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APPROACH TO REDUCE THE IMPACTS OF DELAY TOWARDS TIME OVERRUN IN HIGH-RISE BUILDING PROJECT IN SELANGOR, MALAYSIA

Liyana Nadhirah Shaharuddin¹, Siti Nurhayati Hussin^{1*}

¹Department of Built Environment Studies and Technology, College of Built Environment, Universiti Teknologi MARA, Perak Branch, 32610, Seri Iskandar, Perak, Malaysia

2021482744@student.uitm.my, *sitin1095@uitm.edu.my

ABSTRACT

Project delays are a common problem during the construction process. Project delay is the extension of the period to complete the construction project. In contrast, the project will not be completed within the timeframe and budgeted cost specified in the contract. In this study, high-rise building projects will be concentrated. However, to accomplish the project of a high-rise building within the given time in the contract, the construction will face a challenge: the project delay due to the complexity of this building. Furthermore, this study is focused on delays towards time overrun where the delay is involved with Extension on Time (EoT). In solving this issue, proper study should be done to reduce time overruns in high-rise building projects. Thus, this study aims to recommend strategies to the contractor to reduce the delay problems that impact the high-rise building project towards time overrun in Selangor, Malaysia. In reaching the aim, the quantitative method used an online survey form to approach the respondents. Then, data analysis will be made by using Statistical Package for the Social Sciences version 28.0 (SPSS). The results were obtained from 74 respondents of the G7 contractor companies in Selangor and the highest rank of the strategies is effective planning of programming. Furthermore, this study is based on an overview of perceptions from contractors. The contractors must hire a good subcontractor to ensure the subcontractor does their job. Before hiring the sub-contractor, contractors must check the previous record of sub-contractors and find the experience of sub-contractors. In obtaining more accurate data, the future researcher can approach the respondents using qualitative methods and interviewing the respondents.

Keywords: *project delay, time overrun, high-rise buildings, Extension of Time (EoT)*

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INTRODUCTION

Every construction company wants to give the best performance to their client. Other than that, time is included in parts of the construction success triangle that are used to determine and measure the success of construction (Haslinda et al., 2018). However, without good proper management, it will affect the project delay, especially towards time overrun. According to Vaardini & Subramanian (2015), the critical issue faced in the construction industry is time overruns. In the following year, another article by Aziz & Abdel-Hakam (2016) mentioned that time overrun may cause adverse effects on the construction project. In this research, time overruns in high-rise buildings will be focused on due to several studies that have previously been conducted, most of them focused on infrastructure construction projects in particular. Based on Haslinda, Xian, Mohd, & Fikri (2018), research regarding cost and time overrun for high-rise building construction projects, especially in Malaysia, is still insufficient. Based on Rahman et al. (2017), if the quality of materials does not meet the standard or contains defects, the usage of material on-site may be delayed. The defect might result from faulty packaging, transport, or delivery management. According to Wehandi & Caroline (2020), poor quality material happened due to the specification of work, wrong time of order, and quantity of material delivered by Suppliers that did not suit the building specification. This situation may cause the material to be late to deliver and lead to time overrun. Furthermore, Chanicha, Bhuk, Wissawa & Rizaimy (2019) stated that on a global scale, the issue of delay in high-rise building construction is the serious factor that leads to unexpected negative impacts that will be occurred on construction projects. Plus, high-rise building projects are exposed to construction delays due to the complicated and high-risk project requiring a few contractors to complete the work. (Eric, Arun & Edmund, 2019). Additionally, ineffective technical staff planning and scheduling by project managers and professional engineers are the most critical reasons that lead to time overruns on high-rise building projects in Penang, Malaysia (Haslinda et al., 2018). This statement was supported by the article by Eric, Admund & Arun (2019), but it occurred in India. Next, according to an article from Saad, Khalid & Abdulmohsen (2022), this issue happened due to contractor fault, a severe risk factor for delay in their study. Meanwhile, According to Nurasiah et al. (2021), project delays are caused by poor management in construction. Furthermore, if the project is late for an extended period with no action, it can be considered a "sick project". A "Sick project" is a project that has been delayed exceeding 30% of its planned process or when the sale and purchase agreement (SPA) has expired. An article from the Star (2022) stated that Selangor and Johor have the highest number of "sick projects" of high-rise buildings, followed by the Federal Territories. Therefore, to solve the problem, the research aim should be achieved by implementing the research objective. In recommending the strategies to the Contractor to reduce the delay problems that impact the high-rise building projects towards time overrun in Selangor, Malaysia, one research objective is established which is to suggest the most strategies that can apply by the contractor to reduce time overrun in the high-rise building project.

