



A Research Paper on Analysis of Construction Delays and Their Impact on Project Completion Time and Cost

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Abstract: This study intends to examine the reasons for construction delays and their effects on the cost and schedule of project completion. The study will look into a number of factors, including weather, labor shortages, changes in design, and material availability that affect building delays. Furthermore, the study will investigate the direct and indirect effects of these delays on the time and cost required to complete the project, including higher labor costs, longer project durations, and possible fines. The results of this study will offer insightful information on how crucial it is to control construction delays well in order to reduce their detrimental influence on project outcomes.

In the construction industry, delays in construction are a frequent occurrence that have a major impact on the cost and time required to complete projects. The objective of this research is to examine the reasons behind construction delays, their consequences, and how they affect the cost and schedule of project completion. Statistical analysis, survey and interview data collecting, and a thorough literature review comprise the research approach used. An overview of the several variables that affect construction delays is given by the literature review, which includes modifications to the design, unfavorable weather, a shortage of materials, low labor productivity, and poor project management. The many kinds of delays, including excused and non-excusable delays, as well as their legal ramifications, are also covered in the study. Professionals in the construction industry, such as project managers, contractors, and subcontractors, are surveyed and interviewed in order to gather data. To determine the main reasons for delays and how they affect the duration and expense of the project's completion, the gathered data is statistically examined using techniques like regression analysis and correlation analysis. According to the study's findings, design modifications, insufficient project planning, and a lack of coordination among project stakeholders are the most frequent reasons for construction delays.

Index Terms - Construction Delay; Sorts of Delay, Factors affecting Delay, Regression analysis, Causes of Delay etc.

1. INTRODUCTION

The development business assumes a fundamental part in the turn of events and development of economies around the world. In any case, development projects are frequently tormented by delays, prompting inflated costs, compromised quality, and delayed project fruition time. As the interest for framework projects keeps on rising, it becomes vital to comprehend the causes and results of development delays. The reason for this task is to lead an extensive investigation of development delays and their effect on project consummation time. By exploring the variables that add to delays and their ensuing impacts, we intend to give important bits of knowledge and proposals to development industry partners, including project directors, workers for hire, and policymakers.

Development postponements can emerge from different sources, including outer factors like unfriendly atmospheric conditions, administrative issues, or unexpected occasions like catastrophic events. Interior variables inside the actual undertaking, for example, defers in material obtainment, plan changes, or work deficiencies, can likewise essentially affect project plans. Understanding the mind boggling exchange of these elements is fundamental for successfully overseeing and moderating postponements.

The outcomes of development delays reach out past the undeniable postpone in project culmination. Delays frequently bring about inflated costs, as extra assets might be expected to address the postponements or moderate their effect. Also, deferrals can prompt authoritative debates, harmed connections among project partners, and negative reputational impacts for the workers for hire included. Thusly, it is basic to recognize the critical reasons for delays and examine their ensuing outcomes to foster powerful systems for avoidance and relief.

To accomplish the targets of this task, we will utilize a diverse strategy. It will include an exhaustive writing survey, information assortment through studies and meetings with industry specialists, investigation of important undertaking information, and the use of measurable instruments and methods for information understanding.

2. LITERATURE REVIEW

2.1. Reasons for Postpone in Development Undertakings (Zayyanu Mohammed,et al)

Purposes behind concedes in improvements project which were broke down considering six key game plans: the time apportionment of the articles, where the articles were made, article type, which journal distributors were taken on by the articles research methods used and the subjects explored in the articles. The revelations showed that the expanse of land with most important articles on purposes behind delay being developed tasks is Asia. The majority of the articles examined were observational studies, and less interviews were conducted as part of the study strategy. In order to conduct a comprehensive survey on the reasons for deferment in development projects, future research should also focus on basic research and reasonable work, supporting their research with an impressive hypothetical structure technique.

2.2. A Cross-Sectional Analysis of the Pakistani Construction Industry to Determine the Effect of Delays on Project Costs .(Raza Ali Khan,et al)

The delay causes, for instance, Plan changes by client or his agent during advancement, change orders, Lacking assignment organizing and booking are most fundamental in making misfortunes. Modify in view of goofs can be restricted by enlisting capable and experienced project laborer and master. A precise assessment of the quantity and duration of the material's conveyance can limit deficiencies and late conveyances.

