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Significant Factors of Construction Delays Among Contractors in Klang Valley and its Mitigation

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Abstract: Construction industry has become one of the greatest income provider as it has contributed to the Gross Domestic Product (GDP) for Malaysia. However, construction sector has been much affected by unexpected situation such as construction delays. Delays in construction industry is one of the common problems that happened to most construction projects. By considering all viewpoint from various parties that involves in construction process such as contractors, client, consultant and others, this research identified the major factor that contributes to delays in Klang Valley, Malaysia. Questionnaires were distributed among respondents that involved in construction project in Klang Valley. The process of data analysis was conducted by using descriptive statistic that ranked the mean value of factors that contributes to delays. By using the ranking method, financial difficulties were recognized as the most significant factor that caused delays. Thus, by using the same method, some mitigation action has been proposed in order to avoid time overrun in construction.

Keywords: construction delay, contractor, mitigation

1. Introduction

Building a structure or infrastructure requires a lot of time during construction projects. Lots of discipline are required to cooperate especially to a large construction projects. Ratings [1], outlined that as fairly strong momentum of project awards has been sustained in the last few years, the construction sector remained the fastest-growing economic sector in 2015. According to Abd El-Razek et al., [2], delay in construction project is considered one of the most common factors that caused a multitude negative effect on the project and its participating parties.

Warren [3], mentioned that construction projects tend to be one-offs. A project team comes together to make a one of a kind improvement on a specific site under conditions that will never be repeated. Methods or technique used in construction project must be carefully assembled and followed to maximize the efficiency of construction process. Every progression ought to be deliberately intended to meet the particulars of the part. Lastly proper measurement and management of financial plays the most crucial part in construction project so that the construction process flow according to the actual plan. The 5M's of construction fundamental must be understand completely in order to apply it in construction field and to avoid delays.

Delays in most cases will cause additional cost which it could be direct, indirect or impact cost. Delay in the construction industry is not a recent issue. It has become an epidemic and a taboo that ever players in the construction industry try to avoid. The causes of delays must first be determined in order to mitigate the time lag from contract completion date or cost overrun during the construction project.

2. Investigating the Project Delays

The late completion of a project is a common problem that happened to many construction projects which is it can be a thing that either contractor or client cannot avoid during construction project. Delays in construction will surely cost money and time overrun. A lot of factors can contribute to construction delays. According to the construction industry prospects 2017 in Construction Industry Development Board of Malaysia (CIDB) website, this sector had experienced the economy downturn in 2015 which it highly affect the economy in Malaysia. Moreover, Rafieizonooz [4] stated that shortage of labor, delay in payment and unskilled labor are the most reoccurring causes of delay in recent years.

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Yin [5], mentioned that during the tough and extreme periods, this sector also confronted with financial crisis in 2008. M. W. Hussin et al., [6] considered the negative effects of delay on construction projects such as increased cost, extension of time, dispute between parties and dissatisfaction, focus on delay in construction industry is vital. These negative impacts are giving adverse impact towards construction industry thus, it leads to slow progress in project and also cost and time overrun.

This research was aimed at identifying the factors of delay, major factors of delay, and methods of mitigating delays in construction project in Klang Valley construction project. To achieve the aims, objectives have been identified as followings; 1) To investigate the factors that causing construction delays in Klang Valley; 2) To identify the major factor that causes construction delays in Klang Valley; and, 3) To propose the delays mitigation action.

This research will investigate the factor that causes construction delays in construction projects from a random sample of construction companies in Klang Valley including Kuala Lumpur, Putrajaya, Shah Alam and others. The targeted respondent is contractor G7 that were registered under Construction Industry Development Board Malaysia (CIDB). Klang Valley was chosen as the sampling city as it comprises the majority of total 3074 of G7 contractor according to the CIDB official portal. The data is gathered through a detailed questionnaire survey.

3. Construction Industry & Construction Delay

Peiffer [7], outlined that the year 2016 was predicted to be a strong year for construction industry where Dodge Data & Analytics' 2016 Construction Outlook report had expressed an outcome in advance of 6% growth globally, with construction value approaching $712 billion. In Malaysia construction sector, this industry has been playing a vital role in economy's aggregate of the country. This industry has contributed a lot toward economy in Malaysia and its Gross Domestic Product in terms of profit, capital formation and job creation. Despite the successful achievement, the construction project has to bear with the same problem which is time and cost overrun. There are lot of construction projects that has been done or still running in Malaysia, which include residential or non-residential construction, civil engineering, mechanical engineering, electrical works, plumbing works, tiling works, plastering and others.

