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The Cause and Effect of Delay in LRT3 Depot Construction Project

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Abstract: The construction industry in Malaysia is one of the most significant contributors to economic growth and jobs. However, the increased rate of construction delivery delays is a key worry for the construction sector. In the worst-case scenarios, projects were postponed for more than a year after the contract time had passed. Delay in construction projects is defined as an increase in the amount of time it takes to complete the project. In other terms, a delay occurs when a project is not completed within the agreed-upon timeframe and budget. When projects are delayed, it has a negative impact on several parties, including the developer, contractor, consultant, and client. This research will look at the causes of project delays, as well as the consequences of project delays, in order to make recommendations on how to avoid or minimize project delays. The information was gathered from respondents who worked on the LRT3 Depot Construction and had previous experience of working on a mega construction project.

Keywords: Construction Industry, Construction Delivery, Construction Sector, Delay; Causes

1. Introduction

Construction industry serves as a catalyst for our economy by spawning businesses such as education, finance, manufacturing, and service, among many others. Many issues may emerge throughout the construction project's implementation, with the real issue being delay. Delay is the time overrun either beyond the completion date specified in a contract or beyond the date that the parties agreed upon for delivery of a project (Assaf and Al-hejji, 2006). Delay occurs when a project is not completed within the agreed-upon time frame. The project is running behind schedule, which is a regular occurrence in construction projects. Delays also give rise to disruption of work and loss of productivity, late completion of project increased time related costs, third party claims, abandonment and termination of contract (AbdulRahman H., 2006).

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Delay is one of the most serious issues in the construction industry. Some projects are only a few days behind schedule, while others have been delayed for almost a year. As a result, defining the true reasons for the delay is critical in order to reduce and eliminate delays in any construction project. There are lot of opinion about the causes of delay. Some are traceable to a single party, while others may be traced back to several sources, and many are related to systemic flaws or shortages rather than a specific entity or parties.

According to (John Marrin QC 2002), concurrent delays means a period of project overrun which is caused by two or more affective causes of delay which are of approximately equal causative potency. A condition in which a construction project is delayed by two incidents at the same time, one of which the employer is liable for under the contract and the other of which the contractor is liable. Apart from that, the contractor was able to get new jobs but could not afford to hire extra personnel. This issue will place contractors in a position where they will be unable to complete projects in a timely manner, as well as a problem locating adequate personnel at the new project location. The most common reasons for delays in conventional infrastructure projects, according to Odeh and Battaineh (2002), are insufficient contractor experience and subcontractors.

When construction projects are delayed, the impacts are usually adverse to stakeholders**.** According to Aibinu and Jaboro (2002), they found typical impacts that arise as a result of delay in most regions. The effects are cost overrun, time overrun, dispute, arbitration and litigation and abandonment. (Holm and Bubl, 2002) state that cost overrun can sometimes be attributed to political factors. Politicians lie whether by minimizing or inflating the advantages of initiatives in reselling them and advance their own interests. When a construction project is delayed, the overall cost of the project rises. This is owing to the fact that market pricing for resources change throughout time. As a result, if a delay occurs, the quantity planned for supplies may increase.

The purpose of this study was to identify the causes contributing to the delay of the LRT3 Depot construction project, to investigate the effect of delays in the LRT3 Depot construction project and to determine the methods that can be used to minimize the delays in construction projects.

2. Research Methodology

This paper will concentrate of the literature review and questionnaire survey for the LRT3 Depot construction project. The literature review was conducted using the internet, construction management books and journals, and engineering books and journals. Using prior literature, the information from the causes of construction delays, the impacts of construction delays, and the technique of construction rectification would be utilized to design the questionnaire survey in order to gather data from the intended respondent.

2.1 Data collection

Primary research is research which involved the collection of original data that analyze to elaborate on objectives. It will be collected on site of Depot LRT 3 in Johan Setia Klang. To collect and acquire information from large groups of people, a survey method is employed. People were asked to respond to a specific question concerning their opinion, emption, belief, attitude, and action using this method. The flexibility of this approach of questioning is less than that of an interview. The data will be analyzed depending on the responses of the respondents and interpreted into the simplest data possible.

60 research population will be taken from staff members of Trans Resources Corporation Sdn. Bhd as a civil contractor and 42 where response was received. The sample size should not be too large because the recruitment process is unnecessary and complicated. The number of specimens must yield sufficient and useful tests in order to get the required results.

The sample size estimation approach of Krejcie and Morgan (1970) is employed in this study to determine the suitable sample size for the questionnaire survey. Based on Table 1, for the population size of 60, the sample size that shall answer the questionnaire is 52.

