International Journal of Applied Business and International Management (IJABIM) Vol.7 No.3, pp.30-40, December, 2022
E-ISSN: 2621-2862 P-ISSN: 2614-7432
https://www.ejournal.aibpmjournals.com/index.php/IJABIM

Identification of Project Construction Delay Factors in Depok City, West Java (Study in Department of Housing and Settlement, Depok City)

Ama Muttahizi Ahadan Auhan[1], Ayomi Dita Rarasati[2]
Universitas Indonesia[1,2]
Pondok Cina, Kecamatan Beji, Kota Depok, Jawa Barat 16424, Indonesia
Correspondence Email: ahadanauhan@gmail.com

ARTICLE INFORMATION

Publication information

Research article

HOW TO CITE
Auhan, A. M. A., & Rarasati, A. D. (2022). Identification of Project Construction Delay Factors in Depok City, West Java (Study in Department of Housing and Settlement, Depok City). *International Journal of Applied Business and International Management, 7*(3), 30-40.

DOI:
https://doi.org/10.32535/ijabim.v7i3.1959

Received: 29 September 2022
Accepted: 29 October 2022
Published: 20 December 2022

ABSTRACT

Depok is one of the big cities in West Java, and it is a buffer zone for the capital city of Indonesia, Jakarta. Hence, the Depok city government is very active in developing the city, especially in building housing and settlements. There are many projects handled by the government, but they are often delayed. This study aims to identify the construction project delay factor. This qualitative study was conducted by a literature review, and the results were validated by experts following the provisions of the Project Management Institute. The analysis highlighted five variables affecting the construction project delays. This study is expected to have positive implications and become a reference in mitigating the risk of delays by determining the control measures for future projects in Depok City and other cities.

Keywords: Construction, Delay, Delay Factor, Depok, Housing Project.

INTRODUCTION

Depok is one of the big cities in West Java, and it is a buffer zone for the capital city of Indonesia, Jakarta. Hence, the Depok city government is highly active in developing the city, especially in building, housing and settlements. Assignments related to public service building facilities and infrastructure are delegated to the Department of Housing and Settlement, which has the main task of organizing, compiling, coordinating, and controlling tasks in the building management sector which include building layout planning, construction of regional/government-owned buildings (education, health, and education, and other buildings), and maintenance of regional/government-owned buildings. In carrying out its duties, the Department of Housing and Settlements monitors several delayed construction projects, which lead to construction extension time and pass the city budget.

A construction project begins with the objective of the project in accordance with the contract details in which clients, consultants, and contractors contribute to fulfil the requirements (Tedja & Rarasati, 2021). According to Assaf and Al-Hejji (2006), construction project delays are the condition of missing the deadline of project completion from the time specified in a contract or agreed upon by the parties involved in a construction project. Project delays are highly detrimental to the project owner, the contractor, the consultant, and especially the community, who cannot take full advantage of the development results. In 2019, the Department of Housing and Settlements, Depok City, was trusted to manage a budget of IDR326,547,481,157 divided into 277 work packages presented in Table 1.

Table 1. Work Package Detail in 2019

No	Package Type	Number of Packages
1	Direct Procurement of Consulting Services	124
2	Selection of Consulting Services	34
3	Direct Procurement of Construction Services	22
4	Construction Services Tender	60
5	Progress Payment for the 2018 Work Package	37
	Total	277

However, out of 277 work packages, ten construction work packages with a contract value of IDR60,757,351,766.88 were late, so they had to be carried out past the budget year limit, and the remaining payment progress had to be budgeted for in the budget changes in the following year. Table 2 lists late projects at the Depok City Housing and Settlement Service in 2019.

Table 2. List of Delayed Work Packages

No	Work Package	Physical Progress (%)	Financial Progress (%)
1	SDN Depok 1 Environmental Rehabilitation and Arrangement	92.10	92.10
2	Rehabilitation and Environmental Arrangement of the Mekarsari People's Hall	90.18	90.18
3	Sukatani Stadium Environmental Rehabilitation and Arrangement	85.21	85.21
4	Jatijajar Health Center Development and Environmental Management	95.90	95.90