In the investigation conducted by Mohamed M. Marzouk [8], it depicted that delays are a time overrun either past the agreement date or past the date that the gatherings have settled upon for the conveyance of the venture. Al-Heiji [9], has characterized that delays can be time overrun either past finishing date determined in an agreement or past the date that the parties agree upon for delivery of a project. It is a project slipping over its planned schedule and is considered as the common problem in construction projects.

Sabri [10], claimed that delays can be categorized into two type, namely excusable delays and non-excusable delays. An excusable delay was defined as unforeseeable and outside the ability to control of the contractor. On the other side, non-excusable delays have a meaning of defers that are predictable or inside the contractual worker's control.

Mohd. Razali et al., [11], factorized the causes of delays into two parts which it can be internal causes or external causes. The internal causes are the factors that related to client, contractors and consultants as shown in Table 1.

Table 1: Causes of Delays

Internal causes	External causes
Internal causes of delays comprise the causes emerging by four parties related to the construction projects. They are the client, designers, contractors and consultants	Differ from internal causes, the external factors come from the government, suppliers, or weather

Construction delays or the late completion of activities from its actual schedule as per contract will surely effecting several or whole projects. According to Mishra [12], construction project is basically a temporary attempt with specified time and cost to create a unique product. In the study of delays in construction projects, its types, effects and management [12], outlined that the impacts of delays can be categorized into several parts namely overtime, over cost, dispute, negotiation, abandonment, litigations and lawsuits.

As to reduce the severe impact on construction projects that come from the factor of delays, a mitigation action should be proposed. Griffith [13], observed that in order to avoid the conflicting effect in construction projects, the contractor plays the most significant role amongst all. The mitigation actions are the contractor should be alert and updated about the construction program. Next the contractor should stop work, reduce cost and keep themselves out of this issue during the specific time if the affected activities are not on the critical path. In contrast to that, shuffle the resources to other areas or a simple rearrange it may minimize the impacts of the delay.

4. Research Methodology

The first objective was identified by reviewing literature from several researches that related to this study. The literature review or the primary data of this study was carried out to identify the factors that contributes to delays. This research used qualitative method. A questionnaire survey method has been selected to identify the major factor of delays that occur in construction industry in Klang Valley. The questionnaire booklet was distributed to related field that involved in

construction projects such as client, contractors, consultants, and others.

This survey was divided into three parts namely respondent particular, factors of delays and mitigation method to minimize delays. The first section is asking about personal information on the detail of the respondents included their working experience in construction building projects, their position in the company, job status, and etc. Second section is based on the Likert-scale. The ranking consists of five levels (1) very low contributing, (2) low contributing, (3) medium contributing, (4) high contributing, and (5) very high contributing. The respondents were asked to rank the factors of delays according to the level that was mentioned before. A total of 31 factors were categorized into four (4) main groups which are client related factors, consultant related factors, contractor related factors, and external factors. The factors of delays were listed in Table 2.

The third section also using Likert-scale consist of (1) very low effective, (2) low effective, (3) medium effective, (4) high effective, and (5) very high effective. The respondents were asked to rank the effective method to minimize delays and there is also an open end question that asked respondents to give suggestion or recommendation to mitigate delays from occurring again.

The major factor of delays and the action that should be taken to mitigate delays were identified by using descriptive statistics, as stated by Seirs (2010) [16], that taking the mean descriptive statistic where these measures may use graph, tables, and general discussion to ease the meaning of the analyzed data. By using the mean value, the most common patterns of the data set will be analyzed.

5. Analysis Discussion

5.1 Factors of Delays

The factors that caused delays in Klang Valley were identified by using the primary data which is from the previous research. The factors of delays were listed through reviewing literature from past research. A total of 31 factors of delays were listed under four main groups namely client factor, contractor factor, consultant factor and external factor.

Table 2: Factors of Delays

Category	No.	Causes of Delays	References
Client Related Factors	F1	Delay in progress of payment	(Abd El-Razek, 2008) [1], (Al-Heiji, 2006) [4], (Srdić, 2015) [18].
	F2	Delay to deliver the site	
	F3	Changes of order	
	F4	Late in approving or revising the document design	
	F5	Mitigate the drawing or material's sample approval	
	F6	Slow in making a decision	
	F7	Lack coordination with the contractors	
	F8	Selection of contractor should not be cost driven	

