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Analysis of Causes and Effects of Delays in Construction Projects

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Abstract - *Delay in construction projects is considered one of the most common problems causing a multitude of negative effects on the construction projects. Construction delays can be minimized only when their cause are identified. The objective of this study was to identify the major causes of construction delays. A literature review was conducted to compile a list of delay causes in construction industry. 101 causes of delays categorized into 9 different groups were found in order to make a questionnaire survey with the respective participants (contractors, owners, consultants and others) of construction industry. The collected data were analyzed through statistical techniques and indices (RII and IMPI). Delays will result in several negative effects like lawsuits between house owners and contractors, exaggerated prices, loss of productivity and revenue, and contract termination. If RERA is properly implemented on construction work then automatically there will be less percentage on construction delays as well as cost and time overrun.*

***Key Words*: Causes of Delays, Relative Important Index, Important Index, RERA.**

1. INTRODUCTION

Delays on construction projects are a universal phenomenon. It is considered as a common problem in construction projects. In most of the projects, there will be delays and their impact level varies on each project which depends on several factors such as nature and the type of construction, importance of the project, etc. They are almost always accompanied by cost and time overruns. Construction project delays have an adverse effect on parties (developer, contractor, and consultant) to a contract in terms of a growth in adversarial relationships, distrust, litigation, arbitration, cash-flow problems, and a general feeling of apprehension towards each other. So, it is essential to define the actual causes of delay in order to minimize and avoid the delays in any construction project.

It is a project slipping over its planned schedule and is considered as common problem in construction projects. To the owner, delay means loss of revenue through lack of production facilities and rentable space or a dependence on present facilities. In some cases, to the contractor, delay means higher overhead costs because of longer work period, higher material costs through inflation, and due to labour cost increases. Completing projects on time is an indicator of efficiency, but the construction process is subject to many variables and unpredictable factors, which result from many sources. These sources include the performance of parties, resources availability, environmental conditions, involvement of other parties, and contractual relations

In view of the above, Parliament enacted the Real Estate (Regulation and Development) Act, 2016 which aims at protecting the rights and interests of consumers and promotion of uniformity and standardization of business practices and transactions in the real estate sector. It attempts to balance the interests of consumers and promoters by imposing certain responsibilities on both. It seeks to establish symmetry of information between the promoter and purchaser, transparency of contractual conditions, set minimum standards of accountability and a fast-track dispute resolution mechanism. The Act applies to under-construction as well as new projects. Residential and commercial projects are included in its ambit. Real estate agents or brokers too are included in the purview of the Bill. The Act requires all builders to register their projects with the Tribunal before initiation. The registration process requires them to detail the design and state the deadline for completion. If the deadline is not met they are liable to compensate the buyers and face penalties and or criminal charges. Moreover, until recently most of them were diverting the funds to launch other new projects without completing ongoing ones. This used to cause a delay in ongoing projects due to lack of funds. Under the Act, builders are required to set aside 70% of the initial funds in escrow account for construction of the property. This will ensure that projects are not held up due to lack of funds

2. OBJECTIVES

- To identify the various causes of delay in construction projects.
- To suggest the methodology to work out the importance by different techniques.

3. LITERATURE REVIEW

Delays in construction projects are a widely researched area for which more researches are constantly being carried out. Due to the wide coverage of construction. Following are number of studies have been carried out to determine the causes of delay in construction projects.

A survey on time performance of different types of construction projects in Saudi Arabia was conducted by Assaf and Hejji (2005) to determine the causes of delay and

their importance according to each of the project participants, i.e., the developer, consultant and the contractor. The field survey conducted included 23 contractors, 19 consultants, and 15 developers. Seventy-three causes of delay were identified during the research. 76% of the contractors and 56% of the consultants indicated that average of time overrun is between 10% and 30% of the original duration. The most common cause of delay identified by all the three parties is ''change order''. Surveys concluded that 70% of projects experienced time overrun and found that 45 out of 76 projects considered were delayed.

El-Razek et al. (2008) identified main causes of delays in Egyptian construction projects concluded that different parties of construction don't agree on the relative importance of various factors of delay, mostly blaming each other of delays using importance index and spearman rank correlation similar to Assaf et al. (1995). He also identifies the importance of team effort in the success of a project.

