

Analysis of Factors Causing Delays in Execution of Abc Apartement In Bekasi to Improve Time Performance (Case Study Pt. Xyz)

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Abstract

The booming population growth is the reason it is difficult to have a comfortable place to live like housing in several big cities. Various apartment development projects in big cities are carried out by developers to fulfill public needs, besides the high land price and limited land, it is also the reason for the construction of apartments with adequate facilities. Bekasi City is one of the big cities that looks promising for vertical housing seekers because of the low price offered. The purpose of this research is to identify the factor causes of construction delays, the most dominant factors that causes the delay and find control measures consist of preventive and corrective action in order to minimize project delays. This research used quantitative research methods by distributing questionnaires to respondents who are project employees. This research used 3 stage questionnaire and the results will be conducted to test validity and reliability using statistical software and analysis of Importance Index (II). The results of this research the ABC apartment development project has 5 factors that most dominant, consisting of Late Payments by Owner (51.80%), Late Payments to Workers (51.17%), The Owner is Late for Making Decisions (49%), Unoptimal Worker Productivity (42.87%), and Lack of Manpower (42, 00%).

Keywords:

Apartment Projects, Project Delays, Construction Projects, Quantitative Research.

1. Introduction

Bekasi City is one of the big cities that looks promising for vertical housing seekers because of the low prices it offers. Based on Lamudi Indonesia's analysis, the number of apartment searches through Google increased by 30% from 2017 to 2018. Throughout 2017, the number of apartment searches in Bekasi reached 12,760 people. In 2018, this increased to 18,480 people.

With these opportunities, the ABC Apartment Development Project which consists of 2 towers is presented, where each tower has 34 floors. In addition, around the apartment within a five kilometer radius, it is equipped with public facilities such as favorite educational facilities, hospitals and malls. However, at the time of carrying out the construction work there were many mistakes that caused the mismatch of the ABC Apartment Construction implementation schedule from the schedule that had been planned since the beginning which resulted in a work incident on the project.

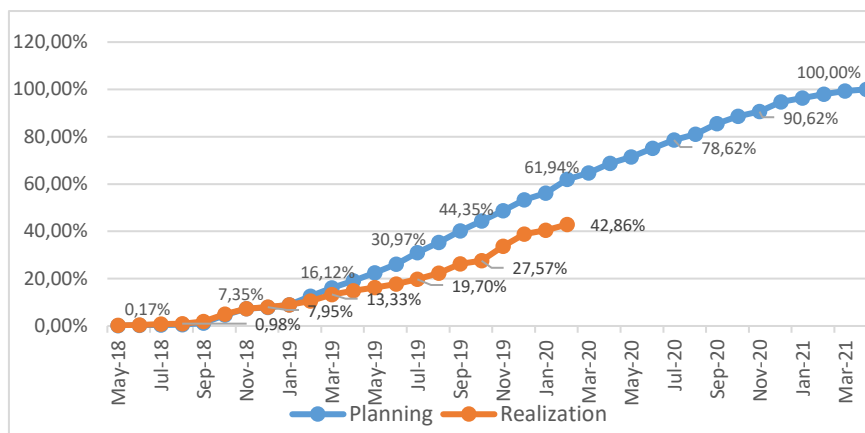


Figure 1. ABC Apartment Project Progress Curve

Source : Project S Curve Documents and Progress Reports, 2020

Based on the S Curve of the project at the beginning of planning and compared to the work progress obtained from the monthly work report there is a difference of 19.08% starting from May 2018 until before the project is temporarily suspended, where work implementation should have reached 61.94% but currently new jobs reached 42.86%.

According to Antarkisa Artidi and Simanjuntak (2019), the causes of project delays can be seen in terms of material, labor, equipment, costs or capital, design changes, relationships with related agencies, scheduling and control, slow monitoring and testing procedures used in the project. environment, contract issues, and the absence of a professional manager consultant.