Continue Table 2: Factors of Delays

Category	No.	Causes of Delays	References
Contractor Related Factors	F9	Late in delivering materials	(Al-Heiji, 2006) [4], (Alaghbari, *et al.*, 2007) [3], (Srdić, 2015) [18].
	F10	Financial difficulties	
	F11	Shortage of site labor	
	F12	Coordination and communication problems with other	
	F13	Management site are not well managed	
	F14	Insufficient tool and equipment	
	F15	Ineffective planning and scheduling	
	F16	Lack skills of subcontractor	
	F17	Often changing the sub-contractor	
Consultant Related Factors	F18	Lacking of experiences	(Abd El-Razek, 2008) [1], (Al-Heiji, 2006) [4], (Ahmed, 2002) [2], (Dinakar, 2014) [6].
	F19	Late in approving the changes of works	
	F20	Coordination and communication problems with other	
	F21	Confusion and mistakes in design document	
	F22	The drawing are unclear and not details	
	F23	Insufficient data collection	
	F24	Lack of input from client before designing stage	
External Factors	F25	Absence of materials on market	(M. W. Hussin, *et al.*, 2015) [9], (Al-Heiji, 2006) [4], (Abd El-Razek, 2008) [1].
	F26	Insufficient tools or equipment on market	
	F27	Bad weather conditions	
	F28	Poor economic status	
	F29	Alteration in laws and regulations	
	F30	External caused by the public sector	
	F31	Late in providing services from utilities (electricity, water, telephone, etc.)	

5.2 Majors Factors of Delay

Figure 1 shows the major factor of delays that was put into three main groups namely client, contractor and consultant. From the top ten of factors of delays in Table 3, 50% from the factors are related to the contractors, 20% of them are client related factor, and another 30% factors are from consultant. This means that contractors occupied the most in construction delays of the top ten list of factors that contributes to delays in Klang Valley.

Table 3: Top Ten Factors of Delays

No.	Causes of Delays	N	Mean	Construction Player
1	Financial difficulties	42	4.07	Contractor
2	Confusion and mistakes in design document	42	3.93	Consultant
3	Late in delivering materials	42	3.93	Contractor
4	Changes of order	42	3.90	Client
5	Lacks coordination with contractors	42	3.86	Client
6	Lacks of input from client before designing stage	42	3.83	Consultant
7	Late in approving the changes of works	42	3.81	Consultant
8	Ineffective planning and scheduling	42	3.79	Contractor
9	Coordination and communication problems with client and consultant	42	3.76	Contractor
10	Lack skills of subcontractor	42	3.76	Contractor

Five of the top ten factors that contributes to delays are contractor related which consist of financial difficulties as the highest reoccurring factors that contributes to delay, late in delivering materials ranked third, ineffective planning and scheduling ranked eighth, coordination and communication problems with other ranked ninth and lastly lack skill of subcontractor ranked tenth. All these factors make contractor as the most responsible party that related to construction delays in Klang Valley.

The second of the most responsible party that related to delay is consultant which their related factor were ranked second, sixth and seventh namely confusion and mistakes in design document, lack of input before designing stage and late in approving the changes of works. Lastly is client related factor that ranked in fourth and fifth. Meanwhile the external factors did not get into the top ten factors that contributes to delays in this study.

The major factor with the highest contribution factor is financial difficulties that was related to contractors in Klang Valley. Hence the second objective were identified by analyzing and extracting the factors of delays in Klang Valley. Financial difficulties occupied the most contribution factors in delays based on the questionnaire that was returned by the respondents. The finding of this study is the same as the study of Aziz [14], which the study was about the Ranking of Delay Factors in Construction Projects after the Egyptian Revolution, and a study by Alaghbari et al., [15], also conducted the factor of delays in Malaysia and financial problems seems to be the major factor that cause delays in construction industry.

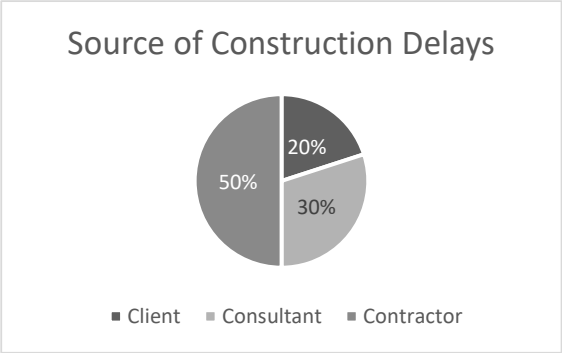

Fig. 1 Source of Construction Delays

5.3 Mitigation of Construction Delay

By using the mean descriptive statistics, the most effective method in mitigating delays were obtained according to the answer in the questionnaire that was distributed to the respondents. Based on Table 4, N is the total number of respondents, mean is the average value of overall answer that was selected by respondents.

The site management and supervision and proper project planning has made to the top two most effective method to mitigate delays. Site management and supervision is the most effective method to reduce delays from the viewpoint of construction players. In construction, it is necessary to ensure the good coordination among all of industry players including client, contractors, consultant and any other professionals that related to it.