Al-Momani investigated causes of delay in 130 public projects in Jordan. The main causes of delay were related to design, user changes, weather, site conditions, and late deliveries, economic conditions and increase in quantity. The study suggested that special attention to factors will help industry practitioners in minimizing contract disputes. Delays have strong relationship with failure and in effective performance of contractors.

Frimpong et. al., conducted a survey to identify and evaluate the relative importance of significant factors contributing to delay and cost overruns in Ghana groundwater construction projects. A questionnaire with 26 factors was carefully designed from preliminary investigations conducted in groundwater drilling projects between 1970 and 1999 in Ghana. The questionnaire was directed towards three groups in both public and private organizations: owners of the groundwater projects, consulting offices, and contractors working in the groundwater works. The questionnaire was distributed to a random sample of 55 owners, 40 contractors and 30 consultants. The result of the study revealed the main causes of delay and cost overruns in construction of groundwater projects: monthly payment difficulties from agencies; poor contractor management; material procurement; poor technical performance; and escalation of material prices.

Doloi H. et al. (2012) [4] did research to analyse factors affecting delays in Indian construction projects. They selected set of 45 attributes. Their research first identified the key factors impacting delay in Indian construction industry and then established the relationship between the critical attributes for developing prediction models for assessing the impacts of these factors on delay. A questionnaire and personal interviews have formed the basis of their research. Factor analysis and regression modelling were used to examine the significance of the delay factors. From the factor analysis, most critical factors of construction delay were identified as lack of commitment followed by inefficient site management and poor site coordination ranked third.

Dinesh Kumar R (2016) he find out the most significant factors causing delays in Indian construction projects through literature review and questionnaire survey. From the literature review 103 causes of delays categorized into 8 different groups, 8 effects of delays were found and also rankings given by each authors for the delaying factors are not the same due to varying native and context. Further, the Questionnaire survey is conducted with the participants (contractors, owners, consultants and others) of Indian construction industry in order to shortlist the top 20 significant factors with respect to Indian context.

As per Divya.R, S.Ramya (2015), the objective of this study is to identify the major causes of construction delays, its effects, and minimizing delays in construction projects. This study is carried out based on literature reviews and questionnaire survey.

Also referred some news articles and interviews on RERA and it says how RERA itself can cause delay in ongoing construction projects. Article from The Economic Times by Sunil Dhawan, he interviewed R K Arora (Chairman, Supertech), and other article from NDTV Property by Anuj Puri (Chairman & Country Head, JLL India) as per them the delays due RERA for ongoing projects are the time consumed in obtaining all approvals, delay in getting completion certificate.

4. RESEARCH METHODOLOGY

The research methodology for present study contains two stages. Initially literature review was made in order to find out the delay causing factors in construction project. From the literature review, 101 causes of delays categorized into 9 different groups (Owner related, Contractor related, Consultant related, Design-related, Labour related, Material related, Equipment related, External factors & RERA related) were found in order to make a questionnaire survey with the respective participants (contractors, owners, consultants and others) of Indian construction industry. Framework of the causes is given in Table no. 1

4.1 List of Causes of Delays

Table -1: Causes of Delays

Owner Related	
	Delay in progress payments
	Delay to furnish and deliver the site
	Change orders (plan/design) & extra orders by owner during construction
	Late in revising and approving design documents
	Slowness in decision-making process
	Conflicts between joint-ownership of the project

	Suspension of work by owner
	Owners lack of experience and involvement
	Bureaucracy in client's organization
Contractor Related	
	Difficulties in financing project/insolvency
	Conflicts in sub-contractor's schedule during execution
	Rework due to errors during construction
	Conflicts between contractor and other participants
	Ineffective & inadequate early planning and scheduling of project
	Implementing improper & obsolete construction methods
	Fraudulent practices and kickbacks
	Negotiations and obtaining of contracts
	Inadequate contractor's work & experience & also poor risk management and ignorance
	Delays in sub-contractors work and their incompetent which leads to frequent change in subcontractors
	Poor supervision & managerial skills and lack of training personnel
	Poor estimation of project time and quantities of material required before contracting
	Often changing project schedule
	Unsafe working condition due to improper safety management by the contractor
Consultant Related	
1.	Poor qualification & Inadequate experience of consultant's engineering staff
2.	Delay in approving overall designs, shop drawing, sample tested materials and major changes in the work
3.	Incompetent/Poor management by consultant
4.	Delaying in performing site inspection & testing
5.	Consultant's reluctance for change and their inflexibilities
Designer Related	
	Insufficient data collection and survey before design
	Mistakes and discrepancies made in design documents leads to frequent revisions of drawings/designs
	Inadequate design team experience & delay in producing design documents
	Unclear and inadequate details in drawings and also slow response on doubts arising from the drawings
	Using poor/old engineering design software
	Complexity of project conception & designing
	Misunderstanding of owner's requirements by design engineer