No	Work Package	Physical Progress (%)	Financial Progress (%)
5	Cinangka Urban Village Office Development and Arrangement	90.08	90.08
6	Reconstruction of the Building for the Storage of Seized Goods from the Depok District Attorney's Office	89.00	89.00
7	Construction and Environmental Arrangement of City Sports Building	96.27	96.27
8	Sukmajaya District Office Development and Environmental Arrangement	96.02	96.02
9	Scouting Building and Environmental Arrangement	94.55	94.55
10	Sawangan District Office Development and Environmental Arrangement	98.04	98.04

The delays in construction projects occur due to several factors. Choong Kog (2018) and Wuala and Rarasati (2020) suggested five elements related to project delays: project owners, contractors, consultants, shared responsibility, and external factors. According to Kurniawan, Saputra, Safri, and Saputro (2020), several factors of delays include human resources, materials, equipment, project locations, budgets, physical aspects of buildings, design, government policies, weather, unexpected events, and work accidents. This often occurs in work carried out by the Housing and Settlement Service and even other technical services in Depok City and makes regional development to improve aspects of service to the community less than optimal.

Delay is a risk in a construction project (Kurniawan et al., 2021). For this reason, it is necessary to carry out risk management to improve project time performance. It is necessary to identify corrective and preventive actions on many factors affecting project delays (PMI, 2017). It could be used as a strategy for the good governance of the project performance.

Based on the background and phenomena in the implementation of construction projects at the Depok City Housing and Settlement Service Building regarding construction project delays, this study was conducted to identify what factors influence and become dominant for further continuous improvement so that the project objectives can be achieved following risk management planning. This study is expected to have positive implications and become a reference in mitigating the risk of delays by determining the control measures for future projects in Depok City and other cities.

LITERATURE REVIEW

Delay in Construction Projects

According to Assaf and Al-Hejji (2006), a delay is a condition of missing the deadline for project completion from the time specified in a contract or that agreed upon by the parties involved in a construction project. Similarly, Elhusseiny, Nosair, and Ezeldin (2020) defined delay as the time exceeding the contract period agreed upon by the different parties. Furthermore, in another study, Agyekum-Mensah and Knight (2016) defined lateness as the inability to meet a predetermined time.

Project Construction Delay Factors

Zidane and Andersen (2017) in their research found ten factors of delay in construction projects, namely design changes during construction, contractor's late payment, weak planning and scheduling, weak field management and supervision, incomplete and imprecise design, insufficient contractor experience, financial difficulties for contractors, financial difficulties of project owners, lack of resources (HR, tools and materials, weak worker productivity and inadequate skills, weak contract management, unreasonable estimates of time and cost, the slow quality inspection process, weak communication and coordination, slow decision-making process, damage to tools and inappropriate tool productivity, unseen geological conditions, security and political situation, external stakeholders, slow progress, field handover, interference by the project owner, corruption, Force Majeure, weak project owner commitment and high demand, and internal bureaucracy in the project organization. Asmi, Djamaris, and Ihsan (2019) identified factors affecting delays in construction projects, including the top ten factors that most influence delays in construction projects. They are scheduled delays, frequent design changes, project owner's financial difficulties, incompetent subcontractors, late payment progress by the project owner, worker productivity, delays in the approval of drawing, design delays, poor design, material delivery delay, and equipment delivery delay.

Choong Kog (2018) and Wuala and Rarasati (2020) identified five elements related to project delays: the project owner, the contractor, the consultant, shared responsibility, and external factors. Ramli et al. (2018) examined almost 20 factors that affect the delay in construction projects. They are the accessibility of human resources, lack of communication and management, availability of required resources, inaccurate estimates of work progress, the distance between project actors, weakness in project planning, difficulties in delivery to the field, project location, weak management skills, unpredictable field conditions, weather, decision making time, improper construction methods applied by contractors, poor contractor performance, delays in material and tool delivery, poor technical quality of staff, poor field management, breakdown of tools and fluctuating material prices. Latief, Bux., Al Saadi, and Rahman (2019) examined the factors that affect delays in each construction phase, namely the planning phase, design phase, construction phase, finishing phase, and other factors.

According to Kurniawan et al. (2020), several factors that cause delays include human resources, materials, equipment, project locations, budgets, physical aspects of buildings, design, government policies, weather, unexpected events, and work accidents. Susanti, Fauziyah, and Suwarto (2021) identified factors that influence project delays, including delays in land acquisition, rework, poor planning, the wishes of the project owner, quality of subcontractors, delays in permits, bad weather, cash flow, contract changes, location, late payment, social, legal and regulatory, unstable material prices, inflation. Tahmasebina and Song (2022) found the most significant factors affecting project delays, namely weak planning and scheduling, late delivery of materials, changes in the scope of work by the project owner during construction, weak field management and supervision, the inadequate financial condition of project owners and contractors, the weak experience of the contractor team, low worker productivity, late due to a design error, late payment by the project owner, and slow decision making by project owners and consultants.

