

STUDY ON THE CAUSES OF DELAY IN A CONSTRUCTION PROJECT AND RECOMMENDATION

AHMAD MONIS ANSARI, DR. SYED KHURSHEED AHMAD

DEPARTMENT OF CIVIL ENGINEERING
AL-FALAH SCHOOL OF ENGINEERING AND TECHNOLOGY
AL-FALAH UNIVERSITY

ABSTRACT

The construction industry in India is an important sector due to its enormous contribution to the country's economic development. However due to the geographical, political, social and financial situation of the country, many construction projects are prone to delay. These delay factors can only be avoided by first identifying the factors and their sources.

The main aim of this research was to find out the main causes of delay in Construction projects in India. The research design was quantitative, where the data was collected from clients, consultants and contractors using questionnaires. The questionnaire that was prepared with Google form technology, had a list of delay causing factors of which the respondents were ask to rank each according to the 5 point Likert scale. The data obtained were analyzed using the Statistical Program for Social Scientists (SPSS).

The results obtained indicate that the top major causes of delay were; the shortage of materials, inaccurate time estimation, and errors during construction. In addition, the top major effects of delay were; Cost overrun, time overrun, negative social impacts and litigation. Also the top major risks associated with construction delay were; too much pressure on project stake holders, disputes amongst project participants, project abandonment, overall cost increase and decline in revenue.

INTRODUCTION

1.1 General

Construction is an extensive process or mechanism for the realization of human settlements and the creation of infrastructure that supports development. Another definition states that construction is defined as an activity of the physical creation of infrastructure, superstructure, and related facilities. It, therefore, comprises all civil engineering works and all types of building projects including housing as well as maintenance and repair of existing structures.

A broad definition of term stipulated that construction is that sector of an economy which through planning, design construction, maintenance, repairs, and operation, transforms various resources into constructed facilities. The types of public facilities produced range from residential and non-residential to massive constructions.

Construction delay is referred to as a prolonged construction period beyond that which was estimated previously. These delays have been proven to be a potential source of risks in the construction industry. Many current studies are looking for ways it can be managed. The various risks associated with projects delay are cost related, where delay will generally lead to an overall increase in the value of the project.

Various studies carried out and have found sources of and categories of construction risks that need to be managed as part of the project management process. They stated that project delay starts from the inception phase of the project

itself. Also, some scholars mentioned that there is a tendency for construction projects to suffer from delays, and such delays possess potential losses for all stakeholders. These include client or owner through a loss of use and increase cost and for contractor and consultant through prolonging presence on the site and loss of confidence.

Delay is most common in the traditional type of contracts in which the contract is awarded to the lowest bidder. This procurement method is mostly practiced in developing countries. Ensuring that the project is delivered on time is one of the most significant needs of the clients in the construction industry. Quality, time, and cost are of primary concern to the contractor, but most often, construction projects are procured based on only two factors; time and cost.

1.2 Characteristics of Construction

The standard features of construction are immobility, uniqueness, heaviness, bulkiness, complexity, long duration of the process, high expenses, and durability. The construction is often characterized by rigidity, custom-built nature, high initial costs, complexity, continuous changing technology. Thus the features of construction products and the broad range activities in the construction industry make construction worth of different consideration.

1.2.1 The role of the construction industry in India's development.

As stated by the World Bank, the construction stimulates growth throughout the whole country and vanguards a country's development. It contributes intensively to the economic development of a country by satisfying some of the primary objectives that include support, generation, and employment creation, income generation, and redistribution.

According to the World Bank, the construction industry of India has been growing over the past decades. Several projects targeting businesses and foreign investors are coming to the country. This consists of multibillion-dollar investments in retail outlets, offices, roads, airports, hospitals, schools, and high-class hotels. The country continues to witness a dynamic activity as a result of infrastructure and rehabilitation and increased demand upon the private and business property. The industry is fragmented and diverse, covering a broad spectrum of projects involving multitude of activities. The construction projects range from mega-projects such as dams, roads, airports, bridges, and buildings to single house construction.

Generally, the industry suffers from lack of communication and coordination amongst the industry stakeholders. This is due to the fact that the industry is highly fragmented and lacks a central body that brings the stakeholders in the industry together. Also, the industry has limited health, safety, and equipment policies.

Most often the construction projects are procured either through competitive tendering, especially for projects of public or business sectors or directly recruiting a professional to prepare a design that fulfills the needs of the client's requirement. In India, the lowest bid tendering approach is the most common way of awarding contracts to contractors. This approach opens the door for corruption and affects both quality and the period of the project. It is often common that contractors guided by the intention to win contracts provide lower prices than actual prices of the projects.

