

Analysis on Causes of Delay in Building Construction

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Abstract: Majority of the building, projects face a serious issue of delay during the construction. Construction sector is said to be the leading part for the development of Indian economic condition. This research is based on the delay analysis in Tamil Nadu. In current situation the construction sector present itself to various delay factors in Tamil Nadu. This study is constructed with the help of questionnaire survey. 200 questionnaires were publicized out of which 187 responses were reciprocated. The questionnaire was embodied with 50 factors which are graded under seven groups such as owner, consultant, contractor, material, labour, equipment and external related causes. About 37% of owners, 33% contractors and 30% of consultants were involved in the survey. The accepted response from various groups are analysed using Importance Index approach. It was followed by confirmation about reliability of response and consistency between various groups. It was found from overall importance index value that changes in government regulations and laws, late in approving documents and design by owner, delay in approving new material, delay in decision making process, Shortage of material, delay in payments, change in orders during construction, delay in finance and payments, are the crucial constraints that leads to hinder in construction in Tamil Nadu. At the minimum reason for delay goes to equipment related factors. On further analysis the result was found that owner's related factors are significant among other groups.

Keywords: Construction projects, Delay sources, Tamil Nadu

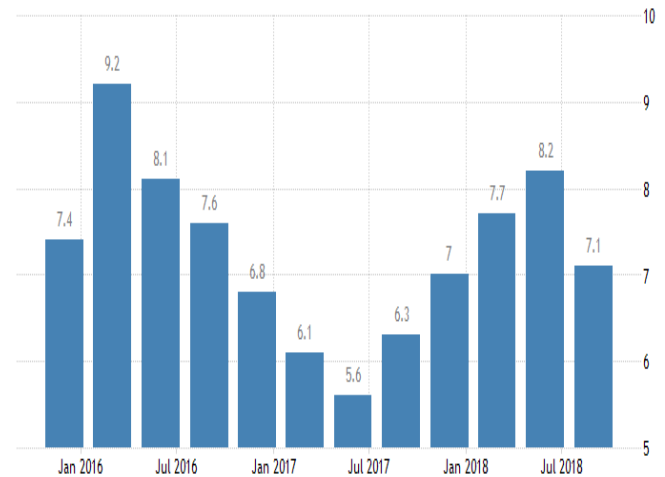
I. INTRODUCTION

Construction sector has a major impact in Indian economy and its Development. It was found that the GDP(Gross Domestic Product) from construction sector plays a major role after agriculture sector. GDP has fallen from 8.2 to 7.1. Gross Value Added, GDP barring taxes bloomed to 6.9 percent which was beneath 8 percent in the preceding year. The recession turned in real estate, finance and professional services(declined from 6.3 to 6.5 percent) and followed by manufacturing(showed changes from 7.4 percent to 13.5 percent in preceding period) and in case of construction(7.8 percent to 8.7 percent).

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SOURCE: TRADINGECONOMICS.COM | MINISTRY OF STATISTICS AND PROGRAMME IMPLEMENTATION (MOSPI)

Figure 1 GDP Annual Growth Rate of India
SOURCE: (MOSP)

It was also noticed that the GDP originating from construction sector in India downfalled to 2378.36 INR Billion from 2491.03 INR Billion during the third quarter of 2018. In addition GDP averaged 2117.79 INR Billion from the year of 2011 to 2018, reaching the greatest value of 2491.03 INR Billion for the construction sector on the period of the second quarter of 2018.

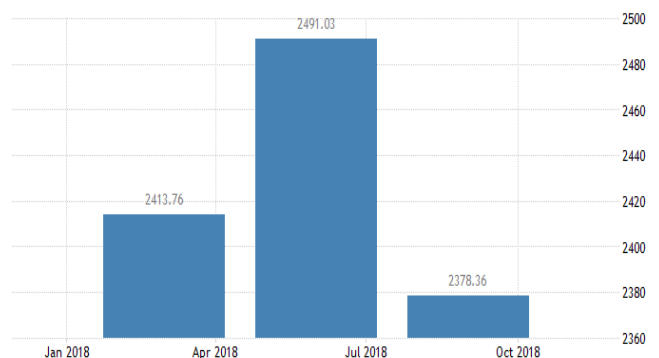


Figure 2 India GDP from construction sector

Quarterly Project Implementation Status Report (QPISR) on Central Sector Projects which valued more than Rs.150 crore concerning the 2nd quarter of 2018-19 from July to September was referred for the number of projects which faced delay. It depicts detailed information and statistics about 1455 projects. In brief, about **464 mega projects** (project costing minimum of Rs.1000 crore) and **991 major projects** (costing Rs.150 crore to maximum of Rs.1000 crore). The expected completion cost of