RESEARCH METHOD

Research Design

This study was designed with a qualitative approach, namely a literature review (Creswell, 2017). A literature review is used to identify and analyze the factors influencing delays at the Department of Housing and Settlements, Depok City. The factors that have been identified are used as research variables for further validation by the experts. Expert validation of expert judgment is a method used in determining risk. According to PMI (2017) and Sugiyono (2018), it is part of a qualitative research approach.

Variables

This study examines five main factors: project owner, contractor, consultant, shared responsibility, and external factors affecting project delays at the Department of Housing and Settlement, Depok City. In addition to variables, this study also examined supporting indicators that affect project delays. These variables and indicators are based on a literature review which will then be validated by experts.

Questionnaire

The questionnaire in this study is a set of closed questionnaires. This questionnaire is an instrument in data collection used to ask for expert opinions on the variables and indicators in this study. This questionnaire uses the Guttman scale to get a clear "yes" or "no" opinion about the variables and indicators asked in this study.

Experts Profile

This study involves experts asked for their opinion on the variables and indicators. This is an expert validation method. It is an expert judgment method to determine the risks of project delays (PMI, 2017). To achieve this study's objectives properly, the selection of experts must meet certain requirements or a non-probability sampling technique (Sugiyono, 2018). The requirements of the experts are:

1. consisting of 3 to 5 people
2. having at least a bachelor's degree in civil engineering
3. at least ten years of professional experience in the field of construction projects
4. stakeholders in construction projects in Depok City who come from the government, consultants, contractors, professional organizations, and academics.

RESULTS

Literature Review

The results of our literature review (i.e., Zidane & Andersen, 2017; Choong Kog, 2018; Ramli et al., 2018; Asmi et al., 2019; Latief et al., 2019; Wuala & Rarasati, 2020; Kurniawan et al., 2020; Susanti et al., 2021; Tahmasebina & Song, 2022) managed to identify five main factors that affect construction delay time. They are project owner (X1), contractor (X2), consultant (X3), shared responsibility (X4), and external (X5). Variable X1 consists of 13 indicators, variable X2 consists of 18 indicators, variable X3 consists of five indicators, variable X4 consists of two indicators, and variable X5 consists of four indicators. The total indicator of the five variables is 42 indicators (see Table 4).

Expert Judgement

As previously explained, this study requires experts to validate the variables and indicators studied. A total of five experts were involved in this study from various stakeholders such as the government or project owners, consultants, contractors, academics, and professional organizations. They are in influential positions in their respective agencies or companies, such as section heads, directors, heads of study

programs, and honorary councils. Expert education is a master's and bachelor's degrees with work experience ranging from 10 to 24 years. Table 3 shows their profiles.

Table 3. Profile of Experts

No	Expert	Position	Stakeholder	Education	Year of Experience
1	E1	Head of Section for the Construction of Government Buildings and Public Facilities	Government / Project Owner	Master Degree	17 Years
2	E2	Director	Consultant	Bachelor Degree	10 Years
3	E3	Director	Contractor	Master Degree	12 Years
4	E4	Head of Civil Engineering Study Program	Academician	Master Degree	24 Years
5	E5	Honorary Council	Professional Organization	Bachelor Degree	20 Years

Based on the identification results, the experts 100% agree on the variables and indicators. This states that the variables and indicators identified are valid in influencing the construction delay time. The results of the expert judgment are presented together with the variables and indicators in Table 4.