Labour Related	
	Shortage of labours
	Working permit of labours
	Low skilled/productivity level or unqualified labours
	Personal conflicts among labours
	High labour wages insists to hire low amount of labours
	Labour exodus/evacuated from the region
	Labour strikes at site
	Labour Safety & health problems when working in hazardous conditions and their absenteeism
	Slow mobilization & demobilization of labour
	Nationality and language of labours
	Lack of motivation
Material Related	
	Shortage of construction materials in market
	Changes in material types during construction
	Delay in material delivery especially while importing
	Damage of sorted material while they are needed urgently due to improper storage of materials
	Delay in manufacturing special-building materials
	Late procurement of materials/late ordering
	Quality problem with procured material
	Procuring undesired or unwanted material instead
	Problem with material transport and processing at site (lack of adequate space for storing materials in site)
	Price fluctuation/inflation in material prices
	Late in selection of finishing materials due to availability of many types in market
	Sudden increase in quantity needed
Equipment Related	
	Equipment breakdown and their idle time and lack of tool in market
	Shortage of heavy equipment when needed
	Low level of equipment-operator's skill
	Low productivity and efficiency of equipment
	Wrong kind or verity of equipment/selection
	Lack of hi-tech, advanced and special equipment
	Complication of hiring and transporting to the site
	Limited mechanization due to cheap labour cost in the locality
External Factors	
	Effects of unforeseen subsurface and changing ground condition (e.g. Soil, high water table) factors
	Delay in obtaining permits from municipality
	Weather, climate (hot or cold) & rain effects on construction activities
	Heavy traffic, over-crowd & other restrictions at

	site
	Accident during construction
	Changes in government regulations and laws
	Unavailability/poor temporary facility of utilities in site (such as water, electricity etc.)
	Civil unrest/public strikes
	Economic crisis
	Delay in performing final inspection and certification by a third party
	Bureaucracy restriction by government agencies
	Slow site clearance due to restrictions
	Work complexity
	Litigation b/w various parties in the mid of construction
	Poor government judicial system for construction dispute settlement
	Security (checking process for quality and other purposes)
	Corruption & hostile political conditions and also strikes called by political parties
	Effects of social and cultural factors
	Original contract duration is too short – Unrealistic time schedule imposed in contract
	Lack of motivation for contractors for early finish and ineffective delay penalties
	Types of construction contract (Turnkey or design/construction only)
	Type of project bidding and award (negotiation, lowest bidder.)
	Aggressive competition at tender stage
	Short bid preparation time leads to improper bidding by contractor
	Land acquisition
	Faulty soil investigation report
	Delay in finalization of rates for extra items
	Lack of periodic meeting among the management, site personnel and the contractors and also weekly project evaluation meetings
	Problem with neighbors
	Improper project document management
	Lack of database and experience for estimating activity duration and resources required in a new type of construction project
	Poor communication and coordination b/w the participants of the construction project (owners, contractors & sub-contractors, designers, consultants, workers and suppliers) observed.
RERA Related	
	The time consumed in obtaining all approvals
	Delay due to re-work of specification area
	Delay obtaining completion certificate

4.2 Questionnaire Design

The second section includes preparation of two type of questionnaire based on two different approach used for giving ranking to causes of delay in construction projects. The questionnaire is written in very simple language so that it is easily understood to the respondents. The questionnaire consists of two parts. Part A includes the questionnaire of factors causes delay. The four point scale ranged from 1(less important) to 4(extremely important) is adopted and transformed to relative importance index for each factor. Part B includes the questionnaire of effects of delay. For each cause/factor two questions were asked: What is the frequency of occurrence for this cause? And what is the degree of severity of this cause on project delay? Both frequency of occurrence and severity were categorized on a four-point scale. Frequency of occurrence is categorized as follows: always, often, sometimes and rarely (on 4 to 1 point scale). Similarly, degree of severity was categorized as follows: extreme, great, moderate and little (on 4 to l point scale).

