Major delays in Construction Projects – A case study of Malaysian Armed Forces Camps

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Abstract. The Malaysian Armed Forces (MAF) camp, where most of the buildings, infrastructure, and facilities are located, needs reconstruction or renovation as time passes. The majority of the current buildings in military camps need to be upgraded in order to keep up with the growth in both the number of personnel and military hardware worldwide. Government projects now routinely experience construction delays; MAF is no exception. It is crucial to look into the reasons behind delays to reduce them, and it might be necessary to suggest some workable solutions to lessen delays and enhance the efficiency of the building project in MAF. To relate stakeholders involved in MAF construction projects that can aid in achieving the goal of this research, a quantitative approach was conducted using a questionnaire survey. Out of the 100 participants in the MAF construction project, 75 provided a reliability index of Cronbach Alpha of 0.96. To list the delays in the proper rank, Spearman's Rank-Order Correlation was performed using SPSS version 24. The element's mean is 266.733 according to the analysis. Consequently, it indicates that most respondents broadly agreed with the reasons given for the delays in MAF construction projects. Among the 65 factors contributing to delays, inadequate coordination, communication, supervision, work planning, and project financing challenges ranked as the top five. The range of the delays' means, 4.85 to 4.76, suggests that the most effective mitigating measures must be implemented to overcome the delays. Based on the findings, the required mitigation effort can be taken to improve the delays and save the cost and time of the project. In overall, the project can gain more advantages than disadvantage if the delays can be controlled from the initial stage of the project.

1 Introduction

Project delays usually arise in the executing phase, which is the third group in the project process. Nevertheless, there are also delays in the earlier stages of the planning and closing processes [1]. Every construction project has delays, though they differ greatly in size from one project to the next. Some projects only delay a few days behind schedule others can be delayed by over the year [2]. Some are attributed to a single party, others can be ascribed to several quarters, and many relate more to systemic faults or deficiencies rather than to a group.

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MAF developments are referring to Housing and Construction Policy, Malaysian Armed Forces Command Volume 3 Chapter 13, (*Dasar Perumahan dan Pembinaan, Perintah Angkatan Tentera Malaysia Jilid 3 Bab 13* (*PATM*)) as guidelines for the MAF Services to manage their planning development for the facilities and infrastructure. The Malaysian Armed Forces (MAF) are developing both non-technical buildings like training facilities and married quarters and technical buildings for new camps.

1.1 Delays in MAF Construction Projects

Construction delays are defined as any addition to the execution period that is more than stipulated in the contract or an increase in time beyond the stated date to complete the project within the agreed period [3]. Delay is simply the inability to meet the scheduled time [4]. In principle, delays are related to time overruns and mainly they occur due to various factors which are very much related to the duration of the particular project. However, the duration of the time overrun is subjective and depends on the causes and methods taken to recover the causes. Some take only a few days and some can take years. The project is categorized as a Sick Project (Projek Sakit) if the progress of the physical work has been delayed by more than two months or 20% of the scheduled progress (whichever is earlier) or the contractor is unable to improve the progress of the work within the stipulated duration [5]. A particular unit called the Implementation Coordination Unit (ICU), which is the implementation arm of projects and programs, is responsible for monitoring sick projects until the completion of the project. MAF spent an average of 99.73% of allocation in 2022 but not many projects were successfully executed. Balance is either delayed or regarded as a Sick Project. Therefore, this is intended to achieve an extra milestone by investigating this issue as not many studies have been conducted previously.

The project is mainly controlled by three main factors namely time, allocation, and quality, which will spell out the performance. The phases are divided into six as shown in Figure 1 below [3].

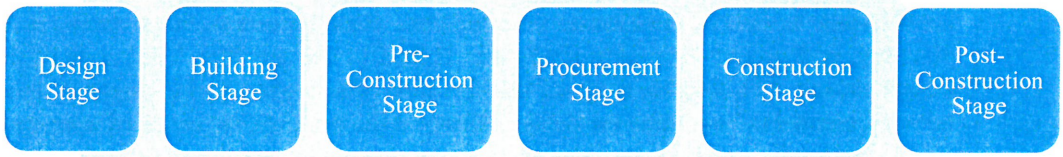

Fig. 1. Construction Phases [3]

Normally each project phase is unique based on the related works that are involved. Each phase will have special management skills that need to be handled by an experienced person. If the problems or issues occur, these will end up either in delay, increased cost, or low-quality work. Therefore, all the six phases of the construction project must be undertaken with a well-planned schedule and dedicated stakeholders.