Table 4. Identified Delay Factor and Expert Judgement Results

No	Variable	Code	Indicator	Code	Expert Judgement		
					Yes	No	Conclusion
1	Project Owner	X1	Asset Problem	X1.1	100%	0%	Yes
			Permission Problem	X1.2	100%	0%	Yes
			Budget Problem	X1.3	100%	0%	Yes
			Addendum Request	X1.4	100%	0%	Yes
			Slow Decision Making	X1.5	100%	0%	Yes
			Slow Bureaucratic Process	X1.6	100%	0%	Yes
			Lack of Execution Time	X1.7	100%	0%	Yes
			Lack of Technical Team	X1.8	100%	0%	Yes
			Late Approval Material	X1.9	100%	0%	Yes
			Late Field Handover	X1.10	100%	0%	Yes
			Problems in the Procurement Process	X1.11	100%	0%	Yes

No	Variable	Code	Indicator	Code	Expert Judgement		
					Yes	No	Conclusion
			Late Payment Disbursement Process	X1.12	100%	0%	Yes
			Contract Issues	X1.13	100%	0%	Yes
2	Contractor	X2	Contractor's financial problems	X2.1	100%	0%	Yes
			Material Delivery Delay	X2.2	100%	0%	Yes
			Subcontractor delay	X2.3	100%	0%	Yes
			Soil Condition Not According to Planning	X2.4	100%	0%	Yes
			Inappropriate Material Quality	X2.5	100%	0%	Yes
			Inappropriate Equipment	X2.6	100%	0%	Yes
			Implementation Method Error	X2.7	100%	0%	Yes
			Less Experienced Contractor	X2.8	100%	0%	Yes
			Low Labor Productivity	X2.9	100%	0%	Yes
			Lack of Workforce Competence	X2.10	100%	0%	Yes
			Work accident	X2.11	100%	0%	Yes
			Increase in material and labor prices	X2.12	100%	0%	Yes
			Poor Quality of Work	X2.13	100%	0%	Yes
			The difficulty of Access to Location	X2.14	100%	0%	Yes
			Limited Workspace	X2.15	100%	0%	Yes
			Limited Working Time	X2.16	100%	0%	Yes
			Incorrect Scheduling	X2.17	100%	0%	Yes
			Technical Obstacles in the Field	X2.18	100%	0%	Yes
3	Consultant	X3	Planning Document Delay	X3.1	100%	0%	Yes
			Planning Document Error	X3.2	100%	0%	Yes
			Lack of Quality of Planning Documents	X3.3	100%	0%	Yes

No	Variable	Code	Indicator	Code	Expert Judgement		
					Yes	No	Conclusion
			Less Competent Consultant Personnel	X3.4	100%	0%	Yes
			Less Maximum Supervision	X3.5	100%	0%	Yes
4	Shared Responsibility	X4	Lack of Coordination Between Parties	X4.1	100%	0%	Yes
			Miscommunication Between Parties	X4.2	100%	0%	Yes
5	External	X5	Changes in Government Policy	X5.1	100%	0%	Yes
			Disaster	X5.2	100%	0%	Yes
			Weather	X5.3	100%	0%	Yes
			Environment	X5.4	100%	0%	Yes

DISCUSSION

Choong Kog (2018) and Wuala and Rarasati (2020) identified five factors related to delays in a project. They are project owners, contractors, consultants, shared responsibility, and external factors. These five variables are valid and approved by the experts who are project stakeholders.

Project Owners

There are many problems with project owners, which are the main factors that affect project delays. Asset problems can cause project delays, such as land acquisition (Susanti et al., 2021). In addition, licensing issues make it difficult because many permits must be taken care of and cause project delays (Susanti et al., 2021; Tahmasebina & Song, 2022). Budget problems are also the main factor of project delays (Wuala & Rarasati, 2020). In practice, adding and subtracting work can become a conflict and lead to project delays (Zidane & Andersen, 2017). Because the approval of contract changes takes a long time, slow decision-making and long bureaucracy can cause project delays, even though the projects require quick decisions, such as material approval (Zidane & Andersen, 2017; Wuala & Rarasati, 2020). The short implementation time will cause project delays because the schedule is not ideal (Latief et al., 2019; Tahmasebina & Song, 2022; Zidane & Andersen, 2017). In addition, the lack of a technical team can also cause work delays (Latief et al., 2019; Ramli et al., 2018).

Contractors

Contractors encounter the most problems in the field and frequently create problems, which is one of the main factors affecting construction delays. Sometimes construction work is carried out by contractors with poor finances, thus disrupting the procurement of materials and labor in the field (Asmi et al., 2019; Tahmasebina & Song, 2022; Zidane & Andersen, 2017). This can cause delays in construction projects. Material is one of the important components of construction work. Its delays in delivery and procurement can interfere with project activities (Kurniawan et al., 2020; Tahmasebina & Song, 2022). Sometimes, the work is subcontracted by the main contractor to minimize or share risk. However, if the subcontractor is late in doing the work, this can also cause delays (Asmi et al., 2019; Ramli et al., 2018).