LITERATURE REVIEW

Definition of delay

The delay issue in construction industry is a worldwide crisis. Most construction projects, whether basic or sophisticated, experience delays. According to Trauner (2009), delay means an event occur at a later time than anticipated, or to be completed later than planned; or fails to take appropriate steps or occurs after the contract's agreed-upon date. Furthermore, the definition of delay in construction is the prolongation of time in the completion of a project. In summary, a delay means that the project will not be completed within the timeframe and budgeted cost specified in the contract. Delays may occur concurrently with other delays, and all of them might affect the project's completion schedule. However, there are many projects encounter significant delays which causes the initial time and cost estimates increase. Construction delays are one of the most common issues in the construction business, and they have a negative impact on project success in terms of time, cost, and quality (Ashwini & Rahul, 2014).

Types of delay

According to Saleh Al Hadi Tumi (2009), delay was divided into two categories: those are non-excusable and excusable delays. A non-excusable delay means the contractor, or its suppliers cause the delay without the fault by the owner. In most cases, the contractor is ineligible for relief and is required to make good the lost time by accelerating the project or pay the owner. Hence, the contractor often does not receive any further compensation or extension of time as a result of non-excusable delays. Meanwhile for excusable delays, Wa'el Alaghbari (2007) & Saleh Al Hadi Tumi (2009) opine that this type of delay was classified into two, which are compensable and non-compensable delays. Owner or owner's agents are causing the compensable delay while third parties or events outside the control of the client and the contractor. These delays known as "acts of God" because not the obligation or fault of any party.

Factors Contributing to Delay in High-Rise Building Construction Towards Time Overrun.

Table 1: Factors Contributing to Delay in High-Rise Building Construction Towards Time Overrun.

FACTORS / AUTHORS & YEAR	Aruna, Bhattacharya, Saha & Jeyaraj (2013)	Aaditya & Prathibha (2017)	Muhammad Ali, Muhammad, & Hani (2018)	Cherian, Siva, Manoj & Srinivas (2019)	Muzak, Peters & Alsharhan (2021)	Frequency
No teamwork	✓					1
Period of plan lead-time	✓					1
Delayed delivery and	✓					1
Delays in approval design and documentation	✓			✓		2
Delays in delivery items of construction	✓					1
Lack of labour and skilled labour	✓		✓		✓	3
Acquiring the permits from Government		✓				1
Low productivity of labour		✓	✓			2
Financial issues to parties involved in project		✓		✓	✓	3
Condition of economic		✓				1
Poor management and supervision at site by contractor		✓			✓	2
Low of bid price awarded		✓				1
Late payment of work items		✓				1
Confliction between the different schedules of sub-contractors		✓				1
Unreasonable contract periods started by Client		✓				1
Less experience of contractor		✓			✓	2
Condition of economic		✓				1
Fluctuating time for preparation and coordination of drawing		✓				1
Changing in design			✓			1
Lack of planning and scheduling			✓	✓	✓	3
Lack of material			✓			1
Inaccuracy of materials estimate			✓			1
Unexpected weather conditions			✓			1
Inadequate of good communication				✓		1
Delay from third party				✓		1
Craftsmen production rate error in forecasting			✓			1
Restriction of project location			✓			1
Slow decision making by the owner				✓		1
Error in the preliminary stage					✓	1
Issues with neighbours					✓	1
Misunderstanding					✓	1

Table 1 shows the factors contributing to delay in high-rise building construction towards time overrun by the previous researcher. The most factors that frequent stated by the previous researcher are lack of labour and skilled, financial issues to parties involved in project, and lack of planning and scheduling (Aaditya and

Bhattacharya, 2017; Sunan, Wuttipong, Santi and Samart, 2015; Haslinda, Xian, Muhammad, and Fikri, 2018; Chanicha, Bhuk, Wissawa and Rizaimy, 2019; Kilintan, Perera & Kajavathani, 2022) Next, factors that frequent mentioned by the previous researcher are delays in approval design and documentation, low productivity of labour, poor management and supervision at site by contractor, and less experience of contractor (Sunan, Wuttipong, Santi and Samart, 2015; Chanicha, Bhuk, Wissawa and Rizaimy, 2019; Aaditya and Bhattacharya, 2017; Kilintan, Perera & Kajavathani, 2022). Meanwhile the rest of the factors not usually stated by the previous researcher.