Several authors had categorized types of delays in common terms and somehow linked one to another. There are three major types of delays; compensable; excusable and non-excusable [6]; Another category of construction delay is concurrent [7]; and the other author mentioned that there are four basic ways to categorize type of delay which he added critical or non-critical as other categories of delay as mentioned in Figure 2 below [8].

Delays are the most common problem faced in the construction industry throughout the world. However, the magnitude of the delay varies significantly between types of construction projects and different locations or sites. Therefore, various studies were carried out to assess the cause of delays in construction projects.

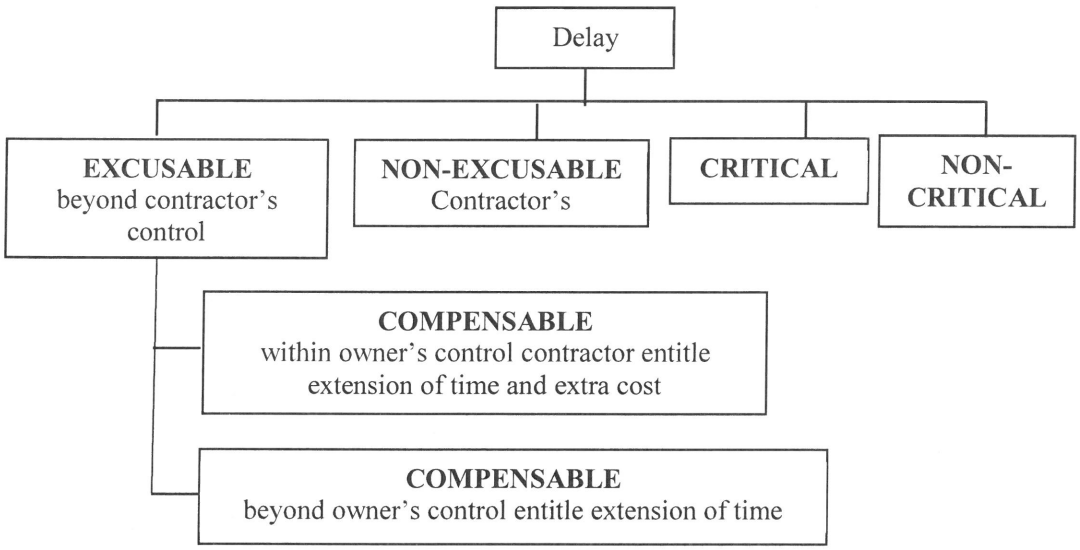

Fig. 2. Type of Delay [8]

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1.2 Effects of Delay

The construction project delay is the most common, costly, complex, and risky problem encountered in construction projects. There were several research pertaining effect of delays [9], [10], [11], [12], [13], [14], [15], [16] and [17]. All the researchers identified six effects of delay as time overrun, cost overrun, dispute, arbitration, litigation, and total abandonment as an effect of construction delays in Hong Kong, Ghana, Vietnam, Malaysia, and Nigeria.

The delays in project delivery affect the financial penalties and also the loss of profit [18]. In which the employer will have to pay extra costs such as designer fees, project financing costs, and also administration costs. The delays in project delivery affect the owner being exposure to the request for the additional loss and expenses claimed by the contractor for the disruption of the work [19].

The evaluation of the loss and expenses claim which resulted due to the delays has not been carried out properly and does not satisfy the parties either the contractor or the owner it will easily turn into legal disputes and will jeopardize the relationship of both parties involved in the construction. The presentation of claims due to delays may generate disputes between the parties and can lead to an arbitration process [20]. When the arbitration fails, litigation may result and this eventually will lead to total abandonment.

The delays in the delivery of materials and equipment to construction sites are often a contributory cause to cost overruns in construction projects [21]. The actual impact of these delays on project costs was found to be on average, only about 0.5 percent of the total budgeted cost of the projects. Construction projects can suffer massively in time and cost

overruns because of mainly two reasons: to gain learning for future projects and to claim compensation from one to another party during the project [22] [23].

Disputes, arbitration, litigation, and total abandonment were the least frequent effects of construction delay. The study carried out in Benghazi City in Libya mentioned the respondents ranked loss of interest by the stakeholder as the most significant effect. Followed by blacklisting by authorities, a waste of money and time also decline in reputation.

2 Methodology

The choice of a methodological approach for addressing research questions and outlining the researcher's strategy for achieving research goals is known as research design. There are four different categories of social research, including evaluation, explanatory, and descriptive research [21]. The research questions comprise the collection of both quantitative and qualitative data, as well as the application of deductive and inductive approaches to analyze the desired information in a research study [24]. After careful consideration and based on the goals of the study, a quantitative study is conducted to determine the reasons behind project delays in military camps and then recommend solutions.