Table 1: The sample size

N	S	N	S	N	S
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	102	700	248	1000	360
150	108	750	254	1500	375
160	113	800	250	2000	377
170	118	850	265	3000	379
180	123	900	269	4000	380
190	127	950	274	5000	381
200	132	1000	278	7500	382
210	136	1100	282	100000	384

The formula for determining the sample size is used. The formula is as below:

$s = X\ 2(1 - P) \div d\ 2\ (N - 1) + X\ 2(1 - P)$ ..... *Eq.* 1

s : required sample size

X^2 : the table value of chi-square for 1 degree of freedom at the desired confidence to level (3.481)

N : the population percentage (assumed to be 0.50 subsequently this will offer the maximum sample size)

P : the population percentage (assumed to be 0.50 sub subsequently this will offer the maximum sample size

d : the degree of accuracy articulated as a proportion (0.05)

2.2 Questionnaire Design

A questionnaire survey was designed to elicit opinions and insights from experienced respondents about the building delays problem. There are four section inside the questionnaire which are Section A (Respondent Background), Section B (Causes of Construction Delay), Section C (Effects of Construction Delay), Section D (Methods to Minimize Construction Delay) and Section E (Comments and Recommendation). The questionnaire is mainly based on Likert's scale of ordinal measure from 1 to 5 according to level of contributing strongly agree (5), agree (4), moderate (3), disagree (2) and strongly disagree (1).

The questionnaire was created based on the goals established early in the process, when the sample size was determined. The respondents were then issued the questionnaire, and the sample process was financed for two weeks after submission. The researchers compile the questions, count the cumulative positive responses, evaluate and measure the results. The data will be calculate by using the Relative Importance Index (RI) and it will be ranking in each category based on the Relative Importance Index (RI).

2.3 Data Representation

The data and findings were then displayed as the final stage. Tables, pie charts and bar charts were utilized for this purpose, as detailed in the next chapter. The ranked characteristics were displayed using tables and bar charts based on the average index analysis. In the meanwhile, pie charts were utilized to display the demographic results, and bar charts were employed to display the study's objective outcomes. Finally, depending on the RII result, the ranking will be displayed in table form.

3. Results and Discussion

3.1 Questionnaire Distribution and Responses

Table 2: Questionnaire Distribution and Responses

Description	Number of Distributed	Number of respondent	Percentage	
			Respond	Not respond
Respondent	52	42	80.77%	12.23%

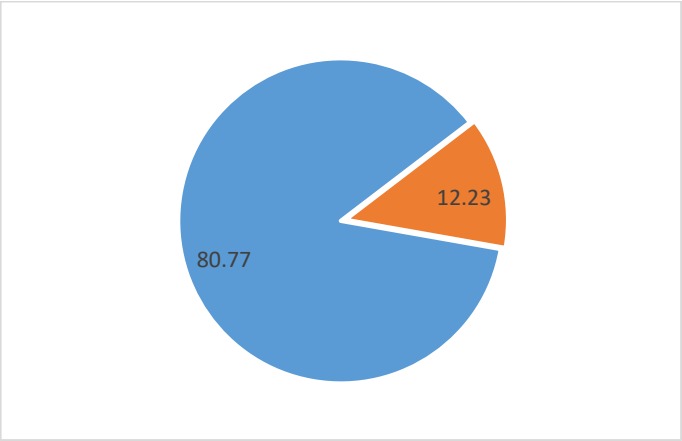

Figure 1: Total number of distributed

3.2 Rank of all the causes from four group (Client, Contractor, Consultant, External)

Table 3: Rank of causes to the delay from four group

Factors	Index	Rank
Delay in approving major challenges in the scope of work	0.88	1
Late in revising and approving design document	0.87	2
Slowness in decision making process	0.84	3
Ineffective planning and scheduling projects	0.84	4
Delay in subcontractor work	0.83	5
Delay in approving shop drawing and sample material	0.82	6
Delay in revising and approving design document	0.80	7
Poor communication and coordination	0.79	8
Effects of subsurface and ground conditions	0.78	9
Weather effect on construction activities	0.77	10
Delay in providing services from utilities	0.75	11
Delay in obtaining permits from municipality	0.70	12
Poor communication between owner and consultant	0.55	13
Accident during construction	0.54	14
Inadequate experience of consultant	0.50	15
Poor communication and coordination	0.49	16
Insufficient contractor experience subcontractor	0.38	17
Delays in site mobilization	0.33	18
Delays in progress payment	0.31	19
Unused of advances engineering design software	0.30	20

The top ten causes from Table 3, there are two form consultant related, four from client related, three from contractor related and only one form external related. It shows that consultant related give 20.00 %, client related give 40.00 %, contractor related 30.00 % and external related 10.00 % as in Figure 2: Top ten causes to the delay.