5. DATA ANALYSIS

The collected data were analyzed through statistical techniques and indices.

A) Relative Importance Index technique: Relative Importance Index method to determine the relative importance of the various causes and effects of delays. The same method is going to be adopted in this study within various groups (i.e. clients, consultants or contractors). The four-point scale ranged from 1 (less important) to 4 (extremely important) is adopted and transformed to relative importance indices (RII) for each factor as follows:

$$RII = (\sum W)/(A*N)$$

Where, W is the weighting given to each factor by the respondents (ranging from 1 to 4), A is the highest weight (i.e. 4 in this case), and N is the total number of respondents. The RII value had a range from 0 to 4 (0 not inclusive), higher the value of RII, more important was the cause of delays. The RII was used to rank (R) the different causes. These rankings made it possible to cross-compare the relative importance of the factors as perceived by the three groups of respondents (i.e. developer, consultants and contractors). Each individual cause's RII perceived by all respondents should be used to assess the general and overall rankings in order to give an overall picture of the causes of construction delays in Indian construction industry.

B) Importance Index technique: In this technique, for each cause/factor two questions were asked: What is the frequency of occurrence for this cause? And what is the degree of severity of this cause on project delay?

1) Frequency index:

A formula is used to rank causes of delay based on frequency of occurrence as identified by the participants.

Frequency Index (F.I.) (%) = ∑ a (n/N) * 100/4

Where, **a** is the constant expressing weighting given to each response (ranges from 1 for rarely up to 4 for always), **n** is the frequency of the responses, and N is total number of responses.

2) Severity index:

A formula is used to rank causes of delay based on severity as indicated by the participants.

Severity Index (S.I.) (%) = ∑ a (n/N) * 100/4

Where **a** is the constant expressing weighting given to each response (ranges from I for little up to 4 for severe), **n** is the frequency of the responses, and N is total number of responses.

Importance index:

The importance index of each cause is calculated as a function of both frequency and severity indices, as follows:

Importance Index (IMP.I.)(%) = [F.I. (%)* S.I.(%)]/100

6. RESULTS AND FINDINGS.

The all ranking indices explained earlier were used to rank delay causes from viewpoints of the respondents. Total 8 respondents participated in this survey.

A) Top 10 causes ranked by Relative Importance Index (RII)

Table -2: Ranking by RII Technique

Sr No.	Causes of Delays	RII
1	Shortage of labours	0.9375
2	Delay in material delivery especially while importing	0.90625
3	Misunderstanding of owner's requirements by design engineer	0.875
4	Delay in obtaining permits from municipality	0.875
5	Land acquisition	0.875
6	The time consumed in obtaining all approvals	0.875
7	Delay in approving overall designs, shop drawing, sample tested materials and major changes in the work	0.84375
8	Labour Safety & health problems when working in hazardous conditions and their absenteeism	0.84375
9	Changes in government regulations and laws	0.84375
10	Delay in progress payments	0.8125

B) Top 10 causes ranked by Importance Index (IMPI)

Table -3: Ranking by IMPI Technique

Sr No.	Causes of Delay	IMPI (%)
1	Shortage of labours	100
2	Poor estimation of project time and quantities of material required before contracting	70.312
3	Accident during construction	62.304
4	Inadequate contractor's work & experience & also poor risk management and ignorance	61.523
5	Insufficient data collection and survey before design	57.421
6	Land acquisition	56.152
7	Poor supervision & managerial skills and lack of training personnel	55.371
8	Shortage of construction materials in market	54.687
9	Sudden increase in quantity needed	53.808
10	Difficulties in financing project/insolvency	53.710

The ranking of all 101 causes of delays categorized into 9 different groups are given in Appendix 1

7. LIMITATIONS OF THE STUDY

• The study has been done on small scale and may not represent the entire universe.

• It has some data based on the expressed opinion of the fellow employees obtained through questionnaires, which may be arbitrary, biased or impulsive.

• The respondent's interest varies in answering the questionnaire, as it may be an interruption to their regular work.

