Engineering and Technology (IJLTET)* Vol. 2 Issue 3 May 2013
- Dinesh Kumar R (2016), Causes and Effects of Delays in Indian Construction Projects, *International Research Journal of Engineering and Technology (IRJET)* Volume: 03 Issue: 04 | Apr-2016
- Ghanim Bekr (2015), Causes of delay in public construction projects in Iraq , *Jordan Journal of Civil Engineering*, Volume 9, No. 2, 2015
- Hemanta Doloi , Anil Sawhney et.al (2011), Analysing factors affecting delays in Indian construction projects, *International Journal of Project Management* 30 (2012) 479–489
- Jamal M. Assbeihat(2016), FACTORS AFFECTING DELAYS ON PRIVATE CONSTRUCTION PROJECTS, *International Journal of Civil Engineering and Technology (IJCIET)* Volume 7, Issue 2, March-April 2016, pp. 22-33, Article ID: IJCIET_07_02_002
- Kartik Kalkani and Shakil Malek (2016), Analyzing Causes of Delay in Construction Projects, *IJRST - International Journal for Innovative Research in Science & Technology* | Volume 2 | Issue 12 | May 2016
- Manoharan Kesavan, Navanesan Gobidan, Pujitha Dissanayake (2015), Analysis of Factors Contributing Civil Engineering Construction Project Delays in Sri Lankan Building Construction Industries, *Journal of Industrial Engineering Research*, 1(7) Special 2015, Pages: 5-11
- Michael Ghuszak , Agnieszka Lesniak (2015), Construction delays in clients opinion – multivariate statistical analysis, science direct Creative Construction Conference 2015 (CCC2015)
- Muhammad Akram Akhund1 , Ali Raza Khoso et.al (2017), Time Overrun in Construction Projects of Developing Countries, *Imperial Journal of Interdisciplinary Research (IJIR)* Vol-3, Issue-5, 2017
- Mulenga Mukuka, Clinton Aigbavboa, Wellington Thwala (2015), Effects of construction projects schedule overruns: A case of the Gauteng Province, South Africa, 6th International Conference on Applied Human Factors and Ergonomics (AHFE 2015) and the Affiliated Conferences, AHFE 2015
- Dr. P. P. Bhangale (2017), INVESTIGATION OF CAUSES OF DELAY IN HIGH RISE BUILDING, CASE STUDY-PUNE, *International Journal of Engineering Sciences & Research Technology*, Bhangale * et al., 6(10): October, 2017
- P.Asmitha(2019), Time Delay and Cost Overrun In Construction Projects, NOV 2019 | IRE Journals | Volume 3 Issue 5
- Stanley Department of Quantity Surveying (2015), Department of Quantity Surveying
- Subhav Singh , anuj Bala et.al (2018), critical analysis of causes of delay in residential construction projects in india, *International Journal of Civil Engineering and Technology (IJCIET)* Volume 9, Issue 1, January 2018, pp. 330–345, Article ID: IJCIET_09_01_033
- Tsegay Gebrehiwet, Hanbin Luo (2017), Analysis of Delay Impact on Construction Project Based on RII and Correlation Coefficient: Empirical Study, science direct Creative Construction Conference 2017, CCC 2017, 19-22 June 2017, Primosten, Croatia
- Venkatesh Parath, Renuka S M, et.al(2012), Causes of Delay in Indian Construction Industry Article in *Applied Mechanics and Materials* · May 2012 DOI: 10.4028/www.scientific.net/AMM.174-177.2768