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Causes and Effects of Delays in Indian Construction Projects

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Abstract – Completion on time with defined cost and quality specified is considered as the important parameter for any successful project. Delays are very severe problem for the construction industry not only in India but all around the world. One of the reasons for cost overrun is the underlying of the other factors which implies the delay in mean time overruns. The main aim and objective of this study is to sort out the important causes of delays within the Indian construction industry so that all stakeholders could have idea about what are the areas that they should give more attention for minimizing delays. These objectives are being completed by implementation of the methodology to identify evaluate the significant factors that causes delays to construction projects.

The study exposes that all investors of construction parties are extremely involved in contributing to the reasons of the issues. Recommendations are suggested to minimize the occurrence of these critical factors causing delays considerably. The outcome of the results indicates that all of the parties have some contributions deeply in causing the delays problems due to the overlapping and dynamic nature of construction activities and hardly one could find out whose responsibility lies at the core.

Keywords –Relative Importance Index (RII), Delays factors, Spearman's Correlation Coefficient etc.

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1. INTRODUCTION

Construction industry is one of the sectors that participates very decisive role in contributing and improving economic sector. Significant part of development of one country depends upon construction industry. Potential of construction industry is too wide that it creates employment not only in construction itself but on other sectors of country like, transport, manufacturing, financial and commerce services. A lot number of people get opportunity of employment due to construction works. People plays very important role in socio-economic improvement of the country. This industry also essential to grow other sector of country as it provides physical facilities which is the need for productions and distributions of good and services. Most of economies consider this industry as the important service sector for offering and adding employment Therefore, it brings direct contribution and development in economy growth of the country and considered as one of the main locomotives for economic growth where it provides materials, manpower, equipment, capital and all resources from and within the country itself. Construction industry is quintessential for the prosperity of any country.

Indian construction industry contributes 40 percent to development investment within the past 50 years. It has given livelihood to 16 percent of working citizens and over 35 million (3.5 crore) people are working because of industry. Indian industry is that the second largest leader in India once agriculture region. Construction industry is enjoying sixth place in contributing economic sector in India, (11% of GPD) accounting for 7.8% of the GDP of India in the finance year of 2016.

2. LITERATURE REVIEW

Gunduz *et al* (2014) proposed to provide decision support tool that uses fuzzy logic incorporation with relative importance index to measure the probability of delays factors in construction projects before bidding phase. With the help of literature review and interviews, the authors came out with 83 delay factors classified into 9 groups on based of literature review. Using relative importance index to rank responses of Interview questionnaire filled by 64 experienced construction professionals to assess delay factors importance with 5 points Likert Scale that resulted in top 5 factors:

- "Lack of experience of contractor"

- "Deficiency in planning and scheduling"
- "Poor site management and supervision"
- "Changes to the project by owner"
- "Delays due to material delivery"

Gunduz, Nielsen and Ozdemir *et al* (2013) aimed for the research to identify the delay factors in construction projects as a result of delays are thought of being a significant drawback within the industry. Through a close literature review and interviews with specialists from the Turkish industry, total 83different delay factors were known and categorized into 9 groups in alphabetical order as follows: adviser connected delay factors, contractor connected delay factors, style connected delay factors, instrumentation connected delay factors, externality connected delay factors, labour connected delay factors, material connected delay factors, owner connected delay factors, and project connected delay factors. The demonstration of those groups of delay aspects was realized by means of the Ishikawa (fishbone) illustration as an outcome of its proficient of presenting aspects, interrelations between completely different teams of things, and consequences following from the factors. The research work then measured the virtual significance of delay aspects and validated the status of the aspects and groups constant with their importance level for delays. This objective was achieved through analysis of interview outcomes. Consistent with the computed RIIs, all factors and teams were graded. The paper addressed the most important factors and teams of causes of seven delays. The most and least vital factors and teams were achieved through ranking results.

Le-Hoai *et al*. (2008) showed investigation and planned delay and cost overruns in Vietnam's enormous construction projects with association with specific selected countries. In this investigation, twenty-one reasons of price and time delays proper with building and industrial construction projects are acknowledged and categorized. Evaluation of causes of cost and time delays are done with different model construction industries in Africa and Asia. The factor analysis method was applied to categorize the causes, as a result seven factors are determined, namely: lack of constraint and slowness, design, estimate and market, financial capability, incompetence worker and Government. These outcomes might encourage specialists to concentration on time and cost overrun issues that might have been in their future or present projects.

