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DRIVING IMPACT OF DELAY IN CONSTRUCTION PROJECT

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ABSTRACT

This thesis examines the factors contributing to delays in construction projects and their impacts on project outcomes. Construction projects often face challenges and delays that significantly impact project schedules, costs, and client satisfaction. Understanding these factors and their consequences is crucial for successfully managing and completing construction projects. The study employs a comprehensive research methodology, including literature reviews, data collection, and analysis of real-world construction projects. The data collected encompass various project types, sizes, and geographical locations to ensure a broad industry representation. The findings reveal several key factors that contribute to delays in construction projects. The findings and recommendations outlined in this thesis offer valuable insights for practitioners, policymakers, and researchers and drive positive changes in project management practices.

Keywords: *construction, delay, impact*

INTRODUCTION

A project is a series of related tasks that must be carried out in the correct order to lead to the project's completion. Projects are short-term activities that usually result in development a physical product or outcome. A construction project, sometimes known as a 'project,' is the systematic process of constructing, renovating, and refurbishing a building, structure, or infrastructure. According to Mohammed (2022) construction projects, such as roads, water supply projects, and hospital construction projects, play an essential role since they are vital for job creation, poverty alleviation, and socioeconomic growth, particularly in emerging economies. Manpower, plant, construction materials, and management are all involved in construction. This industry helps develop and connect civil, structural, mechanical, and electrical infrastructure. (Mohd Fateh et al., 2022).

Most construction projects are one-offs. A project team, brief, and funding are assembled to produce just one design that results in a single project. The team is disbanded once the project ends, and they may or may not work together again. Habibi and Kermanshachi (2018) defined delays in the construction sector as time overruns, either past the date specified in the contract or the day that the parties had agreed the project would be delivered initially. According to Larsen *et al.* (2016)), Construction project delays, cost overruns, and poor quality have long been prevalent issues in the construction and engineering industries.

Many projects face significant delays, resulting in schedule and expense overruns. Globally, the construction industry faces delays that halt many projects and sometimes result in their complete abandonment. Time and cost overruns also occur, resulting in project failure, profit margin reduction, and public confidence loss, particularly in government-funded projects. (Mohammed, 2022). Hasmori *et al.* (2018) also stated that the late completion of many construction projects is typical. Neither the contractor nor the client can prevent it during the development process. According to Ramli *et al.* (2018), poor planning at the start of the project will cause delays at various points during the project. As a result, an experienced contractor and labour are required, especially in big and mega projects. Proper planning and management are essential to speed up the project plan and overcome time waste during delays. Understanding the leading causes of construction project delays will help evaluate gaps and weaknesses in project implementation and pave the way for project performance improvement. (Mohd Fateh et al., 2022) Therefore, this research will help to identify the most effective strategies for reducing construction project delays and to provide construction companies with alternatives for enhancing overall project performance.

LITERATURE REVIEW

Definition Of Delay

According to Ramli *et al.* (2018), Malaysia faces difficulties in the construction industry, including delays in time management and budgets, construction wastage, low productivity, and an over-reliance on foreign labour. Despite the challenges, project delays are classified as a significant component of the construction management process and have become a critical factor in project success. Delays are defined as extending beyond the agreed date or the date the parties have agreed upon for the venture's delivery. (Hasmori *et al.* 2018). Mohammed (2022) also state that in the construction industry, delay can be referred to the time exceedingly beyond to the time exceeding the specified project completion date or time that has been agreed upon by both parties to complete the project. Umar (2018) also states that a delay in a construction project is "the time that passes beyond either the completion date specified in a contract or beyond the date that the parties agreed upon for delivery of a project."

Delay is a period that elapses after the agreed-upon delivery date for a project or beyond the completion date set in a contract. It is a project running behind schedule and is a common problem with construction projects. (Assaf and Al-Hejji, 2006) For the owner, a delay results in lost revenue since there are not enough factories and rental space, or they have to rely on their current facilities. Delays can often result in increased overhead expenses for the contractor owing to extended work periods, higher material costs due to inflation, and higher labour costs. According to Umar (2018), It would substantially impact project performance. Delays result in lost income for project owners and financial losses for contractors. However, delays can also lead to conflict between the owner and the contractor, leading to litigation, arbitration, and even complete project abandonment.

Assaf and Al-Hejji (2006) state that efficiency is measured by on-time project completion, but the construction procedure is subject to various unforeseen variables from many sources. These sources include the behavior of the parties, the availability of resources, the environment, other parties' involvement, and contractual relationships. However, it is uncommon for a project to be finished within the allotted time. The country's economic activities have been significantly impacted by delays in government construction projects, particularly in the road sector. The government has started and is still working on several road construction projects nationwide. Unfortunately, the country's population must be aware of these project timelines.