APPENDIX 1

Ranking of causes of delays of Relative Importance Index and Importance Index

SR NO	DELAY FACTORS	RII	RANK	IMP.I (%)	RANK
1.	Delay in progress payments	0.8125	10	46.38671875	19
2.	Delay to furnish and deliver the site	0.71875	23	26.3671875	55
3.	Change orders (plan/design) & extra orders by owner during construction	0.625	51	26.3671875	55
4.	Late in revising and approving design documents	0.75	16	34.86328125	41
5.	Slowness in decision-making process	0.6875	30	38.671875	29
6.	Conflicts between joint-ownership of the project	0.5625	70	21.875	69
7.	Suspension of work by owner	0.65625	42	27.34375	53
8.	Owners lack of experience and involvement	0.4375	88	25	58
9.	Bureaucracy in client's organisation	0.4375	88	16.40625	84
10.	Difficulties in financing project/insolvency	0.75	16	53.7109375	10
11.	Conflicts in sub-contractor's schedule during execution	0.75	16	30.76171875	48
12.	Rework due to errors during construction	0.78125	14	17.1875	81
13.	Conflicts between contractor and other participants	0.71875	23	34.86328125	41
14.	Ineffective & inadequate early planning and scheduling of project	0.75	16	43.9453125	22
15.	Implementing improper & obsolete construction methods	0.78125	14	35.9375	38
16.	Fraudulent practices and kickbacks	0.65625	42	24.90234375	60
17.	Negotiations and obtaining of contracts	0.625	51	22.8515625	65
18.	Inadequate contractor's work & experience & also poor risk management and ignorance	0.71875	23	61.5234375	4
19.	Delays in sub-contractors work and their incompetent which leads to frequent change in subcontractors	0.5625	70	36.5234375	36
20.	Poor supervision & managerial skills and lack of training personnel	0.75	16	55.37109375	7
21.	Poor estimation of project time and quantities of material required before contracting	0.71875	23	70.3125	2
22.	Often changing project schedule	0.65625	42	37.109375	33
23.	Unsafe working condition due to improper safety management by the contractor	0.65625	42	49.21875	16
24.	Poor qualification & Inadequate experience of consultant's engineering staff	0.625	51	37.5	32
25.	Delay in approving overall designs, shop drawing, sample tested materials and major changes in the work	0.84375	7	43.9453125	22
26.	Incompetent/Poor management by consultant	0.53125	75	32.2265625	46
27.	Delaying in performing site inspection & testing	0.5	79	23.4375	64
28.	Consultant's reluctance for change and their inflexibilities	0.40625	93	24.12109375	62
29.	Insufficient data collection and survey before design	0.6875	30	57.421875	5
30.	Mistakes and discrepancies made in design documents leads to frequent revisions of drawings/designs	0.6875	30	45.3125	21

31.	Inadequate design team experience & delay in producing design documents	0.65625	42	40.4296875	26
32.	Unclear and inadequate details in drawings and also slow response on doubts arising from the drawings	0.625	51	39.0625	27
33.	Using poor/old engineering design software	0.28125	99	12.5	93
34.	Complexity of project conception & designing	0.46875	85	24.12109375	62
35.	Misunderstanding of owner's requirements by design engineer	0.875	3	38.18359375	30
36.	Shortage of labours	0.9375	1	100	1
37.	Working permit of labours	0.71875	23	20.3125	74
38.	Low skilled/productivity level or unqualified labours	0.59375	60	49.4140625	15
39.	Personal conflicts among labours	0.3125	97	16.40625	84
40.	High labour wages insists to hire low amount of labours	0.75	16	38.18359375	30
41.	Labour exodus/evacuated from the region	0.625	51	16.50390625	83
42.	Labour strikes at site	0.53125	75	9.375	96
43.	Labour Safety & health problems when working in hazardous conditions and their absenteeism	0.84375	7	49.21875	16
44.	Slow mobilization & demobilization of labour	0.46875	85	25.390625	57
45.	Nationality and language of labours	0.375	94	8.59375	99
46.	Lack of motivation	0.625	51	17.7734375	78
47.	Shortage of construction materials in market	0.8125	10	54.6875	8
48.	Changes in material types during construction	0.59375	60	22.55859375	66
49.	Delay in material delivery especially while importing	0.90625	2	42.1875	25
50.	Damage of sorted material while they are needed urgently due to improper storage of materials	0.75	16	32.8125	44
51.	Delay in manufacturing special-building materials	0.625	51	14.6484375	89
52.	Late procurement of materials/late ordering	0.6875	30	35.15625	40
53.	Quality problem with procured material	0.46875	85	17.1875	81
54.	Procuring undesired or unwanted material instead	0.53125	75	17.7734375	78
55.	Problem with material transport and processing at site (lack of adequate space for storing materials in site)	0.5	79	28.7109375	51
56.	Price fluctuation/inflation in material prices	0.59375	60	51.5625	14
57.	Late in selection of finishing materials due to availability of many types in market	0.5	79	20.5078125	72
58.	Sudden increase in quantity needed	0.625	51	53.80859375	9
59.	Equipment breakdown and their idle time and lack of tool in market	0.71875	23	22.265625	67
60.	Shortage of heavy equipment when needed	0.59375	60	9.375	96
61.	Low level of equipment-operator's skill	0.6875	30	37.109375	33
62.	Low productivity and efficiency of equipment	0.6875	30	28.125	52
63.	Wrong kind or verity of equipment/selection	0.5625	70	14.0625	90
64.	Lack of hi-tech, advanced and special equipment	0.65625	42	20.5078125	72
65.	Complication of hiring and transporting to the site	0.5625	70	13.28125	91