The research methodology chart as stated in Figure 4 served as the basis for conducting the study. By measuring the relationship and degree of strength between the variables, quantitative research is designed to understand decisions based on numerical data [25] [26]. A questionnaire survey is used to find a large enough sample size for the analysis of quantitative data. The purpose of the questionnaire was to evaluate the perspectives of the various stakeholders engaged in the construction of buildings in military camps. This study used a closed-form style of questioning to reduce response times and take into account the fact that respondents knew a great deal about the subject. The survey questions were divided into four (4) sections.

Thirty respondents participated in a pilot study to see if the questionnaire was clear and accurate in addressing the research goals. Four officers who had the most experience responding to the pilot study were given the questionnaire. The results show that some changes need to be made, and editing has been done. Lastly, respondents can clearly understand the questionnaire. Out of the 110 contractors involved in ATM construction projects, approximately 75 contractors completed the questionnaire survey.

3 Findings and Discussion

The analysis of the study to determine the cause of the MAF construction project delay is included in this paper. To determine the reason behind the delay in the MAF construction project, a limited number of analyses were carried out using the simple regression method.

As indicated in Table 1, the Cronbach's Alpha result is 0.960 based on the analysis conducted with SPSS software to verify its consistency. Given that the value is higher than 0.7, the data was deemed dependable and approved for additional analysis.

The mean value of all 62 elements about the reasons behind delays in the MAF construction project is displayed in Table 4.11. If all of the respondents strongly agree, the minimum mean is achieved, and if all of the respondents strongly agree, the maximum mean is reached. The element's mean, which is 266.733, indicates that most respondents broadly agreed with the stated cause of delay. The purpose of standard deviation is to measure how much a set of data values vary or are dispersed.