El-Razek *et al*. (2008) one of the main reasons of delay in building construction in Egypt studied in this paper. They identified 32 causes of time delay that were classified into nine (9) groups to fit the Egyptian construction industry. These groups were: Financing, materials, contractual relationships, changes, rules & regulations, manpower, scheduling & control, equipment, environment related causes. The main causes of delay in these construction projects are constraints in financing by the contractor while construction, design changes by client or his agent during production, delays in worker's payment by vender, partial payments complete construction, and no expenditure of capable construction/contractual controlling. The investigation outcomes illustration that the advisor is found as having more intermediate views, whereas clients and contractors are seen having opposing views, usually blaming each other for delays.

Doloi H. et al. (2012) have mentioned in his analysis to analyses factors affecting delays in Indian construction projects. They choose set of forty five attributes. Their analysis 1st known the key factors impacting delay in Indian construction industry then established the link between the important attributes for developing prediction models for assessing the impacts of those factors on delay. A form and private interviews have developed the premise of their analysis. For research analysis, feature analysis and regression modelling are used to pattern the significance of the delay factors. From the information analysis, most crucial factors of construction delay were known as lack of commitment followed by inefficient website} management and poor site coordination are ranked third.

Sambasivan and Soon *et al.* (2007) also adopted questionnaire method to establish the most important factors that causes and their effects of delay in the Malaysian construction industry. A method of form survey and relative importance index are wont to determine the causes and effects of delay from all stakeholders like shoppers, consultants, and contractors. the most vital high 10 causes known from the survey embrace, among others, improper coming up with of contractors, poor site management of contractors, insufficient service provider capability, not enough client's economics and expenses for proficient works, problems with subcontractors, deficiency in labour and substantial offer, lack of apparatus and failure, mistakes throughout the development stage and poor communication between parties.

Assaf and Al-Hejji *et al.* (2006) has been done a survey to find out the variables or factors that causes delay and their prominence as per each of the three key project participants i.e. clients, consultant and contractors in construction projects of Saudi Arabia. The field survey carried out includes fifteen owners, twenty-three contractors, nineteen consultants. Seventy-three variables of causes of delay are identified by studying literature review and results discussion with stakeholders involved in the construction projects. These features are classified into nine groups based on the following sources of causes of delay: factors

related to client, consultant, contractor, project, man power, materials, design-team, equipment, and external factors. Owners have explained that causes of delay are associated to contractor and labour. Their study points out the severe important causes of delay for the contractor are related to owner while client and consultants recognize highest frequent factor of delay is that awarding to the lowest bidder. The common cause of delay that all parties agreed is the change of orders by client during construction. Several common factors that causes delays between two stakeholders, such as improper planning and scheduling by contractors, delay in progress payments, poor site management and command by contractors, issues in financing by contractor and lack of labour. All key stakeholders agree that the subsequent causes are the least important: accidents during construction, restrictions at site and traffic control, effect of social and cultural factors and changes in government regulations. However, the study revealed that the contractors identified that the main sources of delay were owners and consultant while both consultants and owners specify contractor and labour related delays are the significant sources of delay.

3. AIM & OBJECTIVE

If the causes of delays of construction projects are known, then only we can find the solution for minimizing it. Consequently, it ought to be well-known and recognised. This study addresses the problem as to why many of construction projects are delivering beyond their scheduled completion date and budgeted cost and how these problems can be solved. This study has aimed to give a try to propose a decision support tool for all stakeholders before the bidding phase or during any construction phase to deliver project within defined time and cost.

The main objectives of the research are:

1. To identify various factors which causes delays in construction projects;

2. To analyze and rank in their order of significant, based on the importance level of main reason of delays observations of the three major parties in any construction, i.e.; owners, contractors and consultants;

3. To analyses and rank the categories of delay and the relevant responsible parties to the causes of time overrun;

4. To recommend mitigation measures that minimize delay in future construction projects.

4. METHODOLOGY

The methodology adopted in this research provides the procedures that are necessary for obtaining the information needed to structure the research questionnaire, collect data, analyze the collected data, and interpret and present the results and give conclusions and recommendations. The methodologies followed in this survey are outlined in the following flowchart 1. For this study, a questionnaire survey method has been adopted which will gives data and subsequently, data collected are being analysed by using the statistical methods.