Impacts of Time Overrun in High-Rise Building

Table 2: Impacts of Time Overrun in High-Rise Building

IMPACTS / AUTHORS & YEAR	Increase in project costs	Increasing in overhead expenses	Increasing of investment risk	Poor or decrease quality of work and productivity	Increases stress to overall team	Decreasing customer's faith and trust	Overall efficiency decreases	Negative social impact	Disputes among the parties	Increases market risk	Decrease of contractors & consultants' reputation	Abandonment of building	Failure to secure project revenue	High cost of obtaining project	Loss of investment in construction industry	Inability to maintain the industry	Slow rate of national growth	Disability to deliver value to clients	Fear of safety competition
Vardini & Subramanian (2015)	✓			✓	✓	✓	✓	✓	✓	✓									
Ennassret, Yilgor, Eri & Alred (2017)			✓								✓	✓	✓	✓	✓	✓	✓	✓	
Khaleel & Hadi (2017)	✓	✓		✓					✓		✓								✓
Redzuan (2018)	✓								✓										
Chanicha, Bhuk, Wissawa and Rizaimy (2019)				✓															

Table 2 above is illustrated the impacts of time overrun in high-rise building by the previous researcher. The most impacts that mentioned by the previous researcher which are increase in project cost, poor or decrease quality of work and productivity and disputes among the parties. (Vaardini and Subramanian, 2015; Khaleel and Hadi, 2017; Chanicha, Bhuk, Wissawa and Rizaimy, 2019). Furthermore, the rest of impacts are not often stated by the previous researcher. (Vaardini and Subramanian, 2015; Khaleel and Hadi, 2017; Chanicha, Bhuk, Wissawa and Rizaimy, 2019; Redzuan, 2018)

Strategies to Reduce Time Overrun.

Table 3: Strategies to reduce time overrun.

STRATEGIES/ AUTHOR & YEARS/	Parkes (2016)	Khaleel & Hadi (2017)	Azry, Suhaniya & Azlina (2018)	Haslinda, Xian, Muhammad & Chanichah (2019)	Chanichah & Chanichah (2021)	Frequency
Effective planning and programming		✓	✓	✓		3
Appointing the Good Project Manager					✓	1
Determination of a reasonable timeframe for completing the project			✓			1
Proper communication and coordination			✓			1
Motivate the labour			✓			1
Training programs for their workers			✓			1
Using advanced technology			✓			1
Purchase the accurate quantity and quality of materials	✓		✓			2
Selecting an professionals of expert designer		✓				1
Exact site evaluations must be performed		✓				1
Creating record drawings		✓				1
Revise the technique of contract awarding		✓				1

Table 3 above shows the strategies to reduce time overrun in high-rise building by the previous researcher. The most strategies that mentioned by the previous researcher which are effective planning and programming (Khaleel and Hadi, 2017; Azry, Suhaniya and Azlina, 2018; Haslinda, Xian Furthermore, the rest of impacts are not often stated by the previous researcher. (Vaardini and Subramanian, 2015; Khaleel and Hadi, 2017; Chanicha, Bhuk, Wissawa and Rizaimy, 2019; Redzuan, 2018)

RESEARCH METHODOLOGY

There are two types of data collection methods that had been used for this research which are primary data and secondary data. For primary data, a quantitative method was used to collect reliable and trustworthy data from the respondents, who were contractor companies from Grade 7 (G7) in Selangor, Malaysia. In collecting the data, online questionnaire survey had been used and the type of questionnaire survey that had been applied in this study is Likert scale. Meanwhile for secondary data, journal articles from the previous researcher had been applied. The journal articles were obtained from Google Scholar by searching the title that relates to the research topic. The latest journal article had been taken to support the previous statement by the past researchers. The journal articles that will be used are from 2015 to 2022 due to the journal articles in these years are still relevant to apply as supporting statement. For number of samples size, it had been obtained from Krejcie and Morgan table

(1970), then to get the sample size, random sampling method had been used. The population in this study is 3244 of G7 contractor companies in Malaysia. The sample size is 341 of contractor companies in Selangor. Besides, the data analysis technique that had been used is Statistical Package for the Social Sciences version 28.0 (SPSS).