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the above mentioned 1455 projects is reported to be Rs. 2227435.16 crore. The total expenditure from the report on 30th September 2018 was found to be Rs.844254.24 crore which sums to 37.90% of the total expected completion cost and 45.38% of the authentic cost.

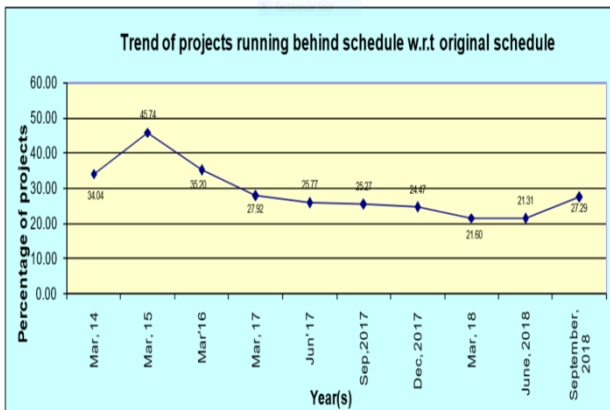


Figure 3 Percentage of projects delayed in India
SOURCE: Project Implementation Status Report Of Central Sector

A good construction practise is one where the project should be finished within the project time. Sometimes, the project experiences a time over-run. This causes delay in completion of the project. This has effect on all the factors related to the project. Chan and Kumaraswamy [17] made a statement that majority of delays in project occur during the construction-phase. Al-Khalil and Al-Ghafly [18] concluded that "Primary impact of retard on owner is due to lag in production. While contractor's face a loss in profit due to high overhead costs." The average time over-run of project from the expected finishing time is about 10% to 30% in Saudi Arabia. Based on the survey, it was found that 45 projects faced time overrun as a delay cause. This contributes to 70% of total projects count.

Quarterly Project Implementation Status Report (QPISR) on Central Sector Projects states that out of 1455 projects on monitor of **Ministry of Statistics and Programme Implementation (MOSPI)** 375 projects be the part of Railways sector. Out of 375 projects, 5 are ahead of schedule and 103 projects are on schedule. It was found about 94 projects are delayed. For 173 projects date of commissioning was not provided. It was finalised that 94 projects face time overrun and 227 projects are under cost overrun, while 59 projects are facing both cost and also time overrun. The main factors for occurrence of delay in project are Socially desirable but they lack in funds, Inadequate budget for financially viable projects, conflict for land acquisition, Forest land clearance and approval and handing over of private land and site to railways, Geographical amaze, change in scope, Delay in shifting of utilities by local government authority and law and order at respective places. Main objective for this research study is:

- To recognize the source of delay in building sector in Tamil Nadu.
- To analyse the factors that bound for delay considering the view of owner, consultant and contractor
- To find the ranking of various groups which leads to delay
- To find the effect of causes of delays.

II. METHODOLOGY

Many researches were done to determine the major causes of delay in various developing countries because the problem varies in different region. N R Mansfield, O O Ugwu [1], examined from the survey that Miserable contract direction and leadership, Finance and remuneration for completed works, Changes in site condition, Shortage of material, Getting materials and plant items, design which are frequently changed, and sub-contractors and distributors are most important elements that are responsible for project delays. Price swings, Imprecise estimates, Retard, Add on works are main factors for overruns in cost.