In several cases, different soil conditions were found in the planning documents due to poor planning (Kurniawan et al., 2020; Ramli et al., 2018). This makes it necessary to recalculate or change construction methods and materials, which can cause project delays. Material quality that does not match often causes rework and delays (Choong Kog, 2018; Wuala & Rarasati, 2020). Inappropriate equipment will reduce productivity and make it difficult for workers to complete work (Ramli et al., 2018; Zidane & Andersen, 2017).

Errors in selecting the implementation method can make the execution of a construction project work longer and greatly affect the project completion time (Choong Kog, 2018). The experience of a contractor also greatly influences the resolution of project problems in the field. Lack of experience leads to problem-solving and delays (Tahmasebina & Song, 2022; Wuala & Rarasati, 2020). Low labor productivity makes the completion of a project take longer, resulting in delays (Kurniawan et al., 2020). Lack of competence or expertise in the workforce can hinder the work carried out (Asmi et al., 2019; Tahmasebina & Song, 2022).

Work accidents in the field can hamper the progress of construction work due to a temporary suspension for evaluation and audits related to work accidents (Kurniawan et al., 2020). The increase in the price of materials and labor causes the contractor to recalculate the cost of the project (Susanti et al., 2021). This has the potential to cause delays in construction projects. Poor quality of work has the consequence of repair work, which can cause untimely project completion (Susanti et al., 2021).

The difficulty of access to the project site causes the distribution of materials and equipment as well as labor to be hampered. It is common for contractors to access the project site and cause delays in the implementation of the overall construction work (Kurniawan et al., 2020; Ramli et al., 2018; Susanti et al., 2021).

Limited workspace can also cause project delays because it affects labor and equipment productivity (Wuala & Rarasati, 2020). When construction work is carried out in densely populated areas, the residents often have requests regarding the setting of construction project working hours. This prevents the implementation from being carried out in full/shifts to catch up with the construction project's progress. This may result in project delays.

Scheduling is a mandatory instrument in the management of a construction project. Nevertheless, the scheduling is not carefully arranged so that the field's work does not match the planned schedule (Latief et al., 2019; Tahmasebinia & Song, 2022; Zidane & Andersen, 2017). Technical constraints often appear in the field unexpectedly, such as the appearance of water in the excavation of the foundation, which results in dewatering before casting, or other technical obstacles that can also cause delays Choong Kog (2018).

Consultant Factors

Factors that affect delays also appear in many project consultants. Project planning documents are fundamental in the implementation of a project. If the planning document is late, the project will be late (Latief et al., 2019; Susanti et al., 2021). Errors in planning documents require repairs until the documents are completed. These improvements can also delay the construction project from the beginning (Latief et al., 2019; Zidane & Andersen, 2017). Lack of quality in planning documents can also make project completion take longer since, during implementation, there will be many things that are

not understood by other parties, and make the document must be revised (Choong Kog, 2018; Wuala & Rarasati, 2020).

Incompetent consultant personnel, both planning consultants and supervisory consultants, cause the results of the planning documents and the results of field supervision to be inconsistent with specifications, resulting in revisions of planning documents and work that does not follow specifications during the execution of work (Latief et al., 2019; Ramli et al., 2018). This absolutely results in delays. The supervision carried out by the consultant will affect the results/products of the construction project. If supervision is carried out less than optimally, it will potentially not achieve the aspects of cost, quality, and time as planned (Tahmasebina & Song, 2022; Zidane & Andersen, 2017).

Shared Responsibility Factors

As the implementation of a project requires cooperation, there is a need for shared responsibility. However, some problems arise that cause project delays. Coordination is the main key to the success of a project. It is a factor that affects project delays (Ramli et al., 2018). Good coordination and good communication management can prevent miscommunication. Miscommunication can cause project delays which must be anticipated (Choong Kog, 2018; Latief et al., 2019; Wuala & Rarasati (2020).

External Factors

External factors are factors that occur because they are beyond the control of project stakeholders. However, the impact is so extraordinary that the project is delayed. Government policies, especially those that regulate the construction project process (initiation, procurement, implementation, operations), are often published and change the old rules that have been implemented (Kurniawan et al., 2020). In addition, disaster is an external factor that is uncertain and will cause the project to be terminated (Kurniawan et al., 2020; Zidane & Andersen, 2017). Weather is also influenced by the environment. If the weather is good, the progress of work in the field can be established quickly (Kurniawan et al., 2020; Ramli et al., 2018; Susanti et al., 2021).

