



Evaluating the Causes, Effects, and Minimization of Construction Project Delays in Ghana

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ABSTRACT

Delays in building projects are a regular problem in the construction business. The frequent delays in construction projects have recently sparked many inquiries into the matter. The goal of this study was to look at the causes and consequences of project delays in Ghana, as well as what could be done to eliminate them. The research's aims are to explain the procedures put in place to ensure that projects are completed on time; to explore the consequences of construction delays; to outline the impacts construction delays have on all parties involved; and to provide strategies to reduce the effects. The data for this study were obtained using standardized questionnaires that were distributed to contractors and consultants such as architects and engineers. A total of 95 questionnaires were distributed to respondents through Google Forms, however only 67 of them were legitimate and acceptable for data analysis, yielding a response rate of 70.53 percent. The gathered data were analyzed using descriptive statistical methods, such as median and mean, with the assistance of SPSS for Windows version 21. According to the study's major results, the top three reasons of construction project delays, when rated using the relative significance index, were inadequate communication and coordination. In addition, there were two main consequences: time and cost overruns. The practical consequences of this research's findings will assist both owners and contractors in understanding the causes of building delays, as well as in saving time and money.

Keywords: Time overrun, Construction Delays, Extent, Critical, Cost Overrun, Ghana.

1. Introduction

Project completion time is a significant consideration in building. Delayed construction projects are described by Assaf & Al-Hejji (2006) as those that go over budget or finish later than agreed upon deadlines for the delivery of a project. In order to avoid costly construction delays, find out what's causing them early on. Despite the rapid advancement of technology, building projects, particularly in poor nations, are often delayed. Disruptions in construction are costly to both the general contractor and the client since they can result in lost income for the owners as well as increased costs for the contractor. There is a scarcity of data on mitigation methods to address these delay causes and impacts²

This study examines some of the primary reasons of delays in the construction sector in Ghana and other countries. The timely completion of a building project is important for efficiency reasons, yet the construction process itself is vulnerable to several variables and unanticipated circumstances. (Assaf et al, 2006). Delays can be caused by faults in designs, climates, and late material delivery, as well as user modifications. (Al-Momani, (2000).

Delays in resolving disputes can have a number of negative repercussions, including a strained relationship between the parties to the contract. The most serious issue is that it sends out negative signals to foreign investors. It's a frequent misperception that contract language is difficult and prone to misunderstandings. Assaf (2006). I will be studying the causes and effects of building delays in Ghana. I will focus more on university construction projects than on other types of construction sites because our studies are at the same stage.

The study's goal is to identify the factors that contribute to construction project delays, to investigate the causes and consequences of building delays in Ghana. The study aims to find out how to ensure that projects are completed on time and under budget, while simultaneously saving time and money.

1.1 Theoretical Framework

Building plans must include some element of risk. Risk can be managed, minimized, exchanged, moved, or even welcomed, but it can never be eliminated completely. A delay means the owner will lose money since demand and rentable capacity are low or the business would have to rely on current facilities. (Keane et al, 2008)

The Ghanaian economy relies heavily on the construction industry. 8.5 percent of the nation's total output is attributed to it (Ghana Statistical Service, 2007). In 2002, the construction industry employed around 2.3 percent of the financially secure population. Amankwa (2003). Ghana's objective is to

become a middle-income country by 2015, and the construction industry's role is important now that commercial oil has been discovered. In light of this, identifying the root causes of construction delays and developing strategies to remove or decrease them is essential (Frank D.K. Fugar et al, 2010). Ghana's construction sector is becoming increasingly important as the country strives to achieve industrial progress. Unique and innovative approaches and solutions to building sector delays are required for the government to accomplish its goals. There are several complex and uncertain variables that arise from various sources during the building process. It is important to conduct a systematic evaluation that measures the damage caused by delays on all sides of the projects.

1.2 Delay Types and Classifications

Delays in construction projects are such a significant issue that it has been studied by a number of scholars. Ahmed et al. (2003; Akshay Dashore 2016) categorized delays into two categories: internal and external causes and classifies delays into four categories: essential or non-critical, excusable and non-excusable, simultaneous and reversible. External factors - i.e., events outside the control of the parties involved - include natural calamities, government legislation, and supply providers. Naha, N.E. (2008). Construction delays are the result of bid gaming, shift order artistry, ambiguity, and post-contractual market control.