According to Lessing, Thurnell, and Durdyev (2017), the impact that often occurs is due to delays in construction projects, namely, additional costs, when the construction project is late, it means that the implementation of the project work cannot be completed according to the applicable contract, so there will be additional time that exceeds the agreement and of course cause losses to the project and use the results of project development to be delayed.

Therefore, through this research can be identified the factors causing delay, the most dominant factors and project control measures that can minimize project delays.

2. Methodology

The research location was carried out on the ABC apartment development project in Bekasi. This type of research is a quantitative research. Research variables are based on references and literature studies relating to project implementation. Primary data collection methods are data obtained in the direct field and secondary data as supporting data related to this research. The population in this study were staff and workers at the ABC Apartment Development Project, with a minimum sample size of 30 people.

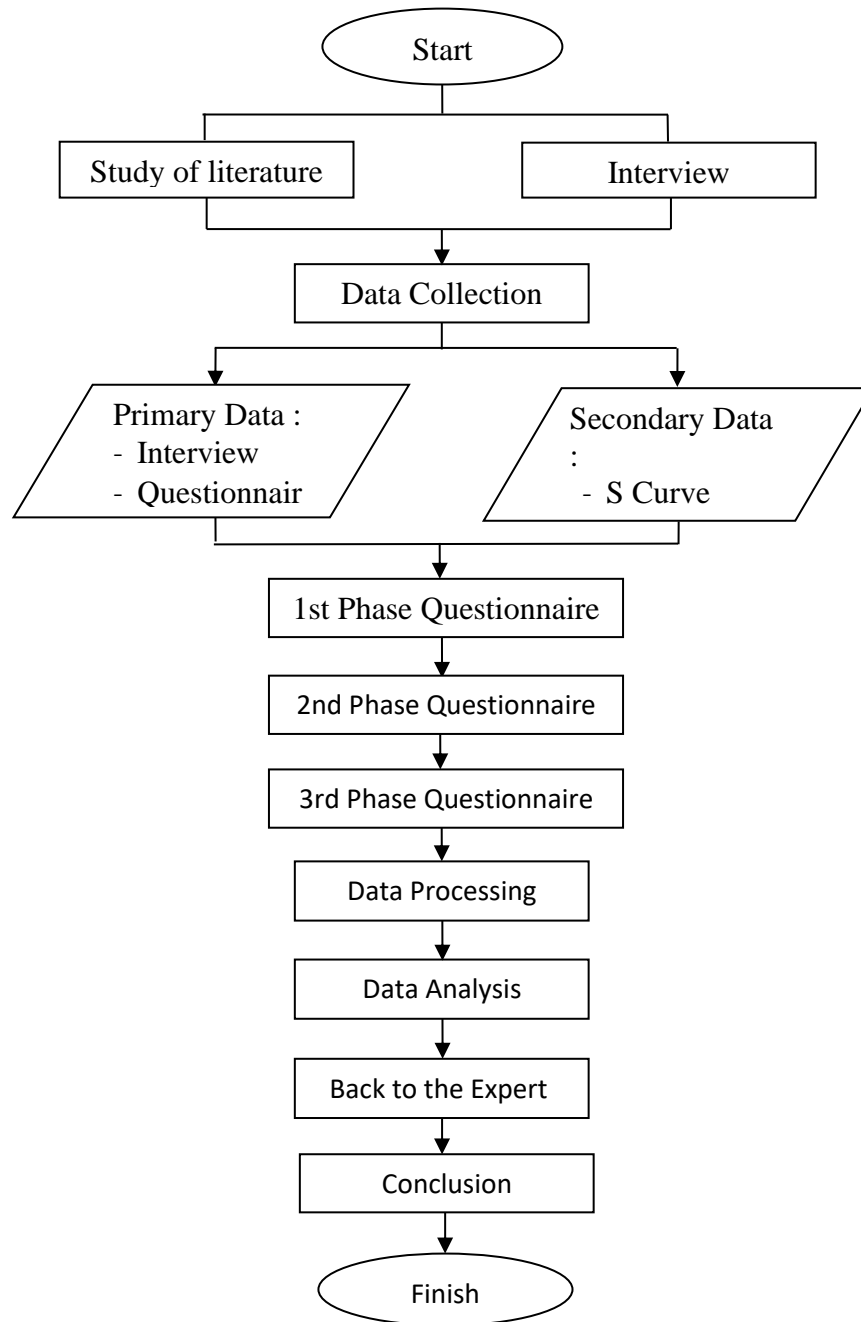


Figure 2. Flowchart
Source: Processed by Author, 2020

Primary data in this study were obtained through a questionnaire survey consisting of several questions addressed to respondents. Meanwhile, secondary data is based on literature study, literature study, S-curve and interviews with several project staff. The data collection technique in this research has three (3) stages, namely by using the first stage questionnaire (expert), the second stage questionnaire (pilot survey), the third stage questionnaire or the final stage (respondents).

Table 1. Research Variable

No	Indicator	Sub Indicator	Research Sources
1	Material	X1. Late delivery of materials	Randy Putra, et al (2018)
		X2. Material change by the owner	Jantje Mangare, et al (2016)
		X3. Scarcity due to specificity	Jantje Mangare, et al (2016)
		X4. Lack of construction materials	Randy Putra, et al (2018)
		X5. Damage materials in storage	Randy Putra, et al (2018)
2	Labour	X6. Lack of manpower	Jantje Mangare, et al (2016)
		X7. Productivity of labour is not optimal	Sebastinus, (2016)
		X8. Less knowledgeable and experienced workers	Sebastinus, (2016)
		X9. Lack of supervision in the field	Mhd Reza Adhiputra (2016)
		X10. Negligence / tardiness of work by sub contractors	Mhd Reza Adhiputra (2016)