Table 4: Methods of Delays Mitigation

Propose Method to Minimize Delays	N	Mean
Site management and supervision	42	4.48
Proper project planning	42	4.43
Use a proper construction method	42	4.14
Effective strategy planning	42	4.12
Frequent coordination with any involved party	42	4.05

Proper and complete design on time	42	4.02
Frequent progress meeting	42	3.88
Provide a clear information	42	3.81
Using an up-to-date technology	42	3.55
Accurate initial cost estimation	42	3.45
Compact or compress the construction duration	42	3.02

A proper project planning and scheduling will create a good path and great measurement tools that is needed to be competitive during the construction project. The project cost can be manage efficiently and a company is better prepared with unexpected events with outlining a plan ahead of time. By sequencing the work properly, the quality control measure can also be maximized and material or other elements can be bought with enough lead time.

6. Conclusion and Recommendation

Based on the research finding, the financial problems are showing the highest mean value that makes this factor as the major factor of construction delays in Klang Valley. In 2015, Malaysia are experiencing the economy downturn with low prices in major national commodity and decreasing value of Ringgit against major world currencies as stated in Construction Industry Prospect 2017, so it is relatable that financial difficulties were identified as the most contributing factors that cause delays in Klang Valley. Furthermore, contractors related factors has been the most contributing factors that cause delays among all groups that has been classified. Thus, contractors play the vital role in mitigating delays in construction industries. Few recommendations have been made according to the finding of this study:

1. A realistic work program must be prepared by the contractor in such a way that all the planning and scheduling are done ahead of time and keep on updating without any delay.
2. The contractor should improve the productivity, good control system for costing, and the quality of project through follow up action.
3. A proper technical training is required and recruiting the skills and experiences worker will help in mitigating delays.
4. Accurate initial cost estimate ensuring all factors are multiplied such as current economic influence during the construction time frame.
5. Defining type of resources with well logistic planning is also critical in ensuring the production on site can be carried out smoothly.
6. A Guidelines on Mitigating Delays should be prepared in order to minimize delays in construction industry.

References

[1] Ratings, R. (2016, June 13). *Business News*. Retrieved from The Star Online: http://www.thestar.com.my/business/business-news/2016/06/13/construction-sector-to-keep-growing/

[2] Abd El-Razek, M. B. (2008). Causes of Delay in Building Construction Projects in Egypt. *Journal of Construction Engineering and Management, 134*, 831-841.

[3] Warren, M. (2017). *Maximize Profitability with 5ME's*. Retrieved from State of the Art Tech-Center: http://5me.com/the-5ms-of-efficiency/material/

[4] Rafieizonooz, M. (2012). Minimizing Delays in Construction Projects in Tehran, Iran. *Research Gate*, 10-30.

[5] Yin, L. T. (2013). *Determinants of Construction Industry Profitability in Malaysia.* Sarawak: UNIMAS.

[6] M. W. Hussin, M. R. (2015). Deterimining the Causes of Delay by Using Factor Analysis in Tehran's Construction Projects. *Research Gates*.

[7] Peiffer, E. (2016, Jan 4). *10 construction industry trends to watch in 2016*. Retrieved from Construction Dive: http://www.constructiondive.com/news/10-construction-industry-trends-to-watch-in-2016/411402/.

[8] Mohamed M. Marzouk, T. I.-R. (2014). Analyzing delay causes in Egyptian construction projects. *Journal of Advanced Research, 5*, 49 - 55.

[9] Al-Heiji, S. A. (2006). Causes of Delays in Large Construction Projects. *International Journal of Project Management, 24*, 349 -357.

[10] Sabri, D. S. (2009). *A comparative study of project construction delays in Johor and Sabah Region*.

[11] M. W. Hussin, M. R. (2015). Deterimining the Causes of Delay by Using Factor Analysis in Tehran's Construction Projects. *Research Gates*.

[12] Mishra, G. (2015). *Delay in construction project, its types, effect and management*. Retrieved from The Constructor, Civil Engineering Home: http://theconstructor.org/construction/delays-construction-projects/13465/.

[13] Griffith, M. (2016, April 19). *Delay Mitigation*. Retrieved from AEOL: http://www.aeol.com.au/databases/news/16/04/hindsblunden_delay_mitigation.html?zoom_highlight=coffey+awards.

[14] Aziz, R. F. (2013). Ranking of Delay Factors in Construction Projects After Egyptian Revolution. *Alexandria Engineering Journal* , 387-406.

[15] Alaghbari, Wa'el; , Mohd. Razali; , Azizah Salim; , Ernawati. (2007). The Significant Factors Causing Delay of Building Construction Projects in Malaysia. *Emerald Insight, 14*, 194-195.