1.2.1 Delays, whether crucial or non-crucial

These include the impact on workers and equipment, as well as the costs associated with idling workers and supplies. A non-critical delay is one that is not the consequence of a longer project length but might have an influence on the timing of activities. S.M Ahmed (2000)).

1.2.2 Excusable and inexcusable delay.

Acceptable interruption happens when the contractor is granted a time extension, payment, or both within the contract's terms and conditions. In this circumstance, the contractor has no influence over the postponed operation.

1.Clause for Measuring Forces G.J Kikwasi, (2012)

2.Natural catastrophes (Tafazzoli and Shrestha, 2017)

Inexcusable delays arise because the contractor is solely accountable for the activities that have been postponed and resulted in an increase in the project's duration (responsible for crucial delays). In this instance, the contractor must bear the financial burden, including the duty to make reparation not just for itself but also for the other parties

1.Procurement Delay (Odeh and Battaineth, 2002)

2.Important papers were not submitted on time. (Arantes et al, 2015)

1.3 Root Causes of delays

There is a plethora of research on building delays and their detrimental effects on project completion and business results Al Rizeiqi, R.K., Umar1, A.A., and Badr, A., (2020) Main drivers of postponement might be resolved during interviews with specialists including the workers for hire. Sometimes, the driving force isn't attributed to a single person or group, but rather emerges from continually hearing about the same issues (IA Majid, (2006)

In Algeria, a study by Jagboro, G., O and Aibinu., A, A. (2002) looked at the main reasons for project delays. The three most common reasons of delay were identified: "slow change orders," "slow deviation orders in additional volumes," and "work begins prior to design conclusion." In order to prevent a stop, the customer must have adequate economic power and financial provisions for the project, as well as make the appropriate timing choice.

Poor site management and other reasons contributed to building delays in Malaysia. According to Naha, N.E. (2008) the most prevalent reasons of delays were variations and modification orders. Even while the results differed significantly from four prior Oman-based studies on the issue, they were very similar to the global list of the ten most common stressors (G.J Kikwasi, (2012)

The main cause of all of these issues is a lack of engagement and collaboration among project members. Assaf and Al-Hejji (2006) identified 73 reasons of construction project delays in Saudi Arabia. According to all stakeholders, the most common cause of delay was modification orders. Almost 70% of the projects, according to the authors, incurred time overruns.

Major risks in the UAE construction sector include inflation and rapid price fluctuations, as well as material and labour supply shortages. Owner risks, such as unrealistic construction timelines and design modifications, are also serious concerns. According to Kumar, D.R (2016), who performed a survey on 130 public projects in Jordan, the biggest reasons of delay are poor design and negligence on the part of the owner. According to calculations, the average delay in Iran is 5.9 months per year, with a 15.4 percent cost overrun. Parchamijalal et al. (2017) investigated the causes of building project delays and cost overruns. A statistical model was created to quantify the relevance of each delay component.

Financial group concerns are the most important factors driving building project delays in Ghana. A delay in honoring payment certificates, problems getting credit, and pricing changes were among the financial group issues. The materials group comes in second, followed by scheduling and regulatory aspects. There were 32 plausible explanations for the delay identified. Fugar and Agyakwah-Baah (2010) are authors.

Tafazzoli and Shrestha (2017) explored the reasons of building project delays in the United States. They discovered that design flaws, modification orders, time-consuming owner decision-making, and problems in contract documentation were the leading causes of construction delays in the United States. The criticality of the reasons was determined using the relative significance index approach.

1.4 Effects of Construction Delays

Jagboro and Aibinu (2002) evaluated the effects of development delays on project delivery in the Nigerian construction industry. The six effects of deferral discovered were as follows:

- a) Inadequate planning by contractors, inefficient site monitoring by contractors, insufficient project management competence of contractors, and delays in payment for finished work all have a direct influence on project completion and cause time overruns.
- b) Cost overrun; The most major effect of project delays in Ghana is cost overrun, which is simply defined as exceeding a project's planned budget or cost. Cost overruns are commonly caused by inaccurate cost estimates, unrealistic project design, inadequate planning relative to allotted length to project activities, and scope changes.
- c) Complete abandonment; the fourth most significant result of project delays in Ghana was clients' lack of consistency. One of the most severe consequences of delays is a loss of project continuity. There is evidence of stalled public-sector activities in Ghana due to a lack of government financing. According to SSNIT (2013), because to a lack of funds, 4,700 government affordable housing units around the country have been delayed.
- d) Dispute; Project participants frequently utilize litigation as a last resort to resolve differences (Sambasivan and Soon, 2007). Litigation is sometimes precipitated by the absence of ADR provisions in contracts or by protracted ADR processes. Arbitration is the employment of a third party to amicably resolve project difficulties rather than going to court. Arbitration is frequently necessary owing to difficulties such as ambiguous contract clauses and a lack of understanding of contract agreements by all players. Arbitrations in client, consultant, labor, and contract-related conflicts, according to Sambasivan and Soon (2007), result in project abandonment. Some reasons generate a general setback for the development task, for example, some are the project employees' responsibility and some are at the risk of the owner. Postponement suggests a lack of money and inaccessibility of the proprietor's offices. Deferred issues are commonly used to justify discussion, trade, claim, total departure, case, and capitulation. (2008) (Naha, N.E.).

Z. RACHID et al. uncovered 28 different causes and six different effects of delay. Improper contractor planning, bad contractor site management, issues with subcontractors, material shortages, labor supply, equipment availability and failure, lack of communication between parties, and blunders during the building stage were the ten most important reasons. Sambasivan and Soon (2007) employed an integrated technique to investigate the impact of individual sources of delay on specific outcomes.

Despite the fact that the vast majority of research focus on the causes of delay rather than the effects, numerous analyses identify potential connections between causes and consequences. In Nigeria and Ghana, Mansfield et al and Frimpong et al established a relationship between delay causes related to the engineer, oversight, materials, and time and cost invades. According to research, the motivations for and effects of delaying development efforts differ based on the type of project and the location of the project.

1.5 Techniques for reducing construction delay time .

How much a Proprietor may collect from a Worker for hire in unpaid pay, is mainly determined on how the development contract was drafted. Avoid delaying progress payments to the contractor since it will have an influence on his capacity to fund the job. Utilize fitting development techniques, achieving success in the planning of the funeral, appropriately acquiring material and Transparency in data and correspondence.

Kumar, D.R., (2016) Construction projects should have a clear scope, a comprehensive feasibility analysis, and as accurate early cost and schedule estimates as possible. The interval between the design phase and the effective start of work should be maintained as short as possible. Training programs in scheduling, time and cost control, information systems, and human resource management are urgently needed.(Assaf, 2006).

Delays have a negative impact on all parties involved in construction projects. To improve project execution, all stakeholders must collaborate. Construction projects must be carefully planned and scheduled. Inspections should be carried out at appropriate periods throughout the project's execution. To ensure the successful completion of these initiatives, government authorities should develop a detailed strategy. (Long, 2008).

1.6 Liquidated Damages

Liquidated damages provisions are commonly included in construction contracts to encourage adherence to time requirements, such as task completion and prompt payment. If the work is not completed by the extended completion date, liquidated damages at the daily rate provided in the schedule shall become due and payable. The maximum amount of damages owed is established, and a party may consider this during the first negotiations

1.7 Ghana's legal environment for building construction

As defined by Toufik et al (2019), when one party fails to fulfill their obligations or accept the performance of the other party within the agreed timeframe, it constitutes a breach of contract. In such cases, the law provides protection to both parties involved in a building contract when there is a delay. Contract law offers the following remedies to ensure the construction customer is safeguarded from project delays: the option to cancel the construction contract and seek compensation.

Cancellation of the construction contract is a drastic measure that may not be readily available to the building client unless the breach is significant. Typically, in most situations, the construction customer relies on seeking damages as a remedy to mitigate the negative effects of the delay. Damages can be pursued independently or in conjunction with a claim for cancellation. Smith J C (2002) explains that the purpose of damages, to the extent that monetary compensation can achieve it, is to place the party who suffered from the breach in the same position they would have been in if the contract had been fully performed. The key question is: How much better off would the injured party have been if the contract had been completed?

To determine the monetary value of the damages, an evaluation of the difference between the current financial state of the injured party and the hypothetical scenario where the contract was fulfilled is necessary. Smith J C (2002) provides an example to illustrate this: If a seller refuses to deliver goods and similar goods are available in the market, the buyer can purchase them and then claim from the seller the difference between the contract price and (assuming it is higher) the market or current price of the goods at the time they were supposed to be delivered.