1.3 Problem Statement.

Delay in construction projects has been a significant issue in the Indian construction industry over the past decades. The government spends enormous amount of money in the construction sector in an attempt to carry out economic development. It's a typical tradition to allocate developmental funds in her yearly budget. Majority of this fund is set aside for the construction of roads, railways, hospitals, schools, residential and non-residential buildings and airports. If these projects are delayed, it will not only slow down economic growth in the country, but it will also increase government expenditures. This will be due to the procurement of materials at a higher price and also due to a change of contractors. The result will be wastage of country's resources that could have been used to for other purposes. In addition, business organizations every year invest a lot of capital in the construction of new facilities in an attempt to expand their businesses and generate more profits by increasing their sizes of operations and also to meet up with the competition. When the problem of delay occurs, the companies turn to lose a significant amount of money that can sometimes render the company insolvent. Moreover, contractors are continually losing contracts due to delay or incompleteness of previous projects. Most often, they are obliged to share the cost of delay which is not necessarily caused by them. Delay has also led to a lot of disputes amongst stakeholders in the construction industry. If these

disputes cannot be resolved amicably to the satisfaction of every party, some parties will prefer litigation and arbitration. All this will go a long way to increase the cost of the overall project.

Finally, the delay will result in a negative perception of the country's construction industry. Investors will not be willing to carry out construction projects in the country. Besides, the predominance of delay will discredit the local construction companies, contractors, consultants, and engineers. This will result in the country's construction industry be less competitive.

Therefore, with all these problems faced by the government, business organizations, contractors, consultants, community, and the construction industry as a whole. Hence, it is imperative that a study is conducted to ascertain the factors contributing or resulting in the delay of construction projects. With these factors clearly outlined, they can be considered as the critical success factors of the projects. With these already known, preemptive measures can then be taken to reduce, eliminate, or mitigate their effects. Moreover, a study on delay will help stakeholders to be able to pinpoint exactly where the delay is from or what causes the delay and which of the stakeholder should be held responsible. With this, the issue of disputes, litigation, and arbitration can be avoided.

1.4. Aim.

The main aim of this research paper is to find out the causes of delay in building construction projects in India's construction industry.

1.5 Objectives

- To find out the factors that cause construction projects delay
- To investigate the effects of construction projects delay.
- To determine the risks associated with construction projects delay
- To identify the relevant ways of eliminating or mitigating the delays of construction.

1.6 Research Significance

The findings from this paper will serve as a guideline to construction project holders of India that is the government, business organizations, contractors, consultants, and the community at large. They will be aware of the uncertain factors that can result from delaying of projects right from the inception phase. This study will also generate a list of delay causative factors that can be used as a benchmark to control existing and future projects.

In addition, stakeholders will also be aware of the delay related factors and how to avoid them. The study will also generate measures to mitigate or eliminate the effects of construction projects delay. Finally, the study will also serve as a support of what other past researchers have written about factors causing a delay in construction projects. It will also provide some information for future researchers who wish to further investigate on this particular or related case.

1.7 Research Scope

The research paper focuses only on the construction industry of India. It concentrates specifically on the building constructions projects such as; schools, residential and non-residential offices, hospitals. Finally, the construction projects were selected such that they have all the stakeholders, such as contractors, subcontractors, and consultants. This is because if a delay occurs, then will be able to know if it was due to the government, owner, contractors, subcontractors, or the consultants.

LITERATURE REVIEW

2.1 Introduction.

The process of construction can be divided into three distinct and significant phases; the project conception phase, project design phase and the project construction phase. In a vast majority of project, delay occurs

during the construction phase where many unforeseen circumstances and factors occur. Completing a construction projects within the estimated time and cost is an indicator of efficiency, but the process of construction is subjected to many unpredictable and changing factors that comes from different sources. These sources include performance of parties, resource availability, environmental conditions, and involvement of other parties and contractual relations, thus the completion of the project within the estimated time is rare.

Delays are usually accompanied by cost overruns. When this occur, it will have a debilitating effect on contractors and consultants in terms of growth and adversarial relationship, mistrust, litigation, Arbitration, cash flow problems and a general feeling of trepidation towards shareholders, In addition, delay of construction projects cause dissatisfaction to all parties involved, and the primary role of the project manager is to ensure that projects are completed within the estimated time and cost. Projects stakeholders need to develop the capacity to foresee potential problems likely to affect their current and future projects. Identification of these common problems encountered on past projects in the construction industry is an excellent option to mitigate the factors that cause delay and their effects

However, construction project success can be defined as the completion of a project within the estimated time and cost. But it is rather unfortunate that projects successes are not frequent in the construction industry, especially in the developing countries and third world countries. This could be due to inadequate expertise, finance, and environmental uncertainties and also the inadequate supply of materials. From several studies and empirical evidence, it is clear that projects overruns comprise both delays and cost overruns occur during the construction phase. Therefore, scholars, researchers and professionals have been motivated to take steps to meet these challenges.