ANALYSIS OF FINDINGS

The analysis and findings of the strategies to reduce were obtained from the online questionnaire survey form. Furthermore, the feedback of the questionnaire was obtained from the respondents who have the information below as stated in Table 4.

Table 4: Respondents' Information

	Description	Frequencies	Percentage (%)
A	<u>Age</u>		
	20-25 years	22	29.7
	26-30 years	8	10.8
	31-35 years	16	21.6
	36 years above	28	37.8
B	<u>Current position of respondents in Contractor Company</u>		
	Senior Project Manager	21	28.4
	Project Manager	39	52.7
	Professional Engineer	14	18.9
C	<u>Years of Contractor's Working Experience in Construction Industry</u>		
	Below 10 years	26	35.1
	10 to 20 years	26	35.1
	Above 20 years	14	18.9
	Above 30 years	8	10.8
D	<u>How many percentages of your project completed on time?</u>		
	Less than 70%	15	20.3
	70% to 90%	41	55.4
	More than 90%	18	24.3
E	<u>Have you ever experienced delay in high-rise building construction?</u>		
	Yes	70	94.6
	No	4	5.4

Table 5: Findings of Strategies to Reduce the Impact of Time Overrun.

Description	Mean	Standard Deviation	Rank
Effective planning and programming	4.71	0.456	1
Proper communication and coordination	4.62	0.516	2
Appointing the good Project Manager	4.62	0.543	3
Purchase the accurate quantity and quality of materials	4.59	0.660	4
Training programs for their workers	4.59	0.547	5
Revise the technique of contract awarding	4.57	0.551	6
Motivate the labour	4.53	0.555	7
Determination of reasonable timeframe for completing the project	4.50	0.579	8
Selecting an professionals or expert designer	4.46	0.601	9
Exact site evaluations must be performed	4.40	0.571	10
Applying advanced technology	4.30	0.656	11
Creating record drawings	4.26	0.621	12

Based on Table 5, this is the last section of questionnaire which is section D regarding the strategies to reduce the time overrun. The most important strategy is effective planning and programming with mean 4.71. The second rank is proper communication and coordination with mean 4.62. This strategy has the same mean with appointing the good Project Manager. Thus, standard deviation had been used to determine either proper communication and coordination or appointing the good Project Manager in the second rank. The standard deviation illustrated that proper communication is supposing in the second position due to the standard deviation is lower than appointing to project manager Next, purchase the accurate quantity and quality of materials and training programs for their workers is the fourth and fifth highest in the ranking with mean 4.59. Then followed by revise the technique of contract awarding in the ranking with mean 4.57. Then, the strategies followed by motivate labour (mean=4.53), determination of reasonable timeframe for completing

the project (mean=4.50), selecting an professionals or expert designer (mean=4.46), selecting an professionals or expert designer (mean=4.46), exact site evaluations must be performed (mean=4.40), applying advanced technology (mean=4.30) and lastly, creating record drawings (mean=4.26).

According to this finding, most of respondents choose effective planning and programming as a strategy to reduce the time overrun from occurred during high-rise buildings construction. Any works required the good planning and programming to make the implementation of the works going smoothly including in construction. If no proper planning and programming it may cause the project delay and can lead to project failure.

Discussion of Findings

This study analysed and found that the strategies strongly agreed upon by respondents are effective planning and programming. This finding can be supported by Pankaj (2016) because this author stated that effective planning must be done and carried out to prevent the surplus or lack of materials and the variation order during the construction process. Furthermore, Azry, Suhaniya & Azlina (2018) opined that implementing proper project planning and scheduling is necessary to obtain efficient time management. Additionally, Haslinda, Xian, Muhammad, & Fikri (2018) mentioned that they must have effective planning and programming if they want to complete the project on time. Next, the second highest mean rank is proper communication and coordination. Based on Azry, Suhaniya, & Azlina (2018), this strategy should do among the parties involved in construction, such as the owner, contractor, and consultant, and the consultant must do well to improve the proper monitoring, coordination and rise the productivity of the project as pre-scheduled. The third highest mean rank is appointing the best project manager. As stated by the previous researcher, Dlamini and Cumberlege (2021), the contractor should hire the best project manager with a track record of completing the project on time.