Type Of Delay

There are 4 types of delay categories which are "Critical or Non-Critical," "Excusable or Non-Excusable," "Compensable or Non-Compensable," and "Concurrent or Non-Concurrent."

Critical Or Non-Critical

The first category comprises Critical Delays and Non-Critical Delays. Critical delays develop When a contractor cannot finish the work by the contract's completion date. The critical Path Method (CPM) is useful for identifying crucial operations in a building project. These critical operations are referred to as the governing item of work. It is essential to note that no matter how a construction project timetable is analyzed to identify delays, there will always be an underlying component that deserves special attention.

The Critical Path Method is a shared project management approach that aids in the identification of essential tasks in a building project. (Richards, 2004) These critical operations have a minor degree of schedule flexibility and, if delayed, can directly impact the project's completion date. The CPM enables project managers to understand the sequence and interdependence of activities, assisting them in determining which tasks are crucial to achieving the project's deadlines.

The phrase "controlling item of work" is frequently used to define these crucial tasks in the context of significant delays. These operations substantially influence the project timeline and need specific attention and monitoring to ensure timely completion. Project managers may assign resources, manage dependencies, and apply measures to avoid delays and keep the project on track by focusing on the main work item. (Lu and Li, 2003) According to Shrivas and Singla (2022) While crucial delays and the Path Method help analyze construction project timeframes and detect potential delays, there may be overarching variables that deserve special attention. External variables such as weather, regulatory changes, or unanticipated occurrences can all impact the project timetable and necessitate proactive management and mitigation techniques.

Excusable Delays & Non-Excusable Delays

As the term used in this category, Excusable Delays are delays caused by unforeseeable events beyond the control of the contractors or subcontractors. Commonly, delays caused by the following events would be regarded excusable based on standard general provisions in public agency specifications. According to Alaghbari *et al.* (2007), Excusable delays, also called "force majeure" delays, are the third main form of delay. These delays are usually referred to as "acts of God" since they are not the fault or responsibility of any specific party. Most contracts enable the contractor to get a time extension for reasonable delays, but not more money.

On the other hand, Non-Excusable delays are events within the contractor's control or foreseeable. For example, the late performance of subcontractors, suppliers' failure to deliver on schedule, and poor workmanship by the contractor and subcontractors. These delays are caused by subcontractor lateness, supplier inability to deliver items on time, or poor craftsmanship by the contractor or subcontractors. Non-excusable delays are usually linked to the acts or inactions of the parties involved and are considered avoidable or preventable. (Alaghbari *et al.*, 2007)

The difference between excusable and non-excusable delays is critical for project management, contractual agreements, and claims resolution. Excusable delays may give rise to time extensions, changes in project timelines, or potential reimbursement for additional costs incurred due to the delay. Non-excusable delays, on the other hand, may result in fines, liquidated damages, or other contractual consequences. By identifying between these two types of delays, project stakeholders may assess the responsibility and accountability for the delay, identify suitable mitigation actions, and allow successful project management and claims resolution.

Compensable Or Non-Compensable

The next category is Compensable or Non-Compensable. It is referred to a case in which the contractor is entitled to a time extension and additional compensation because of a delay. While an excusable delay may have occurred, the contractor is not entitled to any additional compensation due to the excusable delay. Compensable delays refer to those that entitle the contractor to both a time extension and additional compensation. Outside reasons like owner-directed adjustments, design flaws or omissions, or unanticipated site circumstances often cause these delays. In certain situations, the contractor is entitled to a project timetable extension and compensation for the additional costs incurred due to the delay. (Alaghbari *et al.*, 2007)

On the other hand, non-compensable delays are delays for which the contractor is entitled to a time extension but no further remuneration. Excusable events may also cause these delays, but the contractor is not compensated for the impact of the delay. Non-compensable delays are based on the idea that the parties have agreed to share the risk and repercussions of such unavoidable events, and the contractor is rewarded by time extension but not monetary compensation. It is also supported by Yap *et al.* (2021) that the word implies that neither party is at fault under the contract's terms and that both parties have agreed to share the risk and consequences when unavoidable events occur.

Understanding whether delays are compensable or non-compensable helps determine the necessary contractual remedies, such as time extensions and compensation. In the case of unanticipated occurrences or delays, it enables a fair and balanced sharing of risks and duties among project partners.