Construction project delay is a worldwide phenomenon that affects not only the construction industry but the overall economy of countries as well. It often involves multiple complicated issues all of which are invariable critical to recovering the cost of delay or the necessity to prolong the project with the consequential entitlement to recover the costs of adjusting to the contract schedules. When delay arises, there is always a question as to the causes of the delay and the opportunity of blames, which most of the times will result in disputes and litigation. Currently stakeholders in the construction industry are increasing their concerns about the duration of the construction projects because of rising interests, inflation, commercial pressures and of course it's potential to lead to disputes and claims resulting to Arbitration and litigation.

2.2. Classification of construction projects delays

Many factors can cause construction projects. (Ahmed, 2003) classified delay into two groups:

- The internal causes which arise from within the project stakeholders (clients, contractors and consultants).
- External factors which occur as a result of unforeseen factors. These factors arise not from the project participants. They can be termed act of God and may include the followings; weather conditions, natural disasters, government actions and material supplies.

Moreover, construction delay was also classified into three categories by (Bolton,1990). These include:

- Excusable but non-compensable: This is caused by circumstances not attributed to the project stakeholders or participants.
- Compensable delay: This occurs as a result of acts or omissions of a client or someone for whose actions the owner is liable to.
- Inexcusable delays: This results from contractors' fault or his subcontractors or materials. This may sometimes be due to lack of experience.

2.3 Factors causing construction projects delays

Several academic researchers have carried out studies over the years to investigate the causes of construction projects delays. A survey carried out by (Sweis et al., 2008) on the origins of delay of residential projects in Jordan found out that financial difficulties faced by contractors and too many changes made by the client were the leading causes of most delays. In another related research performed by (Abd El-Razak, 2008) in Egypt discovered that the most important causes of delay were financing by contractors during construction, delay in contractor's payment by owners, frequent design changes by owners or his agent during construction, partial payments and non-utilization of professional construction and contractual management.

Furthermore, a study was conducted by (Assaf and Alhajji, 2006) on-time performance of different types of construction projects in Saudi Arabia, in an attempt to investigate the causes of construction delay and their importance according to each project participant. A total of 73 delay-related factors were observed, and the most common cause of delay identified by all three project participants was a change in order.

In a similar report on the causes delay in large building projects in Saudi Arabia and their relative importance, (Assaf et al., 1995) reported a total of 56 possible causes were revealed; the contractors, the owners, engineers all ranked the financing group delay factors like the highest cause of delay. According to the contractors, the most crucial delay factors were preparation and approval of shop drawings, delay in contractor's progress payment by owners, and design changes. To the engineers and architects, the most important causes of delay were cash flow problems during construction, the relationship between different subcontractors, schedules in the execution of the project and the slowness of owners decision-making process. On the other hand, the owners cited the leading causes of construction projects delay to be design errors, excessive bureaucracy in project owner organization, labor shortages and lack of skilful personnel.

Also, research was conducted in Ghana by (Frank and Adwoa, 2007) to determine the factors causing delay of building construction projects in the Ghana construction industry. They carry out a survey using a semi structured interview of 15 key players in the construction industry of Ghana. A total of 32 delay related factors were determined. The most critical factors were found out to be; delay in honouring certificates, underestimation of the project cost, underestimation of project complexity, difficulty in accessing bank credit, inadequate supervision, underestimation of completion time of projects by contractors, shortage of materials, poor professional management, fluctuation of prices, rising cost of materials and poor site management.

2.4. Effects of Construction Project Delay

When construction projects are delayed, the effects are often injurious to the stakeholders. A research conducted in Nigeria stated that they studied the effects of the delay in the construction industry of Nigeria. They discovered six possible common effects arising in most countries as a result of the delay. These effects were; cost overrun, time overrun, disputes, Arbitration and litigation and total abandonment of the project.

2.4.1. Cost Overrun

This refers to the excess of the actual cost that was planned or budgeted for the project from the conception phase to the construction and finishing phase. It can be referred to sometimes as cost escalation, cost increase or budget overrun. It can also be explained as the difference between the actual cost of the project and the initial cost budgeted.

Cost overruns can sometimes be attributed to political factors. Politicians lie by either underestimating or exaggerating the benefits of projects to make it saleable and for their interests.

When construction projects are delayed, the specific and overall cost of the project will undoubtedly increase. This is because the prices of materials in the market fluctuate over time. Thus the amount that was budgeted for materials may increase when a delay occurs. Also, exchange rates will affect the prices of materials purchased from other countries, an increase in the cost of labor.

Moreover, if the delay is as a result of changes in the design, then the cost of the project will increase because the new design will be more expensive than the initial. And finally, the evolution of government policies over time will also lead to a cost increase of the projects mainly due to the rise in tax rates. However, the above mention points will be valid and feasible if the project is delayed for one year and above.