		X11. Poor communication between labour and advisory bodies	Randy Putra, et al (2018)
3	Social environment	X12. Weather effects (rain, etc.)	Dedy Asmaroni, (2016)
		X13. Work accidents that occur to workers	Randy Putra, et al (2018)
		X14. Soil conditions	Sebastinus, (2016)
		X15. There are disputes between different parts of the project	Jantje Mangare, et al (2016)
		X16. The complicated bureaucracy in project operations	Jantje Mangare, et al (2016)
		X17. There was a land dispute	Mhd Reza Adhiputra (2016)
		X18. The difficulty of land acquisition by the community	Mhd Reza Adhiputra (2016)
		X19. Late in making decisions by Owner	Jantje Mangare, et al (2016)
4	Execution time	X20. Poor communication between parts of the organization	Mhd Reza Adhiputra (2016)
		X21. Difference in sub-contractor schedule on completion	Jantje Mangare, et al (2016)
		X22. There is added work	Sulaiman, (2017)
		X23. Delays in making reports and work administration	Mhd Reza Adhiputra (2016)
		X24. There is work that needs to be repaired / dismantled due to mistakes of the executor	Mhd Reza Adhiputra (2016)
		X25. Less strict project schedule setting by the owner	Sulaiman, (2017)
		X26. There was no description of the work	Sulaiman, (2017)
		X27. Incorrect schedule planning	Sebastinus, (2016)
5	Design	X28. Late for shop drawing approval	Sebastinus, (2016)
		X29. There is a design change by the owner	Randy Putra, et al (2018)
		X30. Incomplete provision of detailed images	Randy Putra, et al (2018)
		X31. There is a request for changes to work that has been completed	Mhd Reza Adhiputra (2016)
		X32. Disagreement with the rules for making working drawings	Sulaiman, (2017)
		X33. Change in scope of work at the time of implementation	Mhd Reza Adhiputra (2016)
6	Financial	X34. Insufficient allocation of funds	Randy Putra, et al (2018)
		X35. Late payments to workers	Randy Putra, et al (2018)
		X36. Late payment by the owner	Sebastinus, (2016)
		X37. Delay in requests for submission of payments by contractors	Mhd Reza Adhiputra (2016)
		X38. Increase in prices and materials	Mhd Reza Adhiputra (2016)
		X39. Limited authority of the contractor	Mhd Reza Adhiputra (2016)
7	Equipment	X40. Insufficient work equipment available	Mhd Reza Adhiputra (2016)
		X41. Equipment malfunction	Jantje Mangare, et al (2016)
		X42. Delay in delivery of equipment	Jantje Mangare, et al (2016)
		X43. Equipment productivity	Jantje Mangare, et al (2016)
		X44. Lack of availability of equipment operators	Mhd Reza Adhiputra (2016)