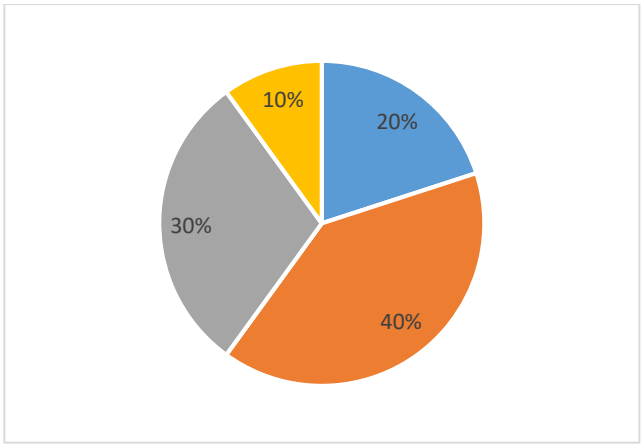

Figure 2: Top ten causes to the delay

3.3 Effects of construction delay

Table 4: The result of effect on construction delay

Effects	Index	Rank
Cost Overrun	0.81	2
Time Overrun	0.84	1
Arbitration and Litigation	0.75	3
Total Abandonment	0.62	4
Dispute	0.46	5

Based on Table 3 and Figure 2, cost overrun, and time overrun was the top of the rank with 0.81 index and 0.84 index respectively. This is due to the causes that have been state on Table 5 ranking of the causes contribute to the construction delay such as delay in approving major challenges in the scope of work and late in revising and approving design document. This two cause give a big impact to the time overrun. Besides that, there are also causes that affect the cost overrun. For example ineffective planning and scheduling of the project.

3.4 Methods to minimize construction delay

Table 5: Methods to minimize construction delay

Methods	Index	Rank
Site management and supervision	0.86	1
Effective strategic planning	0.85	2
Clear information and communication skills	0.84	3
Use proper and modern construction equipment	0.63	4
Use up to date technology utilization	0.36	5

In construction, we must maintain coordination among many professions, manage construction quality and standard compliance, and guarantee that contractors meet deadlines without cutting corners or exceeding financial restrictions. Furthermore, the project manager must ensure that the materials used are those stated in the contract and meet the specifications. Aside from that, strategic planning is

vital for construction organizations since it gives the direction and measuring tools needed to succeed in the industry. Among the many forms of construction, the influence of market demand on the timing of facility start-up is most obvious in industrial construction. To gain time, effective strategic planning is essential to precede the project without major errors. When managing operations, effective communication skills are essential. Because communication involves the interchange of ideas and information, the site supervisor must ensure that his workforce understands his instructions before starting any site activity

4. Conclusion

The first objective of the study has been successfully identified. A total of fifty three factors that causes delays were identified. The factors were grouped into four groups of causes of delays. Group of client was ranked the most significant groups that cause the delay, followed by group contractor, consultant group and lastly is external group. The second objective of this research is to investigate the effect of delays in the LRT3 Depot construction project and it is also have been achieved. There are five effect to the delay which are cost overrun, time overrun, arbitration and litigation, total abandonment and dispute. The result of the analysis found that time overrun was the common effect to the delay construction. The last part of these studies was to determine the methods that can be used to minimize the delays in construction projects. There five methods to minimize the delay: site management and supervision, effective strategic planning, clear information and communication skills, use proper and modern construction equipment and use up to date technology utilization. Site management and supervision was found the most effective methods to minimize the delay in construction.

There are few recommendations revealed in this study to minimize the delay in construction project. The recommendations might be use digital equipment for the progress reporting, improve management methods and assign clear roles and responsibilities.

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References

[1] Assaf, S. A, and Al-Hejji, S. (2006). Causes of delay in large construction projects.”International Journal of Project. Management. 24(4): 349-357.

[2] Abdul-Rahman H. et al (2006). Delay Mitigation in the Malaysian Construction Industry. Journal of Construction Engineering and Management, Vol.132 (2)125- 133

[3] Aibinu, A., & Jagboro, G. (2002). The effects of construction delays on project in Nigeria construction industry. International Journal of Project Management, 20 (8), 593 – 599

[4] Flyvbjerg, B., Holm, M.K.S. and Buhl, S.L. (2002), “Cost underestimation in public worksprojects: Error or lie?” Journal of the American Planning Association, 68(3), 279 – 295

[5] Fugar, F. D., & Agyakwah-Baah, A. B. (2010). Delays in building construction projects in Ghana. Australasian Journal of Construction Economics and Building, 10 (1/2), 103 – 116

[6] Flyvbjerg, B., Holm, M.K.S. and Buhl, S.L. (2002), “Cost underestimation in public worksprojects: Error or lie?” Journal of the American Planning Association, 68(3), 279 – 295

[7] John Marrin QC (2002), society in construction law.

[8] Odeh A. M., & Battaineh, H. T. (2002). Causes of construction delay: Traditional contracts. International Journal of Project Management, 20(1), 67 –73