CONCLUSION

Based on the results of the analysis and discussion, we underlined five main factors, namely project owner factors, contractor factors, consultant factors, shared responsibility factors, and external factors that affect project delays at the Department of Housing and Settlement, Depok City. These five main factors are also based on agreed supporting indicators affecting project delays. Risk management can use these factors to assess the frequency, impact, and level of risk so that preventive and corrective actions can then be determined to prevent delays. This research is expected to be a reference for other cities in the management of government construction projects.

ACKNOWLEDGMENT

The authors would like to express their deepest gratitude to the Department of Housing and Settlements, Depok City for the moral and material support in completing this research.

DECLARATION OF CONFLICTING INTERESTS

All authors declare that they have no conflicts of interest.

REFERENCES

Agyekum-Mensah, G., & Knight, A. D. (2017). The professionals' perspective on the causes of project delay in the construction industry. *Engineering, Construction and Architectural Management, 24*(5), 828–841.

Asmi, A., Djamaris, A., & Ihsan, M. (2019). *Top* ten similarity ranking for project delay factors in construction industry*. IOP Conference Series: Materials Science and Engineering, 650*, 012006. doi:10.1088/1757-899x/650/1/012006.

Assaf, S. A., & Al-Hejji, S. (2006). *Causes of delay in large construction projects. International Journal of Project Management, 24*(4), 349–357.

Choong Kog, Y. (2018). Major construction delay factors in Portugal, the UK, and the US. *Practice Periodical on Structural Design and Construction, 23(*4), 04018024. doi:10.1061/(asce)sc.1943-5576.0000389.

Creswell, J. W. (2018). *Research design: Pendekatan kualitatif, kuantitatif, dan mixed* (4th ed.). Yogyakarta: Pustaka Pelajar.

Elhusseiny, H. O., Nosair, I., & Ezeldin, A. S. (2021). Systematic processing framework for analyzing the factors of construction projects' delays in Egypt*. Ain Shams Engineering Journal, 12*(2), 1501–1511.

Kurniawan, I, Saputra, P. D., Safri., & Saputro, R. (2021). Development of delay factor model for substructure works in building construction. *Advances in Engineering Research,* 203, 259-264.

Latief, I. Q., Bux., Al Saadi, A. M. D., & Rahman, I. A. (2019). Identification of delay factor in Oman construction industry. *International Journal of Sustainable Construction Engineering and Technology*, *10*(1), 34-45.

PMI. (2017). *Project management body of knowledge.* Pennsylvania: Project Management Institut, Inc.

Ramli, M. Z., Malek, M A., Hanipah, M. H., Lin, C. L., Sukri, M. F. M., Zawawi, M. H., . . . Fuad, N. F. S. M. (2017). Study of factors influencing construction delays at rural area in Malaysia. Journal of Physics: Conference Series, 1049(1):012017.

Ramli, M. Z., Malek, M. A., Hamid, B., Roslin, N. T., Roslan, M. E. M., Norhisham, S., & Mohd, M. F. (2018). Influence of project type, location and area towards construction delay: A review on significance level of delay factors. *International Journal of Engineering & Technology, 7*(4), 392-399.

Sugiyono. (2018). *Metode penelitian kuantitatif*. Bandung: Alfabeta.

Susanti, R., Fauziyah, S., & Suwarto, F. (2021). Assessing factors towards construction project delays, *IOP Conference Series: Earth and Environmental Science, 700,* 012064

Tahmasebinia, F., & Song, V. (2022). Significant factors causing delay in the Cambodian construction industry. *Sustainability*, *14*, 3521.

Tedja, B.A., & Rarasati, A.D. (2021). Development in design stage based on risk to reduce variation order in building construction project at PT. XYZ. *Journal of International Conference Proceedings, 4*(3), 477-483.

Wuala, H. D., & Rarasati, A. D. (2020). *Causes of delays in the construction project for developing Southeast Asia countries. IOP Conference Series: Materials Science and Engineering, 830, 022054.* doi:10.1088/1757-899x/830/2/022054.

Zidane, Y. J.-T., & Andersen, B. (2018). *The top 10 universal delay factors in construction projects. International Journal of Managing Projects in Business, 11*(3), 650–672.