Source: Processed by Author, 2020

2.1. First Phase Questionnaire

First stage of questionnaire is a questionnaire given to experts with the aim of finding out and asking for expert opinion regarding whether or not the variables that have been compiled are feasible or not, and eliminating variables that are not used in the questionnaire for the next stage. There are 2 experts in this study.

2.2. Second Phase Questionnaire

The second stage questionnaire (pilot survey) was conducted to see the level of understanding of respondents regarding the variables that had been compiled through the elimination stage by experts through the first stage questionnaire. At this stage the respondents were asked for input, whether the variables in question were understandable or needed to be simplified again.

2.3. Third Phase Questionnaire

The third stage questionnaire is a questionnaire that results from the validation of aspects related to the causes of delays in the project which is the result of the processing of the first and second phase questionnaires. This questionnaire aims to determine the frequency value and its impact on tardiness.

2.4. Data Analysis

The collected data in the field through a questionnaire will be analyzed using statistical techniques.

2.4.1. Validity Test

The data validity test was performed using the SPSS software tool using the number (r) from the Corrected Item Total Correlation results through the Scale menu in the Reliability Analysis option. This analysis is done by correlating each item's score with the total score. Testing using two-party test with a significance level of 0.05.

2.4.2. Reliability Test

The commonly used reliability analysis is the Cornbach Alpha analysis. The test uses the Cornbach Alpha coefficient ≥ 0.6 , which is the value that is considered to be able to test the validity of the questionnaire used in order to determine the level of reliability of the data generated by an instrument. This study conducted a reliability test using the Statistical Package for Social Sciences software program (SPSS 25.0 for Windows).

2.4.3. Frequency Index

Abrar Husen, (2009) suggests that the frequency index is a formula used to measure how often the factors that cause delays occur based on the frequency index. The smaller the rating frequency will be. The frequency index can be calculated as follows :

$$\text{Frequency Index (FI) \%} = \sum_{i=1}^5 \left[a \cdot \left(\frac{n}{N} \right) \right] \cdot \frac{100}{5}$$

2.4.4. Severity Index

Abrar Husen, (2009) suggests that the severity index is a formula used to determine the ranking of each of the factors causing the delay based on the impact or deterioration caused by.

$$\text{Severity Index (SI) \%} = \sum_{i=1}^5 \left[a \cdot x \left(\frac{n}{N} \right) \right] \cdot \frac{100}{5}$$

2.4.5. Importance Index

Abrar Husen, (2009) states that the importance index is a formula used to determine the ranking of each of the factors causing the delay based on a combination of the frequency index and severity index.

$$\text{Importance Index (II) \%} = \left(\frac{\text{FI (\%)} \cdot \text{SI (\%)}}{100} \right)$$

3. Results and Analysis

3.1 First Phase Result and Data Analysis

The results of first phase data collection, the expert responded to the 7 indicators and research variables provided by the author. Based on the results of the validation of technical experts and academic experts, 44 variables were approved by the expert.

3.2 Second Phase Result and Data Analysis

Based on the second phase data analysis results (pilot survey), it can be concluded that the sentences in the variables presented can basically be clearly understood by the respondents. So there is no need for changes or improvements to the variables in the questionnaire.

