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Analysis of Internal Factors Causing Delays in Jabodebek LRT Project

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Abstract:- Light Rail Transit (LRT) is a rail-based accommodation project that started in 2015. During the implementation process, this project faced internal problems which caused delays in the completion process. Therefore, the purpose of this study is to determine the internal factors that cause delays in related projects. The population of this research is the project field staff and the sample is taken using the saturated sample method where the entire population in this study is the sample. The analytical method used in this study is the Structural Equation Modeling (SEM) method. The results obtained from this study indicate that the internal factors causing the delay in the LRT project are Factor 1: Labor, Factor 2: Material, Factor 3: Equipment, Factor 4: Finance.

Keywords:- *Internal; Lateness; SEM