Concurrent or Non-Concurrent

Concurrent delays occur when various variables contribute to project delays simultaneously or during overlapping periods. Concurrent delays, as opposed to delays produced by a single reason, present a more complex scenario for project management and delay analysis. According to Alaghbari *et al.* (2007), Concurrent delays occur when two or more delay events co-occur, impacting the project timeframe. This indicates that several parties or circumstances contribute to the project's delay, making determining the specific influence of each delay event difficult. It frequently involves a mix of excusable and non-excusable delays, with the contractor and other external circumstances contributing to the total delay.

Conversely, non-concurrent delays occur at various periods and do not overlap or coincide. These delays are unique from one another and have independent effects on the project timeframe. Various circumstances or parties can cause non-concurrent delays, although their consequences are unrelated. Managing concurrent delays requires excellent communication, coordination, and cooperation among project stakeholders to address the cumulative effects and develop ways to reduce the delays. Non-concurrent delays, on the other hand, can be handled and controlled as independent events. According to Hasmori *et al.* (2018), the reasons for delays can also divide into two factors: internal causes and external causes. The internal causes relate to the client, contractors, and consultants. Unlike internal causes, external causes come from the government, suppliers, and weather

IMPACT OF CONSTRUCTION DELAY

Frequently effect the Project Timeliness, Cost, And Quality

One of the most common issues in the construction sector is construction delays, which frequently effect project timeliness, cost, and quality. The effect of consultants, contractors, and owners on project performance is a significant factor in project failure. Delays have an expensive impact on all parties involved and frequently lead to disputes, cost overruns, arbitration, litigation, complete abandonment, and project impossibility. The construction process is influenced by several both internal and external variables, making it a risky sector with unresolved.

Effect Company Reputation

Construction projects are frequently deemed successful when they are finished on schedule, under budget, by specifications, and to the satisfaction of all stakeholders—however, most of the projects need to be completed on schedule as expected. Instead, they finished before or after the schedule because of the unpredictable nature of events and their individuality. According to Aydın and

Mihlayanlar (2018), delays in construction projects will cause the company to gain a bad reputation among the local people by reducing the confidence through the company.

Cost Overruns

Cost overruns are a common problem that arises whenever construction delays occur. A strong management structure must serve as the foundation for any construction endeavour. Maintaining effective coordination between all stakeholders involved in the project and the execution teams is also essential. A combination of skilled experience, careful planning, and utilizing innovation typically results in that sweet spot of minimum delay and most efficiency.

Dissatisfaction From Stakeholders

Dissatisfaction from stakeholders is another common consequence of construction delays. Clients, owners, and other stakeholders may be dissatisfied with the project if it is not completed on time. It can lead to legal disputes and financial losses. In some cases, delays can even lead to project abandonment. When projects are delayed for too long, abandoning them may be more cost-effective than continuing to work on them. As a result, it can lead to financial losses for all parties involved.

RESEARCH METHOD

According to Doloi *et al.*, 2012),the research is quantitative when numerical data is required. In other words, the quantitative approach is a method that can be numerically calculated or counted by variables. In short, quantitative analysis is the way to generate numerical data or turn the data into accessible quantity statistics. The quantitative method stresses the purpose of measurement and statistical, mathematical, or numerical analysis of data collected by questionnaires. This study applied the quantitative technique to obtain valid and accurate results from the contractors G5 through G7.

The sampling strategy employed for this study is a particular kind of probability sampling strategy. The scope of this research project focuses on contractor class G5 until G7. This study's data was acquired through a literature review and a questionnaire survey. This research is required to evaluate the amount of understanding of the causes of delays and the use of delay ideas in planning, design, and field operations.

According to CIDB Malaysia, the number of contractors for G5-G7 in Selangor is 642. Besides, the sample size was calculated using a Raosoft sample size calculator with a margin error of 5%, a confidence level of 90%, and a 50% response distribution. As

a result, the total number of communities in Klang Valley, Selangor, in this research sample size is 191.

Concepts like validity and reliability are used to evaluate the quality of research. They show how effectively a methodology, method, or test measures something. Validity is concerned with a measure's correctness, whereas reliability is concerned with consistency. Making accurate inferences and generating precise conclusions from data is crucial in measurement and research. In 1951, Lee Cronbach developed the frequently used statistic, Cronbach's alpha. It assesses the internal consistency or dependability of a scale or instrument. This paper examines the idea of Cronbach's alpha and its significance in research, calculation, interpretation, and restrictions.

Cronbach's alpha, which ranges from 0 to 1, represents how closely a scale or test's components evaluate the same underlying idea. It serves as a barometer for the precision or consistency of the weight measurements made on the scale. In summary, Cronbach's alpha measures the efficiency with which a set of items in a test or questionnaire operate together to measure a particular variable.