66.	Limited mechanization due to cheap labour cost in the locality	0.28125	99	11.71875	94
67.	Effects of unforeseen subsurface and changing ground condition (e.g. Soil, high water table) factors	0.8125	10	29.6875	50
68.	Delay in obtaining permits from municipality	0.875	3	51.66015625	12
69.	Weather, climate (hot or cold) & rain effects on construction activities	0.6875	30	19.3359375	76
70.	Heavy traffic, over-crowd & other restrictions at site	0.4375	88	19.140625	77
71.	Accident during construction	0.6875	30	62.3046875	3
72.	Changes in government regulations and laws	0.84375	7	36.9140625	35
73.	Unavailability/poor temporary facility of utilities in site (such as water, electricity etc.)	0.6875	30	31.4453125	47
74.	Civil unrest/public strikes	0.59375	60	14.84375	88
75.	Economic crisis	0.5625	70	15.625	87
76.	Delay in performing final inspection and certification by a third party	0.65625	42	32.8125	44
77.	Bureaucracy restriction by government agencies	0.6875	30	46.38671875	19
78.	Slow site clearance due to restrictions	0.5	79	29.8828125	49
79.	Work complexity	0.5	79	16.11328125	86
80.	Litigation b/w various parties in the mid of construction	0.4375	88	12.890625	92
81.	Poor government judicial system for construction dispute settlement	0.8125	10	53.7109375	10
82.	Security (checking process for quality and other purposes)	0.59375	60	24.90234375	60
83.	Corruption & hostile political conditions and also strikes called by political parties	0.65625	42	39.0625	27
84.	Effects of social and cultural factors	0.4375	88	10.15625	95
85.	Original contract duration is too short – Unrealistic time schedule imposed in contract	0.625	51	35.9375	38
86.	Lack of motivation for contractors for early finish and ineffective delay penalties	0.59375	60	20.3125	74
87.	Types of construction contract (Turnkey or design/construction only)	0.34375	96	7.91015625	100
88.	Type of project bidding and award (negotiation, lowest bidder.)	0.28125	99	7.03125	101
89.	Aggressive competition at tender stage	0.6875	30	17.7734375	78
90.	Short bid preparation time leads to improper bidding by contractor	0.3125	97	25	58
91.	Land acquisition	0.875	3	56.15234375	6
92.	Faulty soil investigation report	0.71875	23	51.66015625	12
93.	Delay in finalisation of rates for extra items	0.5	79	22.265625	67
94.	Lack of periodic meeting among the management, site personnel and the contractors and also weekly project evaluation meetings	0.6875	30	34.86328125	41
95.	Problem with neighbours	0.375	94	9.375	96
96.	Improper project document management	0.53125	75	26.5625	54

97.	Lack of database and experience for estimating activity duration and resources required in a new type of construction project	0.59375	60	21.09375	71
98.	Poor communication and coordination b/w the participants of the construction project (owners, contractors & sub-contractors, designers, consultants, workers and suppliers) observed.	0.59375	60	21.875	69
99.	The time consumed in obtaining all approvals	0.875	3	49.21875	16
100.	Delay due to re-work of specification area	0.59375	60	36.5234375	36
101.	Delay obtaining completion certificate	0.65625	42	43.1640625	24

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