2.3. Time Overwhelm in Development Ventures of Emerging Nations (Muhammad Akram Akhund,et al)

The improvement of time overpowers causes both concentrated and project the chiefs related factors. This improvement may moreover work on account of human points of view, direct, capacities and mentality. The issue of time overpower being developed ventures has been certain for quite a while. It has so many different effects that it causes any nation's plans to be put off until the very end.

2.4. Evaluation of the Major Causes of Construction Delays (Abdullahi Ahmed Umar,et al)

It discovered that the primary causes of delays were inadequate preparation and planning, erroneous board oversight, varieties and change orders, and unfortunate site. The outcomes of this study differentiated generally from all of the four earlier Oman-set up examinations regarding the subject. Getting ready tasks to chip away at the capacities of specialists ought to be considered and coordinators ought to be viewed as responsible for defective or absurd preparation.

2.5. Concentrate on Development Undertaking Postpone Investigation: Time Defer Examination. (Ar. Meena. V,et al)

Outside factors, financial difficulties, a lack of work, ineffectiveness at work, owner obstruction, and subpar organization are the primary causes of concede, which are reaffirmed in virtually every assignment. Coming about to dismantling the information plainly the obligation of Worker for utilize in deferral of the improvement project is high then, at that point, trailed by client then, at that point, ace side and others. Resource task is the principal model for making an arrangement that means to dispense a term for every development that is associated with the undertaking to decrease improvement project delay.

2.6. Analysis of Delays in Construction. (Pramen P. Shrestha, et al)

The disclosures showed that looking at schedules and understanding reports was a basic resource while settling a defer ensure. The owners frequently recognized the defer guarantee and inquired about its legitimacy and price. The concentrate likewise distinguished steel, cement, and unearthing subcontractors as the best three subcontractors with whom respondents managed the most when it came to postpone claims. The study showed the supernatural supervisors in the process as the proprietor, progression boss, and legitimate guides. The disclosures of this study shed a light to the cycles and data expected to dismantle and choose a case. This study will be helpful to industry workers since it will help them in getting the fundamental information and handling it. It is recommended to conduct additional research on the postponement guarantee system in order to fully comprehend the approach that the development companies are taking with regard to the examination of defer claims.

2.7. Effects of Construction Delays on Project Cost and Completion Time.(Jagannath Daripa ,et al)

Every construction project has delays, and each project's level of delay differs greatly from the next. While some projects take longer than a year to complete, others are just a few days behind. Therefore, in order to reduce and prevent delays in any construction project, it is imperative to identify the true causes of the delays. Divergent opinions exist regarding what exactly causes engineering and construction projects to take longer than expected. A number of them are related more to systemic flaws or shortcomings than to any particular entity or groups; some can be attributed to a single party, while others can be attributed to multiple sources. A methodology requiring good technical judgment is necessary for the successful completion of building projects and for keeping them within budgeted amounts and timetables. Examining client-related construction project delay causes in terms of their individual and combined effects was the goal of this study, given the expensive and common examples of construction project delays in KSA. Aiding the government (as a client of the public sector) in accomplishing its Vision 2030 objectives is the driving force and anticipated reward.

3. CONSTRUCTION DELAYS

Development delays are a typical event in the development business and can fundamentally affect project finish time and cost. Understanding the circumstances and end results of these deferrals is urgent for project supervisors and partners to design and moderate potential dangers successfully. This examination means to investigate the different variables adding to development delays and their ensuing effect on project fruition time and cost.

Improvement delays are a regular occasion in the improvement business, and they can generally influence project schedules and monetary plans. The complexity of the project, the availability of resources, and the weather are all factors that can influence the duration and frequency of these delays. One of the most common causes of development delays is a lack of skilled workers.

3.1. Definition and Kinds of Development Deferrals

Improvement deferrals can be defined as any event or circumstance that alters the planned schedule of the project. These deferrals can be mentioned into three boss sorts: reasonable, compensable, and non-decent postponements. Legitimate deferrals are accomplished by factors past the endeavor expert's compass, compensable postponements are those that qualifies the errand worker for extra time and pay, while non-reasonable deferrals are the expert for select's liability.