Furthermore, Othman, A.A. (2006) emphasize that the aim of damages, to the extent that money can achieve it, is to restore the injured party to the same position regarding damages as if the contract had been fully performed."

1.8 What is the purpose of investigating delays through research?

Fernandez da Silva et al (2015) suggest that conducting research on delays is essential to improve the management of delay situations and minimize their negative consequences. They argue that by examining the occurrence, extent, and causes of delays, valuable information can be gained to facilitate early planning, effectively control these factors, and enhance overall project performance.

1.8.1 To what extent is the issue of project delays in completion widespread ?

Insights into the prevalence of project delays in the construction industry can be gathered from the following data:

- Fernandez da Silva et al (2015) found that 70% of construction projects undertaken by the Saudi Arabia Ministry of Housing and Public Works experienced delays.
- In Jordan, Al-Momani (2000) reported that 81.5% of public projects faced delays.
- Chan and Kumaraswamy (1997) discovered that 88% of building construction projects in Australia did not meet their scheduled completion dates.
- Aibinu and Jagboro (2002) revealed that 70% of building construction projects in Nigeria encountered delays.

1.8.2 Who bears the blame for project delays?

Regarding the responsibility for these delays, previous research sheds light on the subject:

- Al-Khalil and Al-Ghafly's study on Saudi Arabia's public sector projects attributed the majority of delays to the employer/consultant, while the contractor's role accounted for approximately 44% of the overall delay.

1.8.3 Degree of Delay

What is the typical duration of delay experienced in building construction projects? The following findings from previous research studies shed light on this question:

- Aibinu and Jagboro (2002) discovered that the average time overrun for building construction projects analyzed was 92.64% for projects valued at "0-10 million Naira [0-350 000 Pula]" and 59.23% for projects exceeding 10 million Naira.
- Chan and Kumaraswamy reported that building projects in Australia, on average, experience a time overrun of over 40%."

2. Methods and Materials

2.1 Research Methodology

In this study, a quantitative method approach was utilized to develop a questionnaire survey aimed at collecting data from the designated participants. The outcomes of the questionnaires will be employed in conducting research through an appropriate methodology, potentially leading to the success of

the investigation. The data obtained from the various types of questionnaires was analyzed through a statistical analysis software, SPSS to address the research objective.

The sample for this study was selected using a purposive sampling technique. The participants consisted of professionals from Ghana's construction industry, including architects, quantity surveyors, structural engineers, civil engineers, mechanical engineers, site managers, land economists, and project managers. These individuals were chosen purposefully based on their expertise in project management and their comprehensive understanding of the causes and impacts of construction project delays in Ghana.

2.2 Research Approach

For this study, a qualitative data collection method was employed. This decision was based on the research's nature and the specific type of data that needed to be gathered (Henn et al., 2006). The qualitative approach involves investigating individuals' perspectives on the world to gain a deeper understanding of their actions. The objective of qualitative research is to develop a comprehensive understanding of human behavior by engaging with participants and observing them in their natural environments .

The primary focus of this study is to examine the utilization of bamboo as a means of providing affordable housing solutions in Ghana..

Table 2.1: Summary of research methodology according to objectives.

Research objective	Data required	Source of data	Mode of collection
To determine out what causes project delays in ghana	<ul style="list-style-type: none"> Variables of causes of delays. The main causes of delays. 	<ul style="list-style-type: none"> Journals Articles Online publications Questionnaire 	<ul style="list-style-type: none"> Literature review Survey Questionnaire
To ascertain the consequences of building delays in ghana	<ul style="list-style-type: none"> Effects of project delays. Ranking of the effects of project delays. 	<ul style="list-style-type: none"> Journals Articles Online publications Questionnaire 	<ul style="list-style-type: none"> Literature review Survey Questionnaire
To figure out how to keep construction delays at a minimum in Ghana	Relation between the causes and effects of construction delays. The effective methods of minimizing construction delays.	<ul style="list-style-type: none"> Journals Articles Online publications Questionnaire 	<ul style="list-style-type: none"> Literature review Survey Questionnaire

Source: Author's field survey (2021)

A questionnaire survey was created to acquire an accurate evaluation and understanding of the development defers issue from respondents. Questions were designed by identifying the causes of delays found in the literature. This questionnaire did not include any open-ended questions. The questionnaires are organized into four categories: Background information, The Reasons for Construction Delays, Delays in construction and their consequences and Construction Delay Prevention Methods..