The range of Cronbach's alpha is 0 to 1, with higher values indicating more internal consistency. Researchers frequently interpret alpha values based on predetermined standards. Generally speaking, an alpha value greater than 0.7 indicates adequate internal consistency. However, the acceptable degree may vary depending on the circumstance, the industry, and the objectives.

Reliability Statistics

Cronbach's Alpha	N of Items
.781	20

Figure 1: Cronbach Alpha or reliability analysis of the questionnaires

Table 1 : Cronbach Alpha Or Reliability Analysis Of The Questionnaires

Cronbach's Alpha	Internal Consistency
$\alpha \geq 0.9$	Excellent
$0.8 \leq \alpha < 0.9$	Good
$0.7 \leq \alpha < 0.8$	Acceptable
$0.6 \leq \alpha < 0.7$	Questionable
$0.5 \leq \alpha < 0.6$	Poor
$\alpha < 0.5$	Unacceptable

The table above shows that the questionnaire's Cronbach Alpha has achieved 0.781 with 20 items. Thus, it reaches the acceptable level, a minimum of 0.70 based on (Ghazizadeh et al., 2019).

FINDING ANALYSIS

This section presents the findings of the study that fulfill its primary purpose/aim, and the research objectives are achieved through the discussion of the findings. This chapter outlines the results obtained from the survey of questionnaires distributed to contractor G5 until G7in a central zone in the Selangor region, Klang Valley. Many questionnaires were distributed to the contractor through Facebook groups, by email, and others, but 191 were returned. Collecting 191 gathered data from all questionnaire respondents is analyzed using descriptive analysis. The data obtained are analyzed in the form of a table specifically.

Demographic analysis

In this section, the respondents are asked about their particular background. The result is tabled and discussed in more detail in each sub-chapter. The distribution of a Google Form link will analyze the questionnaire yielded by 191 responses. Section A of the questionnaire required respondents to fill in their background information. Table 2 shows the demographic analysis of the needs analysis questionnaire respondents.

Table 2 : Demographic analysis

		Frequencies	%
Age	Below 19 years old	7	5.6%
	20 – 29 years old	28	22.4%
	30 – 59 years old	85	68.0%
	60 years old and above	5	4.0%
Contractor Class	G5	47	37.6%
	G6	45	36.0%
	G7	33	26.4%
Working Experience	Less than 5 years	13	10.4%
	6 years – 10 years	67	53.6%
	11 years – 15 years	41	32.8%
	More than 20 years	4	3.2%
Involved in Delay	Yes	115	92.0%
	No	10	8.0%

Based on the table above, which provides a comprehensive overview of the collected data, several key variables can be discerned and subsequently interpreted, including the respondents' age, the classification of their respective companies, their levels of working experience, and the degree of involvement they had in the occurrence of delays in the construction project.

Next, most of the 85 respondents are aged 30-59. Besides that, there are 28 responses from 20-29 years old. On the other hand, 7 answers were from below 19 years old, and 4 were from 60 years old and above. Hence, those aged 30-59 are more experienced in the construction industry than those 20-29. This is because construction is a physically demanding job, and it takes time to develop the skills and knowledge necessary to be successful in the industry. Workers in their 30s and 40s typically have more time to gain experience and are often more familiar with the latest construction techniques and technologies. Additionally, workers in their 30s and 40s

are often more stable and reliable than younger workers, which can be important for employers in the construction industry.

However, it is essential to note that this trend has some exceptions. Some young workers may have significant experience in the construction industry through internships or apprenticeships. Additionally, some older workers may have left the construction industry for other reasons, such as to start businesses or raise families. As a result, it is crucial to assess each worker's qualifications and experience rather than simply relying on their age.

The following section is the class company of the respondents. Based on table above, most of the responses are from contractor G5, which is 47. In addition, 45 respondents were from contractor G6, while 33 responses were from contractor G7. Contractor class G7 has more scope of work in the construction industry than contractor class G5 and G6. This is because contractor class G7 can undertake civil engineering and building construction projects for an unlimited amount. In contrast, contractor class G5 is only allowed to undertake civil engineering construction and building construction projects at most RM5 million. Contractor class G6 can only undertake civil engineering and construction projects at most RM10 million.

In addition, contractor class G7 is required to have a minimum of two-degree holders (at least one with five years of experience) or a degree holder and a diploma holder (both with a minimum of five years of experience), while contractor class G5 is required to have a minimum of one diploma holder (minimum five years of experience) or a degree (minimum one year of experience), and contractor class G6 is required to have a minimum of two technical persons, one with a degree and one with a diploma (at least one with minimum three years of experience).