3.3 Third Phase Result and Data Analysis

In this stage, questionnaires were distributed by distributing questionnaires to 30 respondents who were staff of the ABC Apartment Construction Project. The profile data of the respondents in the stage III questionnaire in this study were then distributed based on gender, education level, and work experience.

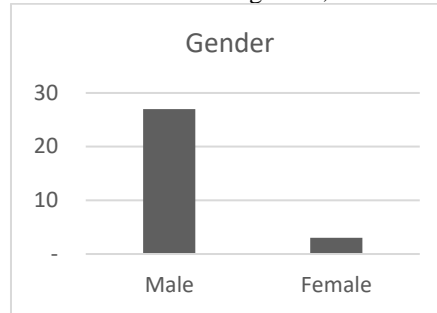


Figure 3. Gender Distribution
Source: Processed by Author, 2020

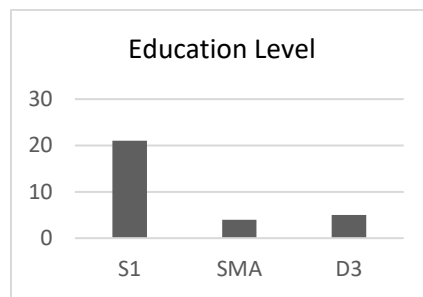


Figure 4. Distribution of Education Level
Source: Processed by Author, 2020



Figure 5. Distribution of Work Experience
Source: Processed by Author, 2020

3.4 Validity Test Results

The validity test was carried out with the bivariate person correlation formula. The output of this validity test is that the data is said to be valid if the Pearson Correlation value is greater than r table. R table is obtained from r with a significance value of 5%, then the r table value of N = 30 is 0.361. Then a statement or indicator is declared valid if $r\text{-count} > 0.361$.

Table 4. Validity Test Results

Variable	Sub Indicator	Total Pearson Correlation		r table	Description
		Frequency	Severity		
X 1	Late delivery of materials	0.664	0.654	0.361	Valid
X 2	Material change by the owner	0.845	0.639	0.361	Valid
X 3	Scarcity due to specificity	0.637	0.585	0.361	Valid
X 4	Lack of construction materials	0.828	0.760	0.361	Valid
X 5	Damage materials in storage	0.621	0.766	0.361	Valid

Source: Processed by Author, 2020

3.5 Reliability Test Results

The calculation of reliability in this study was carried out based on the Cornbach Alpha value. In testing using the Cornbach Alpha coefficient, the test result value must be ≥ 0.6 so that it proves that the questionnaire is suitable for use.

Table 5. Validity Test Result

Indicator	Cronbach's Alpha Item		Cronbach Alpha Value	Description
	Frequency	Severity		
Material	0.737	0.710	0.600	Reliable
Labour	0.778	0.831	0.600	Reliable
Social environment	0.787	0.783	0.600	Reliable
Execution time	0.908	0.915	0.600	Reliable
Design	0.914	0.940	0.600	Reliable
Financial	0.852	0.794	0.600	Reliable
Equipment	0.909	0.934	0.600	Reliable

Source: Processed by Author, 2020

The results of the reliability test of all Cronbach's Alpha values in each indicator if the interpreted value is > 0.60 (Cronbach Alpha value) with 43 variables, so the instruments used in stage III data collection can be said to be very reliable.

3.6 Frequency Index (FI)

The following is the result value of the 5 highest frequency index calculations, using the FI formula based on weighting criteria.

Table 6. Highest Frequency Index Value

Variable	Sub Indicator	Value (%)
X 36	Late payment by the owner	70.00
X 19	Late in making decisions by Owner	69.33
X 35	Late payments to workers	67.33
X 12	Weather effects (rain, etc.)	64.67
X 30	Incomplete provision of detailed images	64.00

Source: Processed by Author, 2020

3.7 Severity Index (SI)

The following is the value of the results of the 5 highest variable severity index calculations, using the SI formula based on weighting criteria.