E C Lim and Jahidul Alum [2] found the major issues encountered by the contractors in Singapore through a survey. Out of 130 distributed questionnaires, 67 response were received. The survey was done by instructing the respondents to rank the list of 17 problems which affects the construction productivity. From the survey it was found that the three factors which are responsible for the major issues are Complication in recruiting skilled workers, Complication in recruiting supervisors and Elevated rate in labour. The least reasons of all the causes were found to be stop-work orders due to government laws and regulations and work stoppage due to conflict and misunderstanding with either owners or consultant.

Abdalla M. Odeh, Hussein T. Battaineh [3] made an analysis from the vantage point of both consultant and contractors. The questionnaire sample which were distributed to 100 contractors and 50 consultants to find the important reasons that brings about delay in projects with conventional contracts. Interference of owner in work, poor contractor work experience, time of payments, labour productivity, poor process of decision making, experience and type of sub-contractor and poor planning are most responsible causes which leads to delay in Jordan construction

A.A. Aibinu, G.O. Jagboro [4] made a conclusion based on the survey on the upshot in construction delays on handing over of project in Nigerian construction sector. About 200 companies were selected for research from which 102 questionnaires were obtained. They followed Relative Importance Index (RII) approach was followed to rank the delay acts. Regression Analysis was done for increase of cost due to loss and demanding expense which arises as the result of delay. Cost overrun and time overrun are found to be the major effect from delay. The major cause of delay is related to the owners involved in construction. It was found that variation or change in design information and specification orders leads to delay in completion of project in Nigeria.

Sadi A. Assaf, Sadiq Al-Hejji [5] conducted a questionnaire survey within Saudi Arabia to find the reason for the emergence of delay in large construction projects. About 73 causes were identified and questionnaire was prepared. Respondents are instructed to evaluate each cause based on frequency and severity due to each cause. The questionnaire returned from the respondent was 66. 73 Cause of delay are classified into 9 groups such as project, consultant, contractor, owner, design, equipment, materials, external and labor. The most repeating cause of postponement is allotting the project to the bidder who provides lowest amount for the project completion. The more severe cause is payment by owner and other causes are mainly related to owners. The important cause was



change in order and scope of the project during construction process.

Murali Sambasivan, Yau Wen Soon [6] made an analysis on Malaysian construction industry about the causes and effect of delays which affects the economy of construction sector. 200 questionnaires were prepared and circulated to the groups such as consultant, owners, contractors. The total response was 150. Based on the analysis, it was found that some of the causes for delay are contractor's miserable strategy, and ineffective site guidance, contractor's less and zero work experience, client's payment for work which was over, conflict with subcontractors who are associated with the project, poor material availability, poor labour supply, failure of machines and equipment, poor communication among people associated in the project and improper detailing in the drawing during construction phase. The study further examined about the effects of these delay in Malaysian projects. It came into light that these results in overrun of time, increase in cost, quarrels among workers, arbitration occurs, lawsuit and total discontinuance are the major effect due to delay in construction.

Hemanta Doloi, Anil Sawhney, K.C. Iyer, Sameer Rantala [7] made a survey to analyse the components causing hold up in Indian Construction. 45 delay traits were selected and were categorized into six kinds namely project, site, process, human, authority and technical issues. About 110 questionnaires was prepared, out of which 77 valid responses was obtained. Ranking of attributes was done by Relative importance index. Factor analysis was done. 27 out of 45 attributes are considered and are categorized under seven context. Based on factor analysis, most crucial constituents of construction hinder are concluded. The result showed that lack of engagement of workers; inefficient site governing and handling of the project; poor scheduling; improper team work; lack of view in project scope; lack of sharing information among various groups; substandard contract to whom work is allotted. Regression model gave a picture that slow decision-making process by owner, less labor outcome during construction phase, architects who show hesitation to change in design and rework because of faults in construction are the basis that cause hinder of the project in Indian projects.