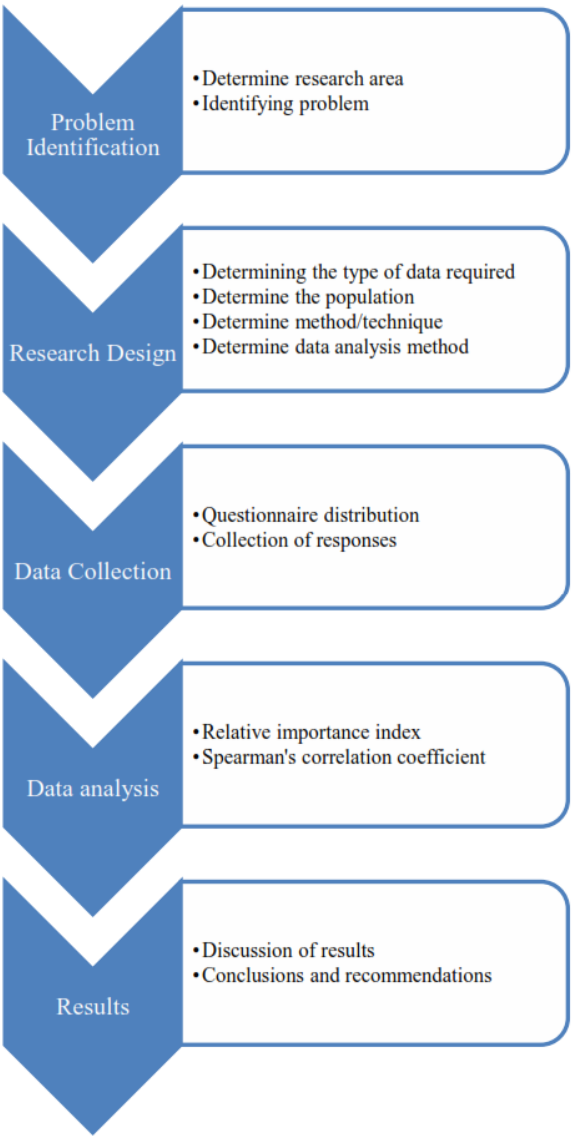

Fig.1: Workflow adopted in this study

A. Data Collection

Firstly, identifications of causes of delays in construction industry has been done through detailed literature. Each cause of delays is taken as a factor that causes delay or a delay factor. About eighty-seven factors are identified and grouped into eight groups. The grouping or delay factors into groups is based on the source of delay like those related to materials, labours, equipment, contractors, consultants and clients, finance, and external factors. To recognise the influence of

delay factors affecting the construction industry, a quantitative method has been adopted by developing a questionnaire survey and analysing to the survey data using statistical methods.

These factors were used to develop the questionnaire survey in order to collect data from the respondent. Then, the data collection was carried out through questionnaire amongst the all stakeholders like Contractors, Clients, Consultants involved in construction projects to assess their respective perceptions. The respondents involved in the survey have good experience in handling various types of projects. Assessment of causes of delays was carried out using 5-point Likert scale from 1 to 5 representing very low importance, low importance, medium importance, high importance and very high importance respectively.

Questionnaire survey were distributed through google form to all stake holders like Contractors, Clients and Consultants working in private and public sectors. Settlement on the significance of the reasons of delay amongst each two groups of parties has been also verified. Recommendations for decreasing delay in construction projects are specified in view of the outcomes of the study.

B. Questionnaire Design

The questionnaire was designed based on factors were identified that contributed to the causes of delays. A questionnaire survey is to assess the perceptions of contractors and consultants and clients. For convenience of all respondents, the questionnaire was distributed through emails in the means of google form.

The questionnaire survey was composed two parts:

1. Respondent's information, which would help in categorizing the respondents into different groups for the purpose of comparisons.

2. Evaluation of delay factors by respondents.

First part of survey includes the details of the respondents and organizations in order to get the information about the respondent's details and background as well as respective organization.