3. Findings and Analysis.

Construction delays were investigated for their causes, as well as their impact and the primary techniques for reducing them. The information examination and discussions based on the questionnaire survey are presented. Chapter Three's approach was used to deconstruct the obtained data and examine how best to reduce construction delays.

3.1 Type of buildings that faces most delays.

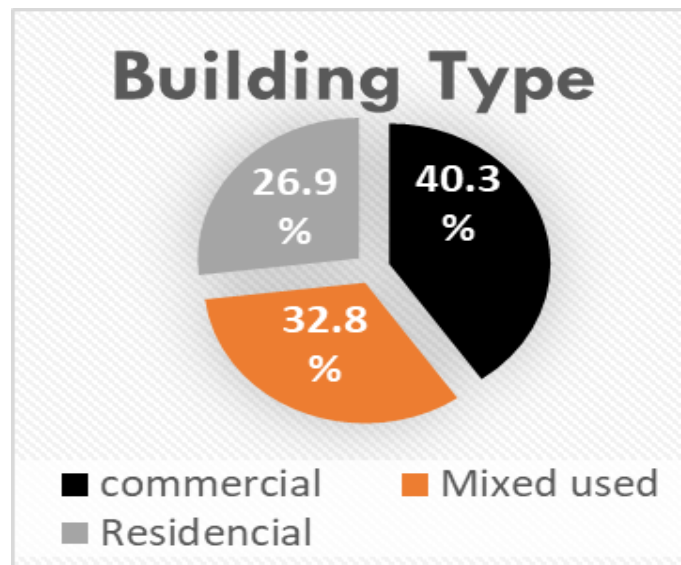


Figure 3.1 Type of buildings that faces most delays.

Source: Field survey (July,2021)

The objective of this study is to investigate the types of buildings that faces most delays in Ghana. Commercial buildings were identified as the most buildings that faces delays in Ghana.

3.2 Delay-causing elements and groups.

3.2.1 Determinants of consultant-related delays.

Inadequate data gathering and survey prior to design was judged to be the least significant. All mean values were between 3 and 4, indicating that the average respondent agrees that all elements of the supplied consultant-related delays are causes of construction delays.

Table 3.3 The result of factors of consultant-related delays

	Total number	Index	Rank	Std. Deviation
Poor communication and coordination	67	3.79	1	1.038
Unclear and inadequate details in drawings	67	3.78	2	1.027
Mistakes and discrepancies in design documents	67	3.67	3	1.223
Delay in authorizing significant modifications to the scope of work	67	3.67	3	1.186
Delays in producing design documents	67	3.57	5	1.131
Insufficient data collection and survey before design	67	3.48	6	1.133

Source: Author

3.2.2 Factors of Material related delays

According to the participants, the primary factor contributing to delays was the lack of available materials in the market. Contractors and consultants expressed a contrasting view, suggesting that delays in material procurement had minimal impact on building delays. The most prominent issue identified in Table 4.13 was the changes in material types during construction. Interestingly, when considering delays related to materials, this particular aspect was deemed to have the least significant effect.

Table 3.4 The result of factors of material-related delays

	number	index		
Changes in material types during construction	67	3.84	1	0.963
Delay in material delivery	67	3.76	2	1.102
Shortage of construction materials in market	67	3.67	3	1.211
Delay in manufacturing special building materials	67	3.63	4	1.204
Late procurement of materials	67	3.60	5	1.194

Source: Author

3.2.3 Factors of Equipment related delays.

A scarcity of high-tech mechanical equipment is the most significant issue affecting building delays, according to contractors and consultants. A lack of equipment operator expertise is second on the list, followed by breakdowns of equipment. However, closeness of the index values indicates that there is less variance in the equipment-related aspects.

Table 3.5 Factors of equipment-related delays.

	Total Number	Index		
Equipment failures	67	3.64	5	1.240
Inadequate equipment	67	3.66	4	1.225
Inadequate equipment-operator competence	67	3.76	2	1.220
Low equipment productivity and efficiency	67	3.67	3	1.160
a scarcity of high-tech mechanical equipment	67	4.06	1	1.140

Source: Author

The absence of high-tech mechanical equipment was placed first, followed by material modifications during construction and insufficient communication and coordination. The least prevalent reason of construction project delays was insufficient data collecting and surveying prior to design. There are four consultant-related delays among the top 10 variables, as well as three equipment-related issues. This implies that the reasons of building delays are not grouped together.