3.2. How Development Deferrals Are Arranged

Excusable Delays - Extreme weather, labor strikes, or unforeseen site conditions are all examples of excused delays that the contractor cannot prevent. These deferrals are ordinarily considered to be bona fide and may qualifies the venture specialist for an expansion of time.

Delays That Cannot Be Excused: Delays that cannot be excused are caused by the contractor's actions or inactions, such as poor project management, insufficient resource allocation, or failure to fulfill contractual obligations. These deferrals are a significant part of the time subject to disciplines and may achieve additional costs for the laborer for employ.

3.3. Delay factor identification

As it empowers partners to expect, relieve, and address potential issues that might emerge over the span of the task, distinguishing defer factors in development projects is a fundamental part of undertaking the board. Project managers can take proactive steps to reduce the impact of deferrals and ensure project success by comprehending their primary causes. I will go over the various methods used to identify factors that cause construction project delays in this comprehensive discussion.

Coming up next are the principal classifications of delay factors:

- 1) Defer factors associated with to project laborer
- 2) Consultant related defer factors
- 3) Owner related defer factors
- 4) Associated with administrations and utilities
- 5) Informal regulations related delay factors
- 6) Postpones brought about by the outside climate

4. DATA COLLECTION AND ANALYSIS

4.1 introduction

This study aims to uncover the elements influencing construction cost and time in highway execution, in response to the evident problem of cost and time overruns in the infrastructure sector. It also suggests potential methods for mitigating these growing effects. In building projects, there are numerous reasons why delays and cost overruns occur. The frequency of incidence and impact on project completion varies depending on the cause of delay and cost overrun. Certain causes might occur more frequently, but their effects might not be as severe. While some other causes might not occur frequently, they might have serious consequences.

4.2 Survey Plan

Postpone factors connected with proprietor, worker for hire, expert, administrations and utilities, unofficial laws and outer climate were remembered for the Survey. Questions connecting with each defer factor were gathered into two classes: recurrence of event and seriousness influence level, each on a four-point scale. To get an elevated degree of reaction, the accompanying focuses were considered during the plan of the Survey:

1. Covering letter was appended with Polls.
2. The kind of examination and the scientist's name were referenced in the introductory letter.
3. The reason and the advantages of the review were featured in the introductory letter,
4. The members were educated that their name, office or organization name would be kept private in the examination.
5. The Survey was introduced in a shrewd and appealing plan.

4.3 Questionnaire Distribution

The Surveys were conveyed to proprietors, experts and project workers working Out in the open and confidential development businesses. For speed of reaction, the Polls were conveyed by and by and gathered the hard way. This strategy was powerful, as there was immediate correspondence between the analyst and respondent.

4.4 Regression Analysis

Here,

X= Delay

Y=Overall Average Factor

Calculation of Regression

X	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Y	2.93	2.86	2.46	3.2	3.53	3.33	3.4	3.53	3.06	2.73	3.06	3	3.2	3.13	3.06

SR NO	X	Y	X ²	Y ²	XY
1	1	2.93	1	8.58	2.93
2	2	2.86	4	8.17	5.72
3	3	2.46	9	6.05	7.38
4	4	3.2	16	10.24	12.8
5	5	3.53	25	12.46	17.65
6	6	3.33	36	11.08	19.98
7	7	3.4	49	11.56	23.8
8	8	3.53	64	12.46	28.24
9	9	3.06	81	9.36	27.54
10	10	2.73	100	7.45	27.3
11	11	3.06	121	9.36	33.66
12	12	3	144	9	36
13	13	3.2	169	10.24	41.6
14	14	3.13	196	9.79	43.82
15	15	3.06	225	9.36	45.9
N=15	ΣX=120	ΣY=46.48	ΣX²=1240	ΣY²=145.16	ΣXY=374.32