Second Part includes factors that cause delays in construction industry. This part is to collect the information on factors that contribute to the causes of delays in construction industry from the perspective of all stakeholders like contractors, clients and consultants. There are eight categories with eighty-seven factors of causes of delays. These factors are, as mentioned earlier, identified through detailed literature.

The questionnaire is mainly based on Likert's scale of five ordinal measures from one (1) to five (5) according to level of importance. The respondents were asked about the scoring of the causes of delay of each factor This scale represent how much one particular factor affects the completion of the project, what is the level of importance we should give to that factor for not having delay.

Each scale represents the following rating:

- (5) = Very high importance
- (4) = High importance
- (3) = Medium importance
- (2) = Low importance
- (1) = Very low importance

C. Data Analysis Approach

The technique used in analyzing of data was expected at forming the relative importance of the different aspects that contribute to causes of delays. There are three steps used in analyzing the data. The responses given by each of the respondents are summarized and counted in their respective categories separately for client, consultant and contractor.

This study consists of 3 steps to analysing the data:

- Calculating the Relative Importance index (RII)
- Ranking of factors in each category based on the Relative Importance Index (RII)
- Find degree of correlation on level the aspects among the three groups

D. Relative Importance Index

The Relative Importance Index (RII) has been decided to consider to assess and rank each delay factor importance based on scores given by respondents collected from the survey. Gunduz (2014), Dolai (2011), Sambasivan and Soon (2006) used the relative importance index to analyse factors causing delays in Turkish, Indian and Malaysian construction industry respectively. It was also considered by many others as it was earlier discussed in literature review. 5 point Likert Scale was useful to rate the importance of the delays aspects and Relative Importance Index was functional using the following equation:

$$RII = \frac{\sum W}{A \times N}$$

Where,

RII= relative importance index

W = weighing given to each factor by the respondents (ranging from 1 to 5).

A = the highest weight (in this case is 5).

N = total number of respondents

The RII value have a range of 0 to 1 (0 not inclusive); the higher the RII, the more important was the cause of delays.

E. Spearman's Rank Correlation

According to Jesse Russell, Ronald Cohn (2012), Spearman's rank correlation is non-parametric test. Non-parametric tests are also recognised to as distribution free tests. These tests do not require the normality of the distribution or the homogeneity of the data which is considered as a big advantage over other approaches". They compare medians rather means and, as a result, if the data have one or two outliers, their influence is neglected. In this study, the Spearman's Correlation is used. Correlation is a relationship measure among different parties or factors and the strength and direction of the relationship. In this study, it is used to show the degree of agreement between the different parties. The correlation coefficient varies between +1 and -1, where +1 implies a perfect positive relationship (agreement), while -1 results from a perfect negative relationship (disagreement).

It might be thought then that sample estimations of correlation nearby to union in magnitude indicate good correlation, while values near zero specify little or no correlation. The Spearman's rank correlation coefficient r is utilized to measure and match the relationship between the rankings of two parties for a single reason of delay, while discounting the ranking of the third party. And it is calculated by the following formula:

$$r_s = 1 - \frac{6\sum d^2}{n^3 - n}$$

Where

r_s= the Spearman rank correlation coefficient between two parties,

d = the difference between ranks assigned to variables for each cause, and

n = the number of pairs of rank.

5. DATA ANALYSIS AND RESULTS

A. General Characteristics of Respondents

The questionnaire survey was given to respondents who are in construction industry working as project managers, projects engineers, site manager, consulting engineers and designers. It includes amalgam of both private & public sectors of construction industry. All respondents are categorised into three stakeholders' viz., contractors, clients and consultants.

A total of forty-five responses were collected out of which twenty-two were contractors, ten were clients and thirteen were consultants.