3.3 Effects of construction delays

The research uncovered two primary consequences of construction project delays: exceeding the scheduled timeframe and exceeding the allocated budget. Among these, cost overruns were identified as the most substantial impact of project delays in Ghana, as indicated by the findings. The study highlighted that inadequate planning by contractors, ineffective site monitoring, and delays in payment for completed work directly contribute to the delay in project completion.

Table 3.7 Results of effects of delays

	Time overrun	Cost overrun	Dispute	Total abandonment
Total number	67	67	67	67
Rank	2	1	4	3
Mean	3.57	3.73	3.24	3.40
Std. Deviation	1.104	.931	1.195	1.155

Source: Author

3.4 Methods of minimizing construction delays

Site control and monitoring, efficient management planning, and the use of modern industrial machinery were judged most effective for decreasing construction delays. Accurate first cost estimates were found to be the least successful of the seven offered techniques. Table 4.17 illustrates the results of strategies employed by contractors and consultants to mitigate construction delays from their respective viewpoints.

Table 3.8 Results of approaches for reducing construction delays.

	Total number	Index	Rank	Median	Std. Deviation
Site management and supervision	67	4.18	1	5.00	.968
Proper material procurement	67	3.90	6	4.00	1.103
Frequent progress meeting	67	3.94	5	4.00	1.099
Effective strategic planning	67	4.03	3	4.00	1.101
Collaborative working in construction	67	3.99	4	4.00	.945
Accurate initial cost estimates	67	3.87	7	4.00	1.100
Use proper and modern construction equipment	67	4.03	2	4.00	.921

Source: Author

4.0 Discussions

4.1 Causes of construction delays

The paucity of high-tech mechanical equipment was rated the highest by all respondents combined. This finding contradicts the findings of Frank D.K Fugar and Agyakwa-Baah, A.B (2010) who discovered that delays in honoring payment certificates are the leading cause of construction project delays in Ghana.

Communication and coordination are necessary for the development of strong teamwork, which may lead to the project's success indirectly. Poor data collection and survey prior to design is a major issue, but it placed last among the six variables with the largest proportion of respondents agreeing on extent of influence. The quality of subcontractor work was crucial to the construction project's timely completion.

The absence of modern technology mechanical equipment is associated with low equipment productivity and efficiency, which is especially true owing to outdated model equipment that is incapable of producing high output and a frequent equipment failure problem. Delays in material supply will have an impact on cash flow and schedule, but the issue of local market building material shortages is usually connected to transportation difficulties.

4.2 Effects of Construction delays.

Cost overruns are the most significant consequence of building project delays in Malaysia, according to a survey of more than 1,000 construction workers by the Malaysian Chamber of Commerce and Industry (MCCI). MCCI surveyed respondents to identify the top ten factors believed to contribute to project delays. The results revealed that each of these factors had a notable influence on exceeding the allocated project time.

4.3 Methods of Minimizing Construction Delays.

Site management and monitoring are the most critical components of the seven-point checklist. Building sector contractors must stick to deadlines without seeking shortcuts or deviating from budgetary limits. We must keep a close eye on building quality and standard compliance. In order to save time, careful strategic planning must be implemented.

The leading causes of construction delays have been identified as insufficient communication, insufficient availability of advanced equipment, and alterations in material types. These three factors have been recognized as the most significant contributors to project delays. Delays have a detrimental impact on building projects, with the most frequent being time and cost overruns. The top three strategies recommended for reducing construction delays are site control and monitoring, use of current and relevant construction equipment, and effective system preparation

5. Conclusion

Primary Reasons of Delays

High-tech equipment was lacking, and material types changed throughout construction. The designs were complex, and the information was inadequate. Delays caused by consultants were the most common, followed by delays caused by materials, consultants, and equipment. There are sixteen different factors that have a role in the occurrence of delays.

The Common Consequences of Delays

Building project delays result in disputes, disputes, and outright abandonment, according to studies. Two of the most common outcomes of construction project delays are time overrun and budget overruns. The study's objective was to find out what causes delays in building projects. All of these goals were met with success.

Techniques for Reducing Construction Delays

A study by the University of Aberdeen has found that a combination of site management and monitoring, using modern construction equipment, and solid strategic planning are the most effective ways to reduce delays in building projects. The study's ultimate aim was to identify effective methods for reducing construction project delays.

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