2.4.2. Time overrun

This is one of the most common issues in the construction industry. It can be defined as the failure to complete a project within the estimated time (Ahmed et al., 2012). It can be used as a tool for qualifying a project as a failure. The most significant factors were design changes, poor labor productivity, inadequate planning and resource shortages.

When the issue of time overrun occurs, the project completion time will be further extended beyond that which was estimated. The tendency is that it will lead to dissatisfaction by the owner or the clients. Sometime the contractor may lose the project as he will be seen as incompetent.

2.4.3.Arbitration and Litigation

Litigation is a court case that occurs amongst project stakeholders or participants in an attempt to settle an existing dispute. On the other hand, Arbitration occurs when in an attempt to settle a dispute amongst project participants, a third party known as an arbitrator is involved without going to the court. According to these two phenomena are inevitable and seem to be part of construction projects.

These phenomena often come into play when there is a delay in the project, and there is a dispute as to the cause of the delay and who to assume the responsibility and claim charges. If any one of the stakeholders is not satisfied, then he will be forced to file a suit against others. The overall effect is that it will further delay the project more and increase the cost, including the cost of hiring an arbitrator or an Attorney.

2.4.4.Project Abandonment

Project abandonment can be referred to as putting a stop or an end to an ongoing project due to many difficulties and constraints or problems faced during the phases of the project life cycle such that it becomes impossible to continue at that time. Many construction and non-construction projects have been abandoned at various stages of their life cycle, thus causing a significant amount of losses to the stakeholders. To the owner or client losses in terms of capital and other resources, including time. To the contractors and consultants losses in terms of time and wastage of expertise — usually, most projects abandoned as a result of the too much-prolonged delay. The contractors, consultants or owner can leave the projects. Project abandonment often results from inadequate planning, inadequate finance, inflation, delayed payments political factors, incompetent management, wrong estimates, design and poor cost control and above all dispute amongst stakeholders.

2.5. Construction Project Risks

Construction risks can be defined as those factors that pose as threats and problems to the overall project completion and hinders or impairs the achievement of the project's objectives that are having significant negative impacts on the scope, costs, schedule and quality of the project. Risks can be clearly distinguished from uncertainty in that uncertainty cannot be quantified, whereas risks can be quantified.

The potential sources of construction projects risk could include unforeseen circumstances and problems related to the construction company's changing profit margin, competitive bidding process, weather conditions, job site productivity, political situations, inflation, contractual rights and market conditions. Construction risks can also be classified in numerous ways by types the origin or source as well as the project phase.

Table 1. A variety of risks

Risk Events	Risk Conditions
Imperfect start of integrated Project Management in relation to the life cycle of the project	Insufficient planning, integration or allocation of resources. Insufficient or no post project review
Inaction or wrong action due to incorrect information or communication	Carelessness in communicating. Wrong handling of complexity. Lack of enough consultation with project's

	publics (both internal and external)
Strikes, terminations, organizational	Conflicts poorly managed
Contractor insolvency	Unenforceable conditions, Incompetent or financially deficient workers/contractors.
Claims settlement or litigation	Adversarial relations, Inappropriate or unclear contractual, Inappropriate or unclear contractual assignment of risk.
Impacts of accidents, fire, theft	Errors in calculation, including estimating uncertain conditions.
Unpredictable price changes.	Inadequate investigation of unforeseen circumstances Low productivity, cost or change control. Poor maintenance, security, purchasing
Changes in the work scope to meet the specific objectives of the project	Insufficient planning or planning lead time. Poor definition of scope breakdown, or work packages. Inconsistent, incomplete or unclear definition of quality requirements, Inadequate scope, control during implementation.

2.6. Risks Break Down

In general, risks associated with construction can be grouped based on their origin and impacts on the objectives of the construction projects. These can be external, internal and legal. This is represented Figure 1.

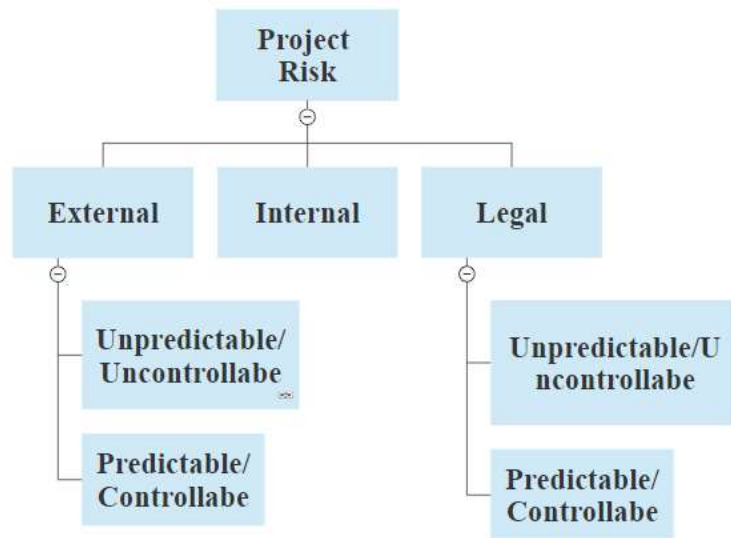


Figure 1. Project Risk Breakdown

According to the breakdown of risks sources, construction project risks classified as internal, that is risk arising from within the project itself, or external that is risks arising from outside the project. External sources could include; legislative, political, economic, social as well as natural. Meanwhile internal sources could be; contract, technological, organizational, resources, and human factors. All this factors is represented in Table 2.