Table 1 Respondents' profile

Description	Number of respondents	Percentage number of respondents
Contractor	22	49
Clients	10	22
Consultants	13	29
Total	45	100

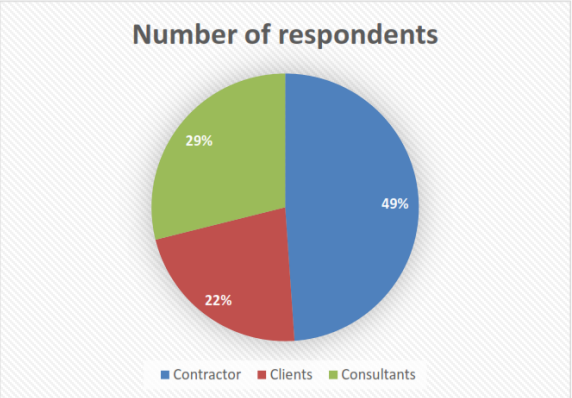

Fig. 2: Percentage of respondents

Table 1 indicates that the respondents comprised of 22 (49%) from Contractors, 10 (22%) from Clients while Consultants respondents accounted for 13 (29%) of the respondents. The three categories of respondents are the main stakeholders as well as participants of the construction industry and it was therefore necessary to engage and involve them in this study so as to obtain their varied and different perspectives and experiences.

B. Ranking of Delays Factors

The Relative Importance Index (RII), was calculated for each delay factor to identify the most important factors causing delays. The factors and also eight major groups of causes of delay were

ranked based on RII values. From the ranking given to each aspect of delays, one can recognize the most vital factors that reason delays of construction projects.

The data composed from the second part of the survey was analysed from the perception of clients, consultants and contractors. RII of each individual factor derived from respondent's responses was computed for overall analysis.

Table 4.2 illustrations aspects and groups of delay aspects, respondent's scorings (from 1=very low important to 5=very high important), computed RII's and ranks. They are indicated as below

1. Very low importance
2. Low importance
3. Medium Importance
4. High Importance
5. Very high Importance

C. Important Factors Causing Delays

The relative importance index (RII) is computed as mentioned in the methodology for each delay factor to figure out the most important factors causing delays. The factors are ranked independently based on the RII value obtained from the responses given by clients, consultants and contractors. From the ranking given to each aspect of delays, it is probable to recognize the most significant important reasons of delays in construction projects.

Table 2 Most important causes of delay according to the owners, contractors and consultants.

Rank	Overall	Contractor	Client	Consultants
1	Improper project planning and scheduling	Improper project planning and scheduling	Improper project planning and scheduling	Delay in progress payments
2	Ineffective control of project progress by contractor	Delay in approving major changes in the scope of work by consultant	Difficulties in financing the project	Inadequate contractor experience
3	Site management and supervision	Inadequate fund allocation	Late delivery of materials	Inflation/Prices fluctuation
4	Poor design and delays in design	Ineffective control of project progress by contractor	Shortage of skill labour	Rework due to errors
5	Inappropriate construction methods	Poor design and delays in design	Site management and supervision	Shortage of skill labour
6	Difficulties in financing the project	Incomplete drawing/detail design	Ineffective control of project progress by contractor	Ineffective control of project progress by contractor
7	Shortage of skill labour	Site management and supervision	Poor qualification of the contractor assigned to the project	Client's financial difficulties
8	Delay in approving major changes in the scope of work by consultant	Frequent equipment breakdown	Poor design and delays in design	Accidents during construction
9	Client's financial difficulties	Shortage of technical professional in the contractor's organization	Incomplete drawing/detail design	Labour supply
10	Incomplete drawing/detail design	Change orders by the owner during the construction	Slow decision making by client	Site management and supervision
11	Contractor's financial difficulties	Client's financial difficulties	Accidents during construction	Poor communication and coordination with parties involved in project
12	Labour supply	Contractor's financial difficulties	Poor procurement of construction materials	Delays in handling over and taking over to another dept
13	Delayed and slow supervision in making the decision	Lack of communication and coordination with contractor	Labour supply	Delayed and slow supervision in making the decision
14	Shortage of technical professional in the contractor's organization	Shortage of skill labour	Frequent equipment breakdown	Lack of communication and coordination with contractor
15	Frequent equipment breakdown	Unrealistic contract duration	Improper technical studies by the contractor during the bidding stage	Weather condition

Fifteen most important factors that causes of construction project delays were selected from each set of rankings, and these are listed in Table 2. The outcomes represents that there are a number of important aspects that describe the primary reasons of delay. From these variables, the top five most important causes identified by the RII analysis of the survey, and based on overall ranking, are:

- Improper project planning and development,
- Ineffective control of project progress by contractor
- Site management and supervision,
- Poor design and delays in design,
- Inappropriate construction methods.