Table 7. Highest Severity Index Value

Variable	Sub Indicator	Value (%)
X 35	Late payments to workers	76.00
X 36	Late payment by the owner	74.00
X 1	Late delivery of materials	70.67
X 7	Productivity of labour is not optimal	70.67
X 19	Late in making decisions by Owner	70.67

Source: Processed by Author, 2020

3.8 Importance Index (II)

Based on the results of the Importance Index data processing, there are 5 variables with the highest Importance Index value which is the most dominant factor causing delays.

Tabel 8. Importance Index Result

Rank	Variable	Sub Indicator	Value (%)
1	X 36	Late payment by the owner	51.80
2	X 35	Late payments to workers	51.17
3	X 19	Late in making decisions by Owner	49.00
4	X 7	Productivity of labour is not optimal	42.87
5	X 6	Lack of manpower	42.00

Source: Processed by Author, 2020

3.9 Final Stage Expert Validation

This stage is the final expert validation stage after obtaining the most influential variables that cause delays in the construction of this ABC apartment.

Tabel 9. Final Stage Expert Validation Result

RANK	VARIABLE	SUB INDICATOR	Expert 1		Expert 2	
			Agree	Disagree	Agree	Disagree
1	X 36	Late payment by the owner	✓		✓	
2	X 35	Late payments to workers	✓		✓	
3	X 19	Late in making decisions by Owner	✓		✓	
4	X 7	Productivity of labour is not optimal	✓		✓	
5	X 6	Lack of manpower	✓		✓	

Source: Processed by Author, 2020

Then, experts can provide input, responses and corrections in the form of preventive and corrective actions against these factors. From several responses given by experts, then the writer summarizes them into one.

Table 10. Action Recommendations for Factors Causing Delay

RANK	MOST DOMINANT FACTORS	ACTION	
		PREVENTIVE	CORRECTIVE
1	Late payment by the owner	The owner should prepare a cash flow project and take into account the source of funds in planning for the construction process	Payments are made according to the contract with a late payment penalty system, the owner is to find a source of funds to pay off the payment
2	Late payments to workers	Contractors should prepare initial funds and take into account financial readiness, it requires proper financial planning from all parties to avoid late payments	Looking for a source of funds for payments to workers, the contractor must have funds for at least the next 3 months
3	Late in making decisions by Owner	Regularly coordinating between agencies through discussion forums with a workforce that is professional and experienced in planning and implementation	Coordinate carefully to get the right decision and study a problem with a professional workforce in order to make decisions quickly

Source: Processed by Author, 2020

Table 10. Action Recommendations for Factors Causing Delay (continued)

RANK	MOST DOMINANT FACTORS	ACTION	
		PREVENTIVE	CORRECTIVE
4	Productivity of labour is not optimal	Perform a professional workforce selection and take into account the number of workers with the number of work items in terms of quantity and quality	The contractor needs to review the adjustment of work stages with the quality and quantity of workforce as well as supervise workers with a target system
5	Lack of manpower	The contractor must carefully calculate the needs of the workforce in accordance with the volume of work and provide guidance and provision to the workforce	The contractor adds a sufficient number of workers according to the volume and workload and prioritizes an experienced workforce so that project implementation will be completed more quickly.

Source: Processed by Author, 2020

4. Conclusion

1. In the initial expert validation stage, 44 variables have been approved by the expert. Then the questionnaire can be continued to the next stage.
2. Various ranks obtained in the study portray the causes for delay. Among all the causes for delay the top rank goes to Late Payments by Owner (51.80%), Late Payments to Workers (51.17%), The Owner is Late for Making Decisions (49%), Unoptimal Worker Productivity (42.87%), and Lack of Manpower (42, 00%).
3. These issues in the construction projects can be resolved by paying some more attention. It is observed that the extremely critical delays are occurring from the owner side as well as contractor side. Other causes are also contributing significantly for delays in execution of projects are due to lack of expertise in labor skills and equipment breakdown etc.

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