As a result of these requirements, contractor class G7 contractors are typically more experienced and have a wider range of skills than contractor class G5 and G6 contractors. This makes them more attractive to clients looking for contractors to undertake large and complex construction projects. Table 2 show the key differences between contractor classes G5, G6, And G7

Next, for the working experience section, the majority of the respondents, 67 respondents, have 6-10 years of working experience. Also, 41 respondents have 11-15 years of working experience. Besides that, 13 and 4 respondents have less than 5 years and more than 20 years of working experience. Based on the findings, most construction workers in this survey have moderate experience. This is likely because construction is a skilled trade that requires a certain amount of time and training to master. Workers with 6-10 years of experience are likely to have the skills and knowledge necessary to complete most construction tasks, while workers with 11-15 years of experience are likely to have the experience and expertise to take on more complex projects.

However, it is essential to note that experience is not the only factor employers consider when hiring. Other factors, such as skills, knowledge, and personality, can also be important. For example, an employer may be willing to hire a worker with less than five years of experience if they have the skills and knowledge necessary to do the job. Similarly, an employer may be willing to hire a worker with more than 20 years of experience if they have a positive attitude and are a good fit for the company culture.

Lastly, most respondents have been involved in the delay of construction projects which are 115 out 125 respondents. This revelation highlights the general nature of delays within the construction industry and underscores the widespread challenges and complexities in project timelines. The high number of respondents acknowledging their involvement in project delays emphasizes the need for further analysis and investigation into the factors contributing to these delays. By recognizing the prevalence of such delays, stakeholders can focus on identifying potential areas for improvement and implementing strategies to mitigate delays and enhance project efficiency in the future.

Findings Of The Questionnaire

For this sections, the average mean method was used to analyze the data obtained from the Likert scale questions. The Likert scale is used for the respondents to rate the evaluation based on their desired level of agreement for the three sections. Then, the data was analyzed using SPSS Software.

Table 3 : Impact of Construction Delay Descriptive Statistics

Impact of Delay	N	Minimum	Maximum	Mean	Rank
Damage company reputation.	125	4.00	5.00	4.58	1
The profit of the project gets affected.	125	3.00	5.00	4.58	2
It affects workers' salaries, increases the project time, and eventually increases the cost, and tenants create a problem.	125	3.00	5.00	4.53	3
Faced different types of problems with the client.	125	3.00	5.00	4.53	4

The project's duration will increase, and construction costs will increase.	125	3.00	5.00	4.42	5
The chain of workers gets broken.	125	2.00	5.00	4.41	6
The scheduling of the project is lacking from the original plan.	125	3.00	5.00	4.37	7
Poor quality of end product.	125	1.00	5.00	4.34	8
The client does not get his building on the given time.	125	1.00	5.00	4.27	9
Construction material gets damaged by the weather.	125	1.00	5.00	4.26	10
Valid N (listwise)	125				

Based on the data, the most common consequences of construction project delays are:

I. Damage to company reputation. When a project is delayed, it can damage the reputation of the company responsible. This can make it more difficult for the company to win future contracts.
II. Reduced profits. When a project is delayed, it can also reduce the company's profits. This is because the company may have to pay for additional expenses, such as overtime pay for workers or rental fees for equipment.
III. Increased costs. Delays can also increase the costs of a project. The company may have to pay for additional materials or labour.
IV. Client dissatisfaction. When a project is delayed, it can lead to dissatisfaction from the client. This can damage the relationship between the company and the client and make it more difficult for the company to win future contracts.
V. Worker's dissatisfaction. Delays can also lead to dissatisfaction from the workers. This might result in higher turnover and lower production.

The data suggest delays can have several negative consequences for the company and the client. It is essential to minimize the risks of delays, such as by developing realistic schedules and budgets and communicating regularly with the client.

CONCLUSION

According to the survey result, the mean response shows that most respondents agree with the question saying that the impact of delay in the Construction Project will damage the company's reputation. Construction projects are often delayed for various reasons, such as weather, labour shortages, or unforeseen site conditions. While delays are sometimes unavoidable, they can significantly impact the company's reputation. Delays can also damage the company's reputation with its clients and partners. A timely project can protect the company's credibility and make it easier to win future contracts. In some cases, delays can even lead to legal action from the owner. Also, clients often feel frustrated and disappointed when a project is delayed. This can lead to a loss of trust and future business.

In summary, a bad reputation for delays can make it difficult for a company to win new tenders. Clients are often reluctant to hire a contractor with a history of delays, as they worry about the project being completed on time and budget.

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Tarikh : 20 Januari 2023

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Sekian, terima kasih.

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Saya yang menjalankan amanah,

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Setuju.

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