The contractors' top five important factors that causes delay are:

- Improper project planning and scheduling
- Delay in approving major changes in the scope of work by consultant,
- Inadequate fund allocation,
- Ineffective control of project progress by contractor,
- Poor design and delays in design.

The top five important causes of delay as perceived by the clients are the following:

- Improper project planning and scheduling
- Difficulties in financing the project
- Late delivery of materials
- Shortage of skill labour
- Site management and supervision

The consultants' top five important causes of delay are:

- Delay in progress payments,
- Inadequate contractor experience,
- Inflation/Prices fluctuation,
- Rework due to errors,
- Shortage of skill labour.

With regard to delay factors, 15 most important factors have been identified for each set of rankings. Out of these most important delay factors, three factors were found to be common for all parties, namely ineffective control of project progress by contractor, Site management and supervision and Shortage of skill labour. There are also many factors which are common between two parties, such as Improper project planning and scheduling, Poor design and delays in design, Incomplete drawing/detail design, Frequent equipment breakdown, Shortage of technical professional in the contractor's organization were recognized as critical factors among top 15 important factors.

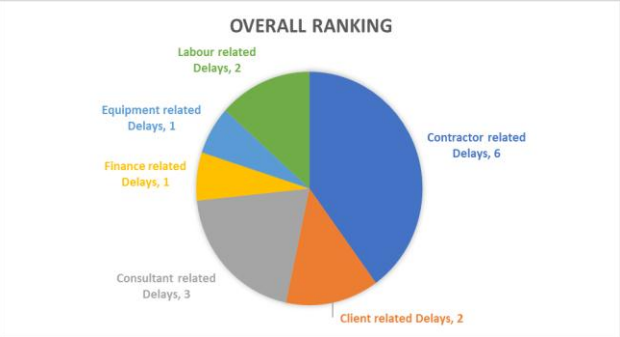

Fig. 3 Contribution of groups in top 15 Delays in overall ranking

Fig. 4 Contribution of groups in top 15 Delays in contractors' ranking

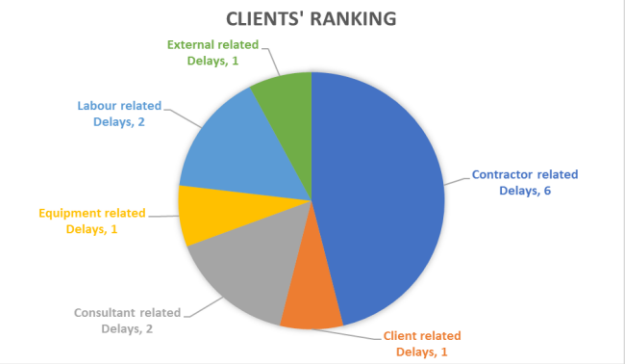

Fig. 5 Contribution of groups in top 15 Delaysin clients' ranking

D. Discussion on Results

In this section results of data analysis are discussed. Each group has obtained some ranking and in each group most crucial factors are discussed below:

1) Material related delays

This group of "Materials related delay" includes ten factors. Out of the ten factors only two factors are identified by the clients in the 15 most important delay cause factors. These are late delivery of materials and poor procurement of construction materials. Design related groups of causes has been ranked by the clients in the 4th position. However, contractors and consultants have ranked

this groups in the 7th and 8th position. The reasons for the factor of late delivery are generally faced because of an unanticipated increase in demand, due to poor coordination and planning between contractors and suppliers and problems related to transportation of materials (e.g. road traffic jams, the bad weather and other factors). As a consequence, implementing Just-In-Time system which is a part of Lean Construction Philosophy could ensure timely arrival of construction materials and hence assists in timely completion of projects, also leads to reduction of holding costs of materials.

2) Labour related delays

Labour related causes of delay is one of the least important groups of delay factors as it has the low rank among all categories of delay causes and includes eight factors. Shortage of skill of labour is identified in the 15 most important causes of delay by all the three parties of rankings. In addition, the client and consultants have identified labour supply (skilled and unskilled labour) to be one of the important factors which causes delays. Human resources should be introduced in the construction industry through continuous and proper training programs so as to improve the productivity of construction projects. Government should involve more number of people in skill training programme.