TABLE 2 Breakdown of risk resources

EXTERNAL SOURCES- outside the project		INTERNAL SOURCES- inside the project	
LEGISLATIVE	Local regulations Permits And Agreements	Contract	Unrealistic Deadline Unrealistic Price Other contract provisions
	Law Changes Standards		TECHNICAL
POLITICAL	Policy Changes Elections		Delay Incompleteness Imprecision Poorly chosen technology Obsolete Technology
	War Existing Agreement		
ECONOMICAL	Economic regulations	RESOURCE	Shortage of workers Shortage of machinery Machinery Breakdowns Late delivery of materials
	Price rises Exchange Rates Financing Conditions		
SOCIAL	Climate	Human	Productivity

Soil Natural disasters	Factors	Sick leaves Motivation
---------------------------	----------------	---------------------------

2.7. Mitigating Construction Delay.

As earlier mentioned above, a construction project is commonly classified as successful when the objectives of the project are attained that is the project is efficiently and effectively completed within the specified time and budget without compromising quality. Mitigation or elimination of construction projects delays implies minimizing or eradicating those unfavorable or negative factors that can hinder or pose as threats which will interfere with the project completion within the allocated time and budget and quality as well.

Researchers cited that implementation of adequate planning during the inception and design phases of the project can be a strong measure of avoiding delay during the construction phase. In another survey was conducted by (Nguyen, 2004) in an attempt to establish measures to minimize delay in large construction project in Vietnam. He recommended five important measures were; availability of sufficient resources, multidisciplinary or competent project team, competent project managers, accurate first cost estimates and accurate initial time estimates.

In addition, it was also found out two major ways of avoiding construction delays (time overrun) to be acceleration of site activities and contingency allowances. The enforcement of liquidated damages and offering of incentives for early completion were also strong measures suggested to improve construction project situations. The researchers pointed out the following measures, sufficient and readily available financial resources until completion of the project, selecting highly skilled consultant and reliable and competent contractors to carry out the project.

Other measures of mitigating construction delay identified from the literature are represented in Table 3.

Table 3. Methods of Avoiding or minimizing Delays.

S. No.	Methods of Avoiding or Minimizing Delays
1	Accurate initial cost estimates
2	Adopting a new approach to contract award procedure by giving less weight to prices and more weight to the capabilities and past performance of contractors.
3	Perform a preconstruction planning of project tasks and resource needs
4	Selection of a competent consultant and are liable contractor to carry out the work.
5	Allocation of sufficient time and money at the design phase
6	Resource Availability
7	Commitment to projects
8	Competent project manager
9	Comprehensive contract documentation
10	Ensure adequate and available source of finance until project completion
11	Frequent progress meeting
12	Enforcing liquidated damage clauses
13	Offering incentives for early completion

14	Hire an independent supervising engineer to monitor the progress of the work
15	Multidisciplinary/competent project team
16	Make use of current technology
17	Absence or less bureaucracy
18	Accurate initial time estimates
19	Adopting new approaches to contracting such as Design-Build (D/B)
20	Construction management (CM) type of contracts
21	Awarding bids to the right/experience consultant and contractor
22	Clear information and communication channels
23	Developing professional and skilful of human resources in the construction industry through proper training and classifying of craftsman.
24	Effective strategic planning
25	Ensure timely delivery of materials
26	Proper emphasis on past experience
27	Community involvement
28	Systematic control mechanism
29	Acceleration of site activities
30	Contingency allowance.

RESEARCH METHODOLOGY

3.1 Introduction.

This chapter comprises the method and the design that was used to conduct the research. It was quantitative research in which the data was collected using questionnaires. The population was made of clients, contractors, and consultants who were selected by random sampling and convenience sampling technique. Also, this chapter presents the questionnaire design, the different sections of the questionnaires.

3.2 Research Design

The research was designed to get opinions from clients, consultants and contractors of construction companies in regards to the factors causing delays, effects of delays, as well risks associated with construction delays. The possible causes, effects and risks of delays were identified from the literature and these factors were tested with the stakeholders of the Indian construction industry.

A total of 30 delay factors were identified from the literature and the stakeholders of the Indian construction industry were asked to give their opinion on these causes in the form of ranking.