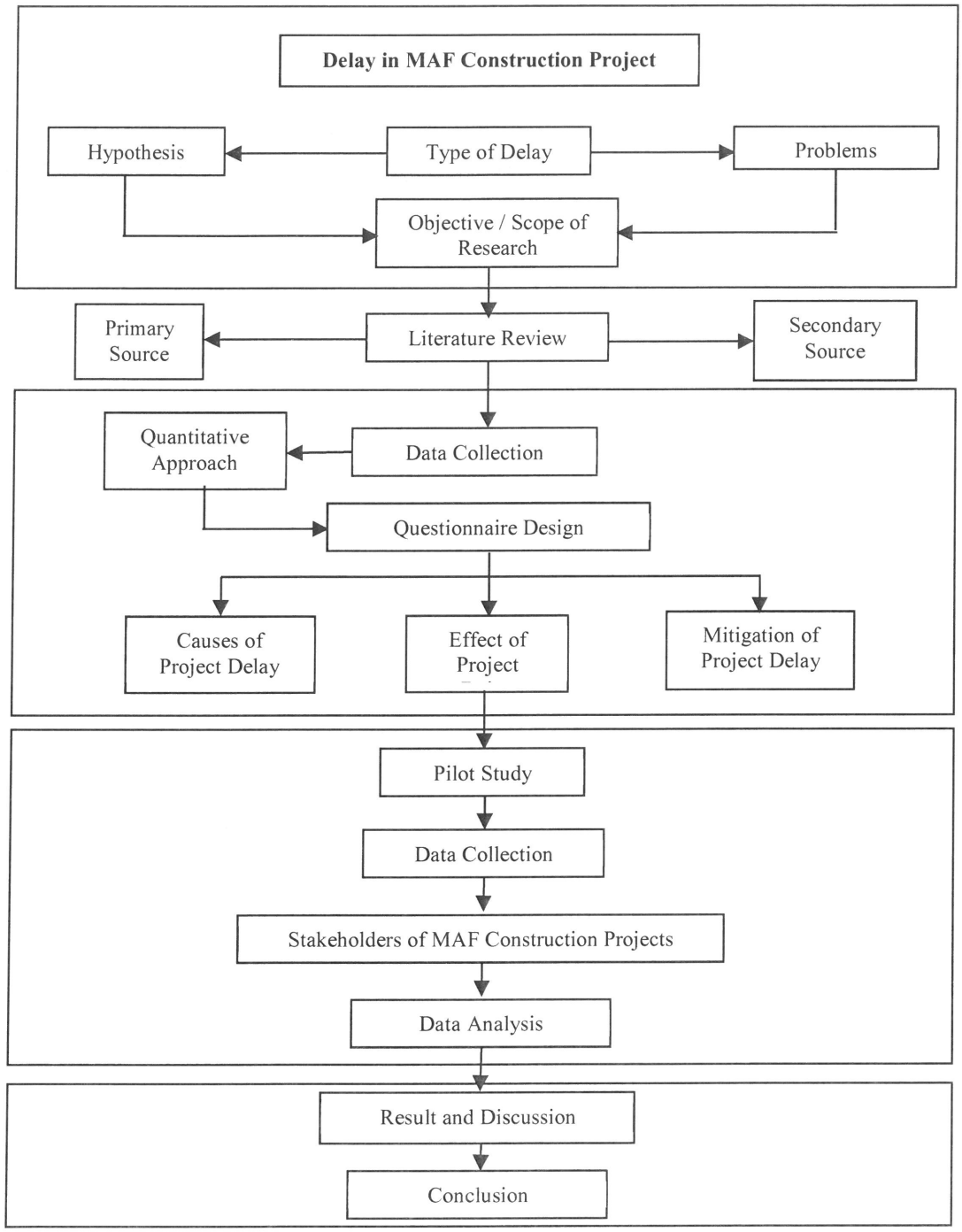

Fig. 4. Research Flow Chart

Table 1. Cronbach's Alpha Reliability Test for Cause of Delay

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.960	.963	62

A simple regression method was used to analyze the data from the survey questionnaire by examining the relationship between the delay's effect and each stage's factor. These included the percentage of respondents who gave each factor a score between 1 and 5 on the significant scale. The mean score and standard deviation from the most significant to the least significant causes of delays are tabulated in Table 2. Among the factors with a mean score of 4.0 or more, the most important ones were chosen. Conversely, a standard deviation near zero suggests that the data points typically lie quite near the set's mean, also known as the expected value. Based on mean score values in Table 2 below, all delay factors were ranked in descending order.

Table 2. Rank of Factors Causing Delay

Factor causing Delay	Mean	Std. Deviation	Rank
Poor coordination	4.8533	.39227	1
Poor communication	4.8000	.59275	2
Poor in work supervision	4.7867	.52744	3
Lack of work program – ineffective planning and scheduling	4.7867	.44398	4
Difficulties in project financing	4.7600	.51570	5
Rework due to errors during construction	4.7333	.50225	6
Conflicts between parties (contractors, subcontractors, consultant and SO(*PP*)/Client)	4.7067	.51395	7
Design problem	4.7067	.48695	8
Project duration not realistic	4.6933	.56886	9
SO (*PP*) - lack of knowledge and experience in project management	4.6533	.55734	10
Suspension of works	4.6267	.73104	11
Slowness in the process of making a decision	4.6267	.58756	12
SO (*PP*) - lack of knowledge on contract administration	4.6267	.56409	13
Underestimation of costs of projects	4.6133	.80360	14
Change scope by SO(*PP*)/Client	4.6000	.56949	15
Late reviewing and approving documents	4.5733	.57359	16
Discrepancy in the contract documents	4.5600	.64179	17
Deficiencies in bill of quantity contract	4.5333	.64375	18
Poor in the construction method	4.5333	.62240	19
Contractor - Lack of knowledge and experience in project management	4.5333	.52847	20

According to Table 2, the ranking for each of the top 20 factors taken into consideration for this study is as follows: the mean score is 4.85, and the minimum score is 2.37. As a result, the factors with the highest significance for project delays were chosen from those with mean values greater than 4. The main reasons behind the MAF construction project's delays are listed in Table 2. However, based on the results displayed in Table 2 above and the mean score of less than 3.0, the most non-significant factor was chosen.

4 Conclusion

A thorough review of the literature revealed 50 reasons why there are delays. The top ten significant factors that cause delays in MAF construction projects were determined by polling of 75 respondents. These factors included poor coordination, poor communication, poor supervision, a lack of a work program (ineffective planning and scheduling), challenges with project financing, rework resulting from construction errors, conflicts between contractors, subcontractors, consultants, and SO (PP)/Client, design issues, unrealistic project durations,

suspension of work, slow decision-making, and SO (PP) - lack of knowledge and experience in project management. The planning, contracting, building, and handover processes are all directly handled by the responders. Therefore the result of the research is significant to the delay problem in MAF construction projects.