Table No. 1

N=15 , ΣX=120, ΣY=46.48, ΣX²=1240, ΣY²=145.16, ΣXY=374.32.
 The equation of the line of regression of y on x is y=a+bx where, a,b are given by,

$$\sum y = a N + b \sum x \quad \& \quad \sum xy = a \sum x + b \sum x^2$$

Putting the values of Σx , Σx² , Σxy , we get,

$$46.48 = 15a + 120b \text{ ----- eq 1}$$

$$374.32 = 120a + 1240b \text{ ----- eq 2}$$

Multiply eq 1 by 16 & eq 2 by 2 & subtract 1 from 2,

$$748.64 = 240a + 2480b \text{ ----- eq 3}$$

$$743.68 = 240a + 1920b \text{ ----- eq 4}$$

$$4.96 = 560b$$

$$b = 0.008$$

Put this value of b in eq 1

$$46.48 = 15a + 120b$$

$$46.48 = 15a + 120(0.008)$$

$$46.48 = 15a + 0.96$$

$$46.48 - 0.96 = 15a$$

$$45.52 = 15a$$

$$a = 3.034$$

The eq of the line of regression of y on x is ,

$$Y = 3.034 + 0.008x$$

The eq of the line of regression of x on y is x=a+by, where a,b are given by,

$$\sum x = a N + b \sum Y \quad \& \quad \sum XY = a \sum y + b \sum y^2$$

Putting the values of Σx , Σy , Σxy , Σy² , we get,

$$120 = 15a + 46.48b \text{ ----- eq 5}$$

$$374.34 = 46.48a + 145.16b \text{ ----- eq 6}$$

Multiply the fifth equation by 3.123 and deduct it from the sixth equation,

$$374.34 = 46.48a + 145.16b \text{ ----- eq 7}$$

$$374.76 = 46.84a + 145.16b \text{ ----- eq 8}$$

$$0.42 = 0.36a$$

$$a = 1.166$$

Enter this a value in equation 5,

$$120 = 15a + 46.48b$$

$$120 = 15(1.166) + 46.48b$$

$$120 = 17.49 + 46.48b$$

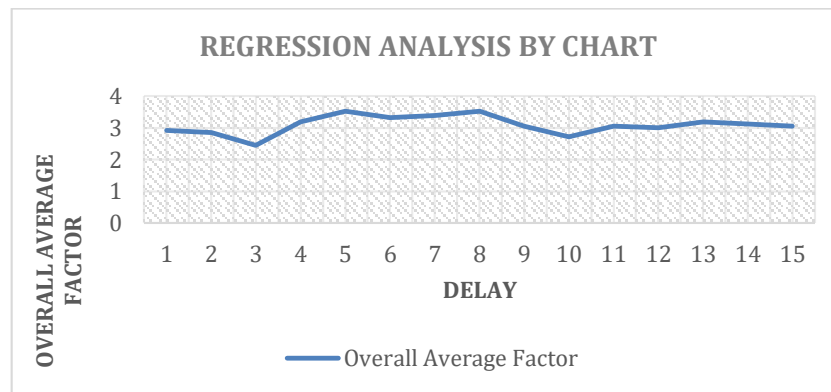
$$102.51 = 46.48b$$

$$b = 2.205$$

The line of regression x on y has the following equation:

$$X=1.166+2.205y$$

Given is a regression analysis via graph:



Graph No.1

4.5 Discussions and results

4.5.1 Reasons behind Construction Project Delays

Purposes behind Delays being developed Endeavors Positions and backslide assessment records for the critical explanations behind time overpowers and concedes according to each social occasion as well as the overall response from above examination are shown as follow. As per the view, everything being equal, the significant reasons for development project defers remembered delay for –

1. Defer in progress installments by proprietor.
2. Obstruction by the proprietor during execution activity.
3. Postpone in dynamic by the proprietor.
4. Deficiency of materials.
5. Inappropriate preparation and booking of task by worker for hire.
6. Unpracticed project worker's labor.
7. Significant difference in plan during development by advisor terrible undertaking cost assessment.
8. Defer in taking care of plan issues.
9. Terrible venture cost assessment.
10. Utilities are unidentified or erroneously found.
11. The norm of training for planners as to imparting utility data on drawings isn't plainly characterized.
12. Utility area data gave on drawings isn't clear especially for complex convergences.
13. Challenges in acquiring work licenses.
14. Land obtaining.
15. Offering framework prerequisite of choosing the most reduced bidder.
16. Blistering weather conditions impact on execution exercises.
17. Traffic redirection.
18. Shortage of materials on the lookout.