3.3. Population and Population size

The population was made of consultants, contractors with over 7 years of experience in the construction industry and private clients or owners. Moreover, all respondents had attained tertiary education. This implied the high position, lengthy years of work experience and educational background provided our respondents with enough knowledge of the construction industry with issues relating to causes, effects and risks of construction delay.

The population size consisted of 50 respondents, which included 15 contractors, 15 consultants, and 20 clients. The population size was limited to this number to effectively maximize the time and cost allocated for the research since the questionnaires had many questions and will be time consuming which might discourage some respondents from participating. Also the wide nature of the questionnaire may not be within the competence of some construction stakeholders.

3.4 Questionnaires

In order to determine the perception of different stake holders in Indian construction industry regarding factors causing delays, a questionnaire was developed. This was the main tool that was used to collect the data from our target respondents. The questionnaire form was created on Google form and distributed to the respondents. The questionnaire was structured into 3 sections to meet the research objectives.

- Section A had question to determine the respondents' background.
- Section B was to designed to get the opinions of construction stake holders regarding causes of construction delay.
- Section C questions were design to ascertain the effects of delay.

A total of 50 questionnaires were prepared and sent via emails to consultants, contractors and private clients in India. Telephone interviews were also conducted with some contractors and consultants to get their opinions on mitigating construction risks associated with delays. Out of the 50 questionnaires, 15 were sent to contractors, 15 to consultants and 20 private clients. All questionnaires were returned via emails after 3 weeks. The results were then obtained and analyzed using statistical tools.

For the factors causing delays and the effects of delay, the questions were design based on the 5 point Likert Scale which measures from 1–5 according to the level of contribution and impact of each factor.

Strongly Agree	(5)
Agree	(4)
Moderate	(3)
Disagree	(2)
Strongly Disagree	(1)

Based on the study design, the questionnaires were sent to the respondents only through emails and there was no physical contact with them. Follow up was done via phone calls to constantly remind them on the importance to participate in the survey and also crucial nature of the time line to resend the questionnaires. Only questionnaires that were fully completed were accepted. Those partially filled were not considered for the analysis.

RESULT AND DISCUSSION

4.1 Introduction.

This chapter presents a series of statistical tests and analysis carried out for the factors of each of the sections. These include the causes of delay, effects of delay, the risks of delay as well as ways of mitigating delays. It also presents the results of the questionnaires which were carried out using the SPSS. The results are represented using tables and descriptive statistics such as the bar charts, pie charts, and the mean.

4.2 Participants job positions.

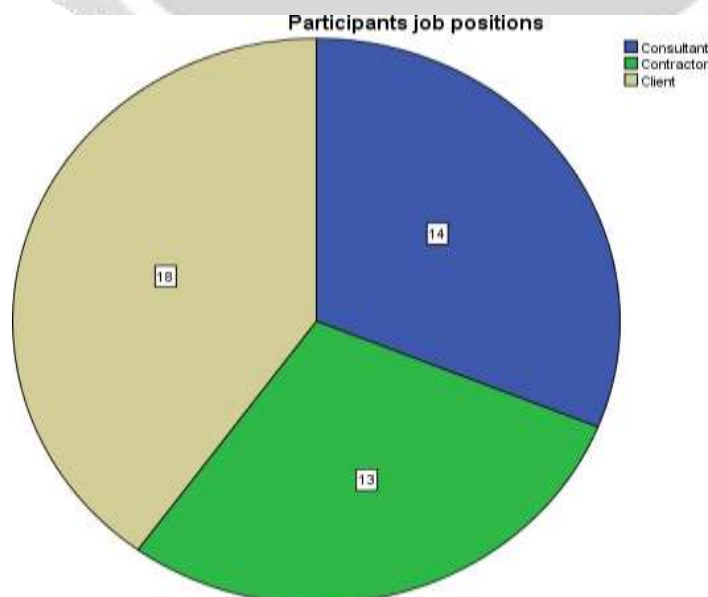
The results indicate that out of 50 questionnaires that were distributed, 45 were successfully completed and returned. Of the 45 questionnaires returned, 18 (36%) were answered by Clients, 14 (28%) were responded to by Consultants and 13 (26%) were answered by Contractors.

Table 4 The Job Distribution of Participants

Job Profile	Frequency	Percent	Percent Valid Percent	Cumulative Percent
Consultant	14	28	31.1	31.1
Contractor	13	26	28.9	60
Client	18	36	40	100
Total	45	90	100	100

The representation of Job distribution of participant in form of pie chart is shown in figure 2.

Figure 2 Job distribution of participant



4.3 Factors causing Construction delay.

To analyze the results of the factors causing delay, SPSS was used to calculate the mean of distribution of each factor. The factors were then ranked based on the frequency of response by the respondents. The factors that scored the highest mean were ranked top factors that cause delay in the building construction. This is represented on the table below.