3) Equipment related delays

The groups of "Equipment related delay" contain not enough amounts of apparatus, equipment allocation issue, inadequate current equipment, frequent breakdown, slow mobilization and shortage of equipment parts. All parties agreed that equipment related causes of delay factors are not the most important factors contributing delay in construction projects. But frequent break down of equipment is considered important factor by contractor and clients, it is the fact that contractors should be hold responsible for this groups.

It is recommended that during bidding stage, the contractors should have assessed the ability to avail the minimum requirements of major equipment and the ability of acquiring sufficient stock of spare parts and/or access to replacement equipment in cases of breakdown of major equipment. During construction phase, the supervision team should check the productivity of major equipment.

4) Contractors related delays

From results, contractor related group of delay is ranked top by both clients and consultants and third by contractors. Clients and consultants know more about these problems and have given them higher priority. This group of delay includes 19 delays factors. Most of the factors are found in top 15 important factors given by all three parties which causes great delays in construction industry. In overall ranking also, these groups have been ranked first.

Out of the 19 factors, seven are identified in the most 15 delay factors by the clients and consultants. These are improper project planning and scheduling, difficulties in financing the project, poor qualification of contractor, improper technical studies be the contractor during the bidding stage, delays in handling over and taking over to another department and poor communication and coordination with parties involved in the project.

Site management and supervision and ineffective control of project progress by contractors are the two factors which are in these groups are common in the ranking given by all parties.

Under the groups of contractors "Inadequate fund allocation" and "Contractor's financial difficulties" are seen as the most important delay factors based on the overall analysis respectively. These factors are directly related to financial ability of the contractors which seriously affect performance of project and responsible for delay of the project. These delay causes may be because of delay in progress payments by the client, incompetency of the contractor and inadequate cash flow of the contractor to handle the expenses of the construction work.

5) Consultants related delays

The findings of results of groups of delay factors confirms that consultant related delay groups are ranked first and second as per contractors and client, respectively. The position in the consultants' ranking of these groups is fifth position. It seems that consultants are not willing to admit their responsibility for the cause of delay the project. These groups have included 9 factors of delays. Out of the 9 factors only 3 are identified in the 15 most important factors by the contractors. According to contractors, delay in admiring main modifications in the possibility of work by advisors, poor design and delays in design, inadequate drawing/detail design are amongst the 15 most important factors of delay. These factors are dependable on the consultants' ability of producing and presenting design to contractors.

6) Clients related delays

Client related delays are ranked by contractors, clients and consultants in the 4th, 7th and 3rd position and which includes 13 factors. From these factors, change in order by owner, lack of communication and coordination with contractor, slow decision making by clients delay in progress payments by the consumer is generally acknowledged by all parties. There are one common causes identified by contractors and

consultants "Lack of communication and coordination with the contractors".

"Delay in advancement expenditures by the client'' is acknowledged as the principal most essential factor by advisors. Contractors face very bad consequences of this factors which will lead to delay the project. Since construction actions necessities high quantities of currency, workers find very tough to allow the heavy everyday construction expenses as soon as this factor ensues. Insufficient cash flow is result of late payments by clients to handle the construction expenses for financially weak contractors. The occurrence of the factor "Change orders by the owner during construction" shows clients have a problem of lack of clear definition of project objectives. Clients change their mind to include the interest of different stakeholders during construction phase which cause late variations.

7) Finance related delays

This group is one of the most important which cause delays according to all parties which has highlighted factors such as inadequate fund allocation, financial difficulties of contractors and clients among top 15 important factors. Contractors and consultants agreed that clients' financial difficulties are more adhere to delays than contractors whereas clients think contractors' financial difficulties is more responsible for delays. In overall ranking also, clients' financial difficulty comes prior to contractors' difficulty in finance.

8) External related delays

The "External causes of delays" includes 17 factors. Among these factors, an accident during construction is identified by both consultants and clients and has given eighth and eleventh position as the most important cause of delay. The consultants also identified weather conditions to be among the critical factors in construction that results delays.

External delay causes are those in which no party is responsible and have control over these delays but still adversely impact projects performance and hence increases project duration and affect at least one of the parties. Hence, it is the responsibility of the client to clearly indicate risk allocation through the contract documents.