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References

1. I.A. Aishatul, A. R. Noorlizawati, M. Zainai, and N. M. Ain (2023). Critical delay factors in typical physical projects: The case of the Ministry of Home Affairs in Malaysia.
2. M.A. Syed, K. Pragny, and G. Dharam (2003). Delays in Construction: A Brief Study of the Florida Construction Industry. ASC Proceedings of the 39th Annual Conference Clemson University Clemson, South Carolina.
3. S.W. Nunally (1980). Construction Method and Management. Englewood Cliffs, NJ: LLP Reference Publishing.
4. G. Agyekum-Mensah and A. D. Knight (2017). The professionals' perspective on the causes of project delay in the construction industry. Engineering, Construction and Architectural Management, 24(5), 828-841.
5. Malaysian Treasury Circular: PK 4.5. Tatacara Pengurusan Projek Sakit dan Pelantikan Kontraktor Penyiap bagi Projek Sakit. Perbendaharaan Malaysia. Retrieved on 25 July 2024.
6. Z. M. Kraiem (1984). Application of microcomputers in analyzing delay claims. Thesis presented to the Univ. of Colorado, at Boulder, Colo., in 601 J. Constr. Eng. Manage. 1987.113:591-602.
7. B.B. Bramble, M.T. Callahan (2010). Construction Delay Claims, 4th ed.; Aspen Publishers: New York, NY, USA.
8. T. Theodore (2009). Types of Construction Delays. Understanding them clearly, and analyzing them correctly. 2nd Edition. Oxford: Elsevier Inc.
9. A.A. Aibinu and H. A. Odeyinka (2006). Construction Delays and their Causative Factors in Nigeria. Journal of Construction Engineering and Management, 132 (7): 667-677.
10. M. Al-Khalil and M. Al-Ghafly (1999). Important Causes of Delay in Public Utility Projects in Saudi Arabia. Construction Management and Economics, 1999; 17(5): 647-655.
11. Irfanullah, Hasmori, M. F., Memon, M. H., & Ismail, R. (2023). Critical Factors and Mitigating Measures of Construction Delays of Pakistani Building Construction Projects. International Journal of Sustainable Construction Engineering and Technology, 14(2), 240-249
12. D.W. Chan and M.M. Kumaraswamy (1997). Comparative Study of Causes of Time Overruns in Hong Kong Construction Projects. International Journal of Project Management, 1997: 55-63.

13. Y. Frimpong, J. Oluwoye and L. Crawford (2003). Causes of delay and cost overruns in construction of groundwater projects in developing countries: Ghana as a case study. International Journal of Project Management, 21, 321-326.
14. D. L. Nguyen, O. Stephen, Q. Truon and C. L. Ka (2004). Large construction projects in developing countries: A case study from Vietnam, International Journal of Project Management, 22(7) 553-561.
15. M. Sambasivan and Y. W. Soon (2007). Causes and Effects of Delays in Malaysian Construction Industry. International Journal of Project Management, 25 (5): 517-526.
16. P.K. Madhav and R. S. Roshan (2024). Examining the causes and effects of time overruns in construction projects promoted by rural municipalities in Nepal. Evaluation and Program Planning, 105, 102436.
17. M. Abonassrya, M. Alam and A. Saifullah (2023). Analysis of Categories That Delay Global Construction Projects. In: Duan, W., Zhang, L., Shah, S.P. (eds) Nanotechnology in Construction for Circular Economy. NICOM 2022. Lecture Notes in Civil Engineering, vol 356. Springer, Singapore.
18. T.J. Trauner (1993). Managing the construction project: a practical guide for the project manager.Wiley, New York
19. D. Arditi and T. Pattanakitchamroon (2006). Selecting a delay analysis method in resolving construction claims. International Journal of Project Management. 24(2): p. 145-155.
20. A.A. Aibinu and G. O. Jagboro (2002). The effects of construction delays on project delivery in Nigerian construction industry, International Journal of Project Management, 593–599.
21. M. A. Yusof, N.Mohammad and Z. M. Derus (2007). Excusable and Compensable Delays in the Construction of Building Project: A Story in the States of Selangor and Wilayah Persekutuan Kuala Lumpur, Malaysia. Journal of the Institution of Engineers, Malaysia, 68(4): 21-26.
22. O. Rathee and T.S. Kalirawana (2019). Comparative Study of Various Delay Analysis Methods in Construction Industry. Global Journal of Engineering Science And Researches.
23. J. Tariq and S. G. Shujaa (2023). Study the delays and conflicts for construction projects and their mutual relationship: A review. Ain Shams Engineering Journal, 14(1).
24. Schutt, R. K. (2018). Investigating the social world: The process and practice of research. Sage publications.
25. Schutt, R. K. (2019). Quantitative methods. The Wiley Blackwell Companion to Sociology, 39-56.
26. J.W. Creswell (1994). Research Design: Qualitative and Quantitative Approaches. Thousand Oaks. CA: Sage.