Table 5. List of factors causing construction delay

Clients	Consultants	Contractors
Fluctuation of prices	Inaccurate time estimation	Errors during construction
Shortage of materials	Improper planning	Old technology
Delays in payment to contractors	Design changes	Late delivery of material
Compensation issues	Inaccurate cost estimation	Incompetent contractors
Funding problems	Project schedule changes	Inadequate contractor's experience
Shortage/Late delivery of material	Poor understanding of the Project	Incompetent project team
Contractual claims	Acts of God	Accidents during construction
Government interference		Multiple projects by contractors
		Inappropriate construction methods
		Conflicts among the involved parties
		Rework due to errors
		Delays caused by subcontractors
		Poor site management
		Skills shortage / unavailability

4.3.1 Kruskal Wallis H Test.

The Kruskal Wallis test was carried using SPSS to determine if there are significant differences between the delay factors caused by clients, contractors and consultants. The results were reported as shown on Table 6.

Table 6 Kruskal Wallis H Test Ranks

Project	N	Mean Rank
Clients	18	32.50
Consultants	14	21.5
Contractor	13	20.5
Total	45	

Table 7. Descriptive statistics of factors causing delay

Descriptive Statistics			
Factors	N	Mean Score	Rank
Acceleration losses	45	3.64	1
Cost overrun	45	3.64	1
Time overrun	45	3.33	2
Disputes	45	3.20	3
Negative social impact	45	3.18	4
Litigation	45	3.11	5
Bankruptcy	45	3.04	6
Total abandonment	45	3.00	7
Create stress on contractor	45	3.00	7
Arbitration	45	2.76	8
Idling resources	45	2.76	8

4.3.2 Discussion

1. Acceleration of losses.
When construction projects are delayed, the organization loses a lot of money and time in terms of increase cost and not being able to meet with its customers demand.
2. Cost overrun.
This is one of the most common effects of construction delays. Delay in construction might lead to an increase in price of construction materials as well as price of labor.
3. Time overrun.
Delay will cause the project to fall behind schedule. This is detrimental to the owner because he might not be able to meet up with his objectives on time.
4. Disputes
Conflict will arise amongst project participants as to who will bear the responsibilities as a result of the delay.
5. Negative social impact.
Delay in many community construction projects will have negative effects on the social structure such as riots strikes and boycott.
6. Bankruptcy
When construction projects are delayed possibly due to finance, the organization will utilize most of its assets in order to complete the projects. If the delay persists, in attempt to finish the project, the company may run out of cash.
7. Litigation.
If there is no agreement amongst the project participants as to who will bear the responsibilities of the project delay, either of them may file a law suit against each other
8. Total Abandonment.
Prolong project delay might lead to abandonment by the owner or contractor. This may be due to inadequate finance or expertise to successfully complete the project

4.4 Risk Of Construction Delay

The result obtained was analysed using SPSS. The mean score of each of the factor was calculated and a ranking was done based on the mean values to observe the most predominant risks of construction delays according to the respondents. The factor with the highest mean was considered the most common risk of construction delay in the Indian construction industry.

Table 8. Descriptive statistic for risk of construction delay.

Descriptive Statistics			
Risk of Construction Delay	N	Mean	Rank
Too much Pressure	45	3.89	1
Price Inflation	45	3.80	2
Disputes	45	3.60	3
Project Abandonment	45	3.56	4
Overall cost increase	45	3.56	4
Decline in Revenue	45	3.56	4
Arbitration	45	3.27	5
Loss of Confidence	45	3.20	6
Litigation	45	2.98	7
Change of Contractor	45	2.89	8

4.4.1 Discussions

1. Too much pressure.

This is a major risk that arises as a result of project delay. When projects are delayed, the owner mounts too much pressure on the contractor and his team. The end result is a poor quality job by the contractor in order to meet his clients demand.

2. Price Inflation.

The prices of construction materials fluctuate over time. As such if construction projects falls behind schedule, there is a tendency that the material prices will increase.

3. Disputes.

Conflict will arise amongst project participants as to who will bear the responsibilities as a result of the delay.

4. Total Abandonment.

Prolong project delay might lead to abandonment by the owner or contractor. This may be due to inadequate finance or expertise to successfully complete the project.

5. Cost increase.

This is one of the most common effects of construction delays. Delay in construction might lead to an increase in price of construction materials as well as price of labor.

CONCLUSION AND RECOMMENDATION

5.1 Conclusion:

The consequences of delay in a construction projects are always negative thus delay should be avoided at all cost. To avoid construction delays, it is imperative for project participants to first of all identify the possible factors that can cause delay and label them as critical success factors. Once these factors have been identified, suitable preventive measures can also be put in place to counter the negative effects that may arise as a result of their occurrence

Based on our research in the Indian building construction industry, I discovered the top 10 most common causes of delay. These were;

- Fluctuation of prices of construction materials
- Shortage of materials
- Inaccurate time estimation
- Errors during construction
- Improper planning
- Delay in payment to contractors
- Compensation issues
- Design changes and inaccurate cost estimation.