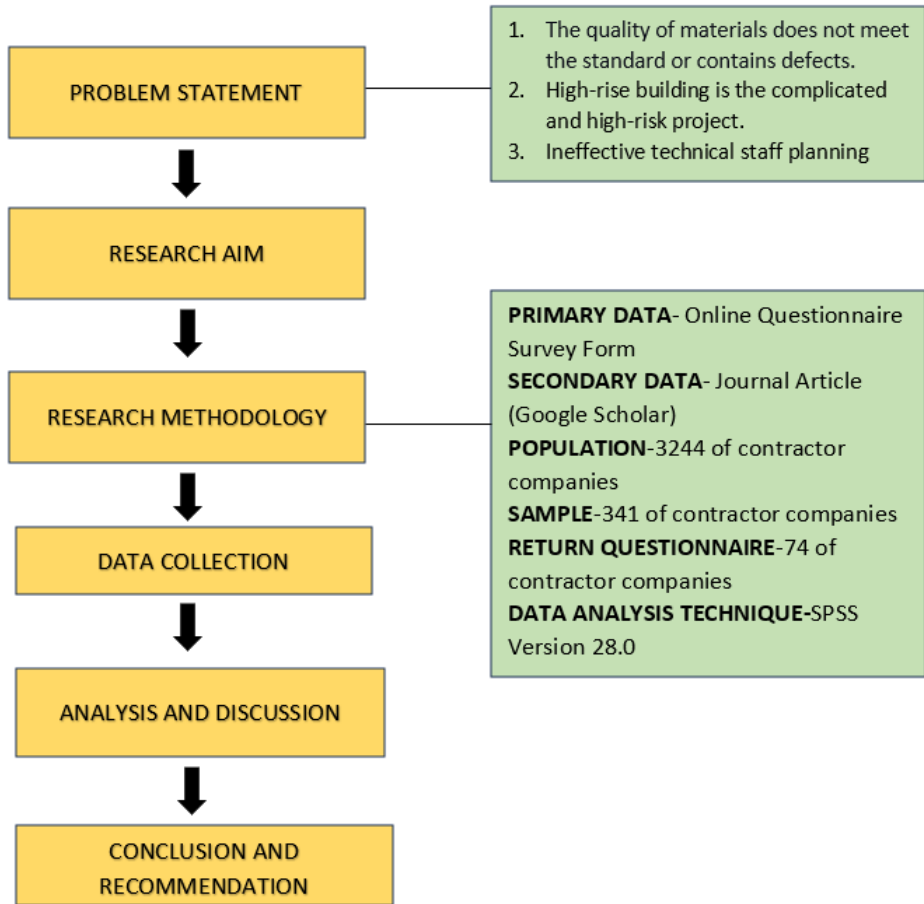


Figure 1: Framework of Study Process

Figure 1 illustrated the study process. First, identify the problem statement of the study. Next, determine the research aim and it must be achieved. In achieving the aim, quantitative method had been applied as primary data by using online questionnaire survey form. Furthermore, for secondary data, journal article that related with this study from Google Scholar had been used. The respondents are G7 contractor companies from Selangor and the population is 3244 of G7 contractor companies in Malaysia. The sample size is 341 of contractor companies in Selangor. The return questionnaire is 74 of contractor companies. The data analysis technique that had been used is Statistical Package for the Social Sciences version 28.0 (SPSS). After analysing the data, the discussion will be carried out. Lastly, conclusion and recommendation of study had been implemented as reference for future study.

CONCLUSION

To sum up, in reducing the time overrun for high-rise building project in Selangor, it was established that there are a few strategies to minimize issue of time overrun. However, the most strategy to reduce time overrun is effective planning and scheduling by the contractor. This result can be supported by Pankaj (2016) because this author stated that effective planning must be done and carried out to prevent the surplus or lack of materials and the variation order during the construction process. Furthermore, the findings of strategies have been supported by previous studies in literature review. Additionally, this study is based on an overview of perceptions from contractors. The contractors should be aware because other parties, especially the sub-contractor, may want to take advantage of them. Furthermore, the contractors must hire a good subcontractor to ensure the subcontractor does their job. Before hiring the sub-contractor, contractors must check the previous record of sub-contractors and find the experience of sub-contractors. Next, for future research, the researcher can make this study from clients' or consultants' overview to know either the ranking of the factors, impacts and strategies are still the same. In obtaining more accurate data, the future researcher can approach the respondents using qualitative methods and interviewing the respondents. Furthermore, the future researcher can change the scope of the location by focusing on Kuala Lumpur because Kuala Lumpur is known as a developing country, and there is more high-rise building there. Besides, the future researcher also can minimize the scope of location by doing this study only in a city of Selangor such as Klang or Shah Alam.

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