5. CONSTRUCTION DELAY MITIGATION

5.1 Mitigation Measures to Control Effects of Causes of Delays

There are many defer contributing variables that are past the proprietors and workers for hire control. Because of variety in each thruway project, there are no straightforward answers for beat delays. However, there are some that contractors and owners can both control. Information and experience from past tasks have assisted with portraying some defer causes, for example, cost and time invades. When attempting to reduce anticipated delays, the following are some of the crucial considerations that should be made by all parties:

1. To reduce delays, establish targets prior to the commencement of planning.
2. When the use of consultants increases, design plans must to be thoroughly examined.
3. Examine issues pertaining to design from previous projects.
4. Before placing a bid, carry out further on-site preparatory study and examinations.
5. Reduce disagreements during construction with parties involved by improving coordination and communication.
6. Create novel approaches to contracting.
7. Enhance the design plans' quality.
8. Use consultants and employees with experience.
9. Stress the need to meet the project's completion date.
10. Carry out constructability assessments to determine whether projects can be constructed as crafted.

The subsequent sections go over various potential solutions for resolving delay-causing causes.

6. CONCLUSIONS

6.1 General Suggestions

This work examined the postpone in roadway projects. It concentrated on the recurrence and seriousness of defer causes, as well as the recurrence of postpone impacts. The examination is a field overview through a Poll coordinated to project workers, specialists, and proprietor who is the Service of Works. It was reasoned that there are many reasons for postpone connected with project workers like Insufficient development strategy execution, Lack of materials, Installment issues among project worker and his representatives. The significant causes connected with the proprietor, for example cut, are Obstruction by the proprietor during execution activity, Postpone in dynamic by the proprietor, Defer in progress installments by proprietor. The primary issues connected with experts are because of absence of involvement. Postpone causes connected with administrations and utilities are the most basic elements as demonstrated by the high upsides of their seriousness implies. Besides, cost and time overwhelms and disturbance of traffic development were the most regular impacts of postponement.

6.2 Conclusion

All in all, the examination of development delays uncovers their huge effect on both task fulfillment time and cost. Postponements can come from different sources like climate, material deficiencies, or unforeseen site conditions. These interruptions draw out the task timetable as well as heighten costs through expanded work and above costs. Alleviation techniques like proactive booking, compelling correspondence, and hazard the executives are vital for limiting postponements and their antagonistic impacts. Eventually, focusing on effectiveness, joint effort, and flexibility can assist with alleviating the effects of development delays, guaranteeing projects are finished on time and inside spending plan.

According to the findings of this study, one of the primary causes of delays is inefficiency in project management. Inadequate scheduling, poor planning, and misallocation of resources frequently result in time overruns. Project directors should answer this by carrying areas of strength for out for project the executives that incorporate complex arranging strategies, consistent checking, and adaptable methodologies for rapidly resolving unanticipated issues.

In conclusion, construction delays have a significant impact on project completion times and costs, but they can be effectively managed through technological integration, robust risk management, and strategic planning. Stakeholders have the potential to enhance project efficiency, reduce costs, and enhance overall outcomes by comprehending the underlying causes of delays and implementing targeted measures to address them. This study stresses the requirement for ceaseless improvement and advancement in development practices to adjust to the powerful difficulties of the business, at last prompting more fruitful and manageable task conveyances.

6.3 Future scope of the project

Looking forward, there are a few construction for additional investigation and upgrade inside the task examination of development delays and their effects. Moreover, extending the extension to incorporate contextual investigations from various districts and task types could offer a more extensive point of view on the different variables impacting development delays. Additionally, incorporating continuous checking and sensor innovations on building destinations can work with early location of likely deferrals, taking into account opportune mediation and relief. Besides, investigating the financial effects of development delays, like consequences for neighborhood networks and partners, could give a more extensive comprehension of the more extensive ramifications. Finally, cultivating cooperation among industry partners, including project workers, designers, and government offices, can drive aggregate endeavors towards executing best practices and inventive answers for address development delays really.

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