It was observed that majority of the delay factors are Contractor and Consultant related, while the client also play a role in the delay in terms of compensation issues and design changes and delay in payment of contractors.

As for the effects of delay in Indian construction industry, the 5 top most common effects were:

- Cost overrun,
- Acceleration of losses,
- Time overrun,
- Negative social impacts.
- Litigation.

As it was earlier mentioned, different countries will experience different causes of building construction delay, different effects, and different risks and will apply different measures to eliminate those risks that are suitable for that particular country. In India the top 8 most common measures of eliminating construction delays are as recommended by projects participants were observed to be:

- Information sharing,
- Total Quality Management (TQC),
- Quality cycles,
- Benchmarking,
- Joint risk management,
- Continuous trainings,
- Automated material tracking
- Early involvement of contractor and subcontractors

India is a developing country that lacks the resources needed to successfully complete a building construction project within the allocated time and budget. This has had adverse effects on infrastructural development aspect of the economy. Therefore, it is not doubtful that the government and private institution keep spending huge amount of money on construction projects which are later delayed and some abandoned.

5.2 Recommendations.

Building construction delay is an inevitable phenomenon that occurs in almost every country due to a combination of the factors investigated above. However construction delays turn to be very common occurring now and then in most developing countries especially countries in Africa. This may be due to lack of in adequate financial resources to successfully complete projects on time. It could also occur as a result of natural disasters or environmental hazard that is very common in most African countries. In addition it could also be due to lack of technical expertise, poor construction skills and labor intensive as oppose to capital intensive in developed countries. African countries are also seen as a hub for corruption which can also answer the question why delay in construction is mostly common in these countries. Another very obvious reason could be the shortage of material supplies since most African countries don't produce their own building materials. Majority are being imported from other countries.

Taking all the above mentioned points into consideration and in order to reduce or mitigate these delay factors, I therefore recommended the following measures to be implemented in India.

- Setting up factories to produce building construction materials in the country. This will reduce the chances of delay occurring due to shortage of materials since there will be a constant flow of materials supply. The time taken for the materials to leave the manufacturing base to the construction will also be shortened. Finally the cost of the materials will be reduced as there will no tax levied on imports and excised duties.
- The government in collaboration with other stakeholders should invest heavily in human capital development by training construction workers with the right technical skills to become efficient. With this kind of measure in place India can construct quality infrastructure without seeking costly assistance from companies. In addition it will make the country to be more competitive in the global market.
- The government should also ensure that project bidding should be based on experience and expertise in a particular area and not full of cronyism. With this in place it implies the best company will get the project and will be completed within the time allocated without any delay.

I also strongly recommended future researchers who wish to investigate on this area of study related or closely related to India, should focus on building construction projects in other parts of the country since this was limited only to the states of Uttar Pradesh city namely Kanpur, Lucknow and capital city New Delhi. Moreover, the sample size was also small so future researchers could take a bigger sample size in order to produce a more valid results

REFERENCES

- Ahmed, S.M., Azhar, S., Kappagtula, P., Gollapudil, D. (2003) 'Delays in construction: a brief study of Florida construction industry', Proceedings of the 39th Annual ASC Conference, Clemson University, Clemson, SC, 257-66.
- Assaf, S.A. AlHejji S. (2006) 'Causes of delay in large construction projects', International Journal of Project Management,
- Ayodele Elijah Olusegun and AlabiOlumuyiwa Michael, 2011. Abandonment of Construction Projects in Nigeria: Causes and Effects. Journal of Emerging Trends in Economics and Management Sciences (JETEMS) 2 (2): 142-145 © Scholarlink Research Institute Journals, 2011 (ISSN: 2141-7024) jetems.scholarlinkresearch.org.
- Ahmed, S., Azher, S., Castillo, M. and Kappagtula, P. (2002) Construction delays in Florida; an empirical study, Florida, 2002.
- Assaf, S.A. and Al-Hejji, S.A. (2006) 'Causes of delay in large construction projects', International Journal of Project Management.
- Faradi, A.S. and El-Sayegh, S.M. (2006) 'Significant factors causing delay in the UAE construction industry', Construction Management and Economics.

- N. Mansfield, O. Ugwu, T. Doran, Delay causes and cost Over runs in Nigerian construction projects, International Journal of Project Management.
- Palalani, K. (2000). Challenges Facing the Construction Industry: A Botswana Perspective. Proceedings of the 2nd International Conference on “Construction in Developing Countries: Challenges Facing the Construction Industry in Developing Countries.
- Ram Singh, 2009. Delays and Cost Overruns in Infrastructure Projects: An Enquiry into Extents, Causes and Remedies.