Prakash Rao, Joseph Camron Culas [8] made a case study on reason that drives to postpone in construction and those effect of delay including suggesting some points to avoid the delay in project completion. 46 factors are considered and these are classified under seven groups. From response it was concluded that holding up in revising and finalise the design documents of the work, slow including poor subcontractor work, poor communication among workers and change in orders and design from the owners during construction stage are found to be the most frequent cause of delay. It was determined that degree of cause of delay is high because of contractor which is ranked first and then followed by client and consultant. The major effect was cost and time overrun. Proper site management and experienced supervision, proper planning and designing, and clear communication among various groups of workers are required to minimize the delay. Samad M E Sepasgozar, Mohamad Ahmadzade Razkenari, Khalegh Barati [9] examined the principal use of latest technology which are responsible for hindering the construction sectors. 73 causes are identified and they are grouped related to project, consultant related, owner, contractor related, design groups, material indulged,

equipment, man power related and external factors. Specialist from Twenty-Six companies were involved in this process. The research was based on frequency, severity of each factor Importance Index was calculated, from which major causes of delay are identified. Few factors were summarized as important and primary causes of delay such as contractor group attributes and relation, New technology related to instruments and equipment, low labour availability, very few of the external factor, material deficiency in the period of construction phase, design adding up to specification issues, owner attributes, less availability of developed technology , consultant attributes and project attributes.

Mr Ashish Chandu Pawar. Mrs. Sheetal .D. Marawar, Mr. Nikhil V. Bhalariao [10] made a study about the approach for listing out some of the major causes of obstruction in residential building projects in Indian construction scenario. The study was based on the interview with 26 sites. It was examined that the primary actions that bring about delay are: Late to obtain permits from authority and municipality, delay due to weather conditions in the site, delay due to extra works to be carried out because of design change or mistakes of consultant, delay due to wrong and incomplete drawing and specification, poor instructions of supervising engineers responsible for the project result into rework, Manufacturing difficulties of special materials and shortage of Skilled labour.

Dr. Ashraf Samarah, Dr.Ghanim A. Bekr [11] evaluated a survey about brings about delay and effect of those delay in Jordan considering public sector projects. Questionnaire were prepared and distributed to 210 engineers out of which 146 responded. Based on Importance Index the primary reason of delay are ranked. Considering the number of occurrence, effect of postpone in project delivery are ranked From the study it was declared that, Unsuitable direction and supervising from contractor side, client's frequent change in scope and specification, weak planning and command by contractor, providing contract to the lowest bid, frequent modification in the project, flaws in design of project and documents related to contract, settlement are not made in proper time by client to workers, Rework and additional work due to errors in construction stage and Low level productivity of the workers are the key factors leads to delay. The research extended and provided information about the effects. It stated that, the delay may lead to overrun of time and cost, quarrels among workers, which ends in mediation, law and total pause or end of the project sometimes.

Serdar Durdyev, Maksat Omarovand SyuhaidaIsmail [12] carried out a study to examine the major sources of postpone of project time in Cambodia considering residential projects. Questionnaires were prepared and distributed to 75 contractors and consultant. Total response was 48. The causes are grouped under five groups such as material and equipment related, workforce related, project related, management, and external. It was concluded that highest reason for occurrence of project holdup are: deficit of materials on work site during work on progress, lack in proper and right scheduling in the project, absence of delivery and supply of material at time which are required, Poor number of skilled and efficient labor at work site, entanglement of project requirement and scope, frequent absent of labour, effect of rain during construction process, changes in design frequently due to change in

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requirement, delay by subcontractor in completion of allotted work and accidents and damage due to poor site safety.

Tsegay Gebrehiwet, Hanbin Luo [13] made a survey to find the impact of delay in Ethiopian building project. Questionnaire was distributed and responses were from 77 respondent. About 52 causes were included. They followed RII to find the rank and correlation coefficient to find the relation between various group. The construction stage is divided into construction stage, pre-construction stage, post-construction stage. The overall factor was found to be the most and primarily related, construction stage takes the place of second reason, post-construction stage was the third among those phase. Pre-construction stage is least among all phase. The overall causes of delay are immorality, poor availability of utilities and material at working place, increases in material value, less quality in materials that are procured, late availability of design including design document of the work, slower supply of materials, late in permitting of project scope including work, worst site directing and governing and further adds to performance of workers, too late in release of funds and specified budget, and poor effective and proper planning of project and its scheduling from which this results in the effect was found to be cost increase, time prolongates, stopping of contract, mediator, and dispute and lawsuit in project.

G. Muneeswaran, P. Manoharan, P. O. Awoyera & A. Adesina [14] made a approach using statistics to find out the delays and their risks in our Indian projects. Questionnaire was prepared and circulated to 250 professionals and 195 respondents provided their response. Analysis was done using relative importance index. This includes fuzzy ranking of factors. Inadequate schedule is ranked first among various factors. It was found that delays and risk mainly happen during tendering stage. Elements such as slighting the past mistakes, errors and use of poor and inability team found to experince greater effect among construction project. Appointment of experienced person during the tendering stage helps to reduce the risk in delay in project.

Mohamed Saad Bajjou Anas Chafi [15] made a study to determine the impression of contractors and consultants about the main factors about sources of delay. The study was done in Moroccan construction sector. About 440 questionnaires were circulated to the contractors and consultant. 49 causes are identified and grouped under 9 categories. Analysis was done using RII and Spearman rank correlation. Results shows that major causes sensed by the two groups are holdup in payment, low number of specilaised employee, poor consideration in waste management, hidden contract time provided by owners, extra works due to poor interpretation of information, excess subcontract for each work, obtaining permits which was found to be late from government, poor strategy and schedule followed, lack of ability in planning and poor labour.

Zemra Rachid, Boudouh Toufik, Baheddi Mohammed [16] identified fifty-nine sources of obstruction in Algerian construction industry. Most respondents include project managers and directors involved in the project, site engineers, senior most engineers working in projects, team of quality assurance including quality control officers. Total of 78 questionnaires were distributed out of which 52 returned. Analysis was done by Importance index method and Spearman rank correlation. The study pictures about the major causes of delay. Those factors are transform in orders

during construction, hidden contract time, gradual variation of orders in most frequent quantities and amount, poor payment for finished work and poor strategy in planning including schedule of the works from contractors. Further the work concluded that owner's are primary and frequent source for increase in time for completing the project.

A. Questionnaire design

This study is based on the questionnaire survey. Pilot survey is essential to determine and to analyse the level of clarity of the questionnaire which is to be distributed among the respondents. Based on the study from various journals and research article, the major causes responsible for the delay are explored. Pilot survey is done with experienced professionals such as contractor, consultant which include structural engineer and architect to find the major cause responsible for delay based on their experience in the project they encountered. Individuals were selected with work experience greater than six years. Fifty questions were finalised and are circulated to various segments of people related to the project in Tamil Nadu. The respondent includes owners, consultant, contractor. The questionnaires are circulated by hardcopy by meeting the professionals in individual. The questionnaire includes two parts. The first part is prepared in such a way to collect the basic details of the respondent. The second part consists of questions which is classified under seven major groups with which each cause is related. The delay factors are classified under owner, consultant, contractor, material, labour, equipment, external related. Each individual is requested to assess each question considering the frequency including severity of the cause. The assessment is done based on the Likert's Scale considering from the range of Very Low to Very High. About 187 responses were collected from 200 questionnaires which was circulated. Out of which 37% of the response was from owners, 33% was from contractors and 30% was received from consultants.

B. Data Analysis

Based on formula Frequency Index and Severity Index was calculated from the obtained data.

$$FI(\%) = \frac{\sum_{i=1}^5 b_i z_i}{4Z} * 100 \quad (1)$$

Where b_i =number of respondents who choose necessary frequency; Z_i =degree of frequency ranging from 1 to 5, Z =total number of responses received; FI =Frequency Index.

$$SI(\%) = \frac{\sum_{i=1}^5 b_i z_i}{4Z} * 100 \quad (2)$$

Where b_i =count of respondents who choose necessary severity; Z_i =degree of frequency of responses from very low to more severe; Z =Total Number of responses received; SI =Severity Index.

$$IMPORTANCE INDEX (IMP. I)(\%) = \frac{FI * SI}{100} \quad (3)$$

Table I Factors considered

SI. No.	Groups	Factors
1	Owner	Delay in decision making process
2	Owner	Late in revising & approving design documents
3	Owner	Poor communication and coordination by owner and other parties



4	Owner	Delay in furnish and deliver the site to the contractor
5	Owner	Delay for finance and payments
6	Owner	Changes in orders during construction
7	Owner	Delay in approving new materials (e.g.: M-Sand)
8	Owner	Unavailability of incentives among contractor for finishing ahead of project schedule
9	Owner	Ineffective delay penalties
10	Owner	Owner interference
11	Consultant	Inadequate experience of consultant
12	Consultant	Delay in inspection and testing by consultant
13	Consultant	Delay in approving design documents
14	Consultant	Inadequate details in drawings
15	Consultant	Poor communication between consultant and other parties
16	Consultant	Inflexibility of consultant with owner
17	Contractor	Difficulty in financing project by contractor
18	Contractor	Poor site management and supervision
19	Contractor	Ineffective planning and scheduling of project
20	Contractor	Rework due to errors during construction
21	Contractor	Delays in sub-contractor's work
22	Contractor	Inadequate contractor experience
23	Contractor	Conflicts between contractor and other parties
24	Contractor	Improper construction methods
25	Material	Shortage of construction materials in market
26	Material	Delay in selection of materials due to availability of many types in market
27	Material	Changes in material types and specifications during construction
28	Material	Delay in material delivery
29	Labor	Shortage of labors
30	Labor	Unqualified workforce
31	Labor	Conflicts among labors
32	Labor	Labor strikes due to less payment
33	Equipment	Low level of equipment operator's skill
34	Equipment	Equipment breakdowns
35	Equipment	Lack of high-technology mechanical equipment
36	Equipment	Shortage of equipment
37	Equipment	Low productivity and efficiency of equipment
38	External	Weather effect (hot, rain, etc.)
39	External	Environmental restrictions
40	External	Changes in government regulations and laws(e.g., GST)
41	External	Slow permit by municipality

42	External	Effects of soil conditions (e.g., soil, water table)
43	External	Traffic control at job site
44	External	Unavailability of utilities and services in site (water)
45	External	Accident during construction
46	External	Problem with neighbors
47	External	Delay in performing final inspection and certification by a third party
48	External	Lack of communication between the parties
49	External	Fluctuations in cost
50	External	Force Majeure as riot, strike, and earthquake

Table II Top ten delay causes based on owner's perspective

Groups	Factors	Imp. Index	Rank
Consultant	Delay in approving design documents	67.45	1
External	Changes in government regulations and laws (GST)	64.93	2
Labor	Shortage of labors	58.69	3
External	Slow permit by municipality	56.57	4
Material	Shortage of construction material	55.21	5
Consultant	Delay in inspection and testing by consultant	50.15	6
Contractor	Poor site management and supervision	47.83	7
Contractor	Ineffective planning and scheduling of project	47.45	8
Consultant	Inflexibility of consultant with owner	45.87	9
Owner	Delay in decision making process	42.12	10

Table III Ten delay causes based on contractor's perspective

Groups	Factors	Imp. Index	Rank
External	Changes in government regulations and laws (GST)	69.65	1
Owner	Changes in orders by owner during construction	69.19	2
Owner	Delay in finance and payments	68.79	3
Owner	Delay in approving new materials (M-Sand)	67.88	4



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Material	Shortage of construction material in market	67.52	5
Consultant	Delay in approving design documents	64.46	6
External	Effect of soil condition (Soil, water table)	60.13	7
Consultant	Inadequate experience of consultant	57.84	8
External	Unavailability of utilities and services in site (water, transport)	56.38	9
Contractor	Delay in sub-contractor's work	51.57	10

Table IV Top ten delay causes based on consultant perspective

Group	Factors	Imp. Index	Rank
Owner	Delay in decision making process	65.37	1
Owner	Late in revising and approving design documents by owner	64.98	2
Owner	Changes in orders by owner during construction	64.05	3
Owner	Delay in finance and payments	63.19	4
Contractor	Rework due to errors during construction	59.33	5
Material	Changes in material types and specifications during construction	58.91	6
Contractor	Poor site management and supervision	54.73	7
Contractor	Inadequate contractor experience	53.12	8
Owner	Poor communication and coordination by owner and other parties	51.12	9
External	Unavailability of utilities and services in site	49.86	10

The factors are grouped under seven groups. These groups are ranked based on the importance index on the perspective of owner, contractor and consultant.

Table V Ranking of groups

Owner Perspective			Consultant Perspective		
Group	IMP. Index	Rank	Group	IMP. Index	Rank
Contractor	47.73	1	Contractor	42.97	1
Consultant	45.81	2	Owner	42.32	2
External	41.63	3	Labor	39.19	3

Material	40.94	4	Consultant	36.82	4
Owner	35.29	5	External	36.07	5
Labor	34.90	6	Material	34.13	6
Equipment	32.08	7	Equipment	33.25	7

Table VI Ranking of groups based on Contractor perspective

Contractor Perspective		
Group	IMP. Index	Rank
Owner	49.18	1
Consultant	48.79	2
External	46.98	3
Material	46.42	4
Labor	43.93	5
Contractor	41.25	6
Equipment	40.77	7

C. Rank correlation

Spearman's Rank correlation (r_s) gives the possibility of agreement between two groups while excluding the third party which is associated with the study using SPSS. The value ranges from -1 to +1 which denotes there is no agreement between associated parties to perfect agreement between related parties.

$$r_s = 1 - \frac{6\sum d^2}{N^3 - N} \quad (4)$$

Where r_s = Spearman's rank correlation coefficient between the associated group, d = total difference obtained from the rank which was awarded for every particular cause, N = Total number of delay factors which was considered (50 factors and 7 groups which are categorized in this research). It was found that correlation coefficients was 0.541 between contractor and owner. In case of, consultant and contractor the correlation coefficient was 0.697. On the other hand, the correlation between owner and consultant is 0.613. This shows that there is lot of disputes and disagreement between owners and contractor.

D. Reliability Analysis

To investigate the reliability of the data which was collected for the research, Cronbach's alpha test was followed. This correlation gives the reliability of the collected data. It was found that Cronbach's alpha (α) should bear values between 0 to 1. If the value is greater than 0.9, the data collected was excellent and has better consistency in data. If the value is between 0.8 to 0.9 it is said to be good. The Cronbach's alpha value was also determined using SPSS software.

$$\alpha = \frac{k}{k-1} \left(1 - \frac{\sum \sigma_i^2}{\sigma_t^2}\right) \quad (5)$$

Where $\sum \sigma_i^2$ = Variance that was found from the observed test factors; k = Total number of variables that are considered in the research; σ_t^2 = Variance in scales on each factor. Based on the formula it was found that, the value of $\alpha = 0.981$ which is greater than 0.9. This shows that the data collected has excellent reliability.

III. SUMMARY AND CONCLUSION

The research was done in Tamil Nadu to find the causes which leads to delay in completing the project.



Based on the Importance Index the main causes of delay are determined. Questionnaire was sent to 200 respondents out of which 187 received. 30% was from consultant, 33% was from contractor and 37% of responses was from owners. From the calculation of Importance Index it was found that delay in approving design documents and Government regulations has a greater impact on delay in owner's perspective. In case of consultant's perspective, the major reason was delay in decision making process and late in revising and approving design documents are the main causes. While contractor's find difficulty in finishing the project due to the government rules and owner's showing reluctance for approving new materials. It was found from overall importance index value that the major delay rank goes to changes in government regulations and laws, late in approving documents and design by owner, delay in approving new material, delay in decision making process, Shortage of material, delay in payments, change in orders during construction, delay in finance and payments are the major cause for the delay in construction projects in Tamil Nadu. It can be concluded that majority of the delay is due to owner related causes which has greater index value. The change in Government rules and regulation was the distinct factor, since there was an escalation in tax which increased to 12% to 16% of the project cost, thereby resulting in cutbacks of profit of the contractor and also increase in budget of the owner. Recently, due to unavailability and shortage of materials such as sand, it makes owner reluctant to approve new material such as M-sand as an alternative. This causes delay in schedule of contractor and consultant timeline. The major effect due to delay are increase in time and the budget allocated to the project. This may sometime get serious and leads to conflict between the groups and leads to arbitration.

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