6. CONCLUSION

From the results of analysis, it could be concluded that the most important factors causing delays in construction industry are related to contractors. The next responsible party for causing delays is followed by consultants, clients follow consultants because of financial difficulties of clients and delayed and slow decision making. Out of fifteen top factors, six are from contractors related, three are of consultants related, two are of clients and labour related, others are of finance and equipment related. It is evident from the study the contractor's related delays occupy a forty per cent of the top fifteen factors while twenty percent is belonging to consultants related delays. In blaming game of their responsibility, contractors' groups of respondents were being barely fair than other two groups i.e. clients and consultants of respondents.

Ultimately, recommendations are suggested to minimize the occurrence of these critical factors causing delays considerably. The outcome of the results indicates that all of the parties have some contributions deeply in causing the delays problems due to the overlapping and dynamic nature of construction activities and hardly could we find out whose responsibility it is. Just by blaming each other stakeholder would yield no value to successful accomplishment of construction projects and hence they need to change the mindset, so as to have better coordination and collaboration among each other.

A. Recommendations

The significances caused by the delays affect incredibly to building industry, so all shareholders (consumers, contractors and specialists) ought integrate, coordinate & collaborate together to complete projects within the defined time, budget, and quality standard. It is the responsibility of project team and construction managers from contractors' side to pay attention to planning and to secure the completion of project within time.

For construction managers, recommendations for minimizing occurrence of delays are:

- Feasibility study should be done more carefully and seriously
- Resource efficiency of procurement of labour, materials and equipment should be maximized.
- State-of-art tools to enhance communication & coordination should be incorporated to resolve the conflicts which would inevitable.
- There should be surety to all payments within time.
- Clients should be having financial stability to spend on extra costs in the activity of any delay.
- Working system should be empowered with modern management technique and up to date technologies such as BIM (Building information modelling).

- Robust procedures should be incorporated right from the outset of project for smooth and healthy coordination and control of planning.

B) For contractors

In order to minimize the occurrences of the factors in construction projects, contractors are suggested that:

- Contractors should have financial stability during the project lifetime cycle. Financial resource and cash flow should be monitored and controlled by forecasting progress payments and managing the contingency budget to overcome spending from climates change and high market prices or any risk.

- As project have been awarded, Administrative and technical staff should be assigned to make arrangements of site management to overcome delays due to poor site management and command

- Essential many labours should be given and be encouraged to increase productivity through mobilizing all resources and by raising their pay. Experienced personnel should be assigned dedicated to work.

- Contractor should be aware of all expertise before bidding.

- For successful project delivery planning and scheduling needs to be attended by analysing available resource during construction.

- Contractors should plan effectively for the delivery of materials and equipment in time to avoid expected delays from late delivery during construction.

- To develop contractors' management skills, there is a requirement for constant work training programmers for persons in the industry, so that they can update their information and become familiar with project management skills.

C) For clients

- Contractor's experience, resource ability, technical ability, financial capability and enough manpower to manage actions should also be evaluated rather than only its lowest bid. The evaluation of contractors should be improved to get qualified contractor with sound financial stability.

- Monitoring of planning technique of contractor, quality assurance manual should be done at time bidding. Contractors' deployments of resource should have timely review with approved work during construction phase.

- Sufficient time should be given to bidding periods for detailed technical study to contractor.

- Before starting the design phase, client's objectives should be clear, unambiguous and satisfied to all the stakeholders. This will result into reduction of potential change orders during project life cycle which in turn avoids the delays.

- Clients/owners have the final call on any decision with the problems that are faced by contractors during construction, so clients should be quick in giving decisions to resolve any problems, the management from contractor's side should be cooperative.

- Alike contractors' financial stability, clients' financial stability should also be sound, clients should pay the contractors timely and regularly on schedule as per contract so that contractors be able to complete projects and morale of contractors could improve.

D) For consultants

- *It is necessary to consultants to weekly/monthly meeting to improve the communication and coordination among other stakeholders to avoid delays which might occur during construction.*

- *Reviewing and approving design documents should be done within less time, since work cannot proceed without consultants' call. Designer and architects should define their schedule for completion of design and plan document with minimal mistakes.*

- *There should be time limit mentioned in the contract between clients and consultants for producing and approving design documents.*

- *Consultants should monitor and do inspection of the work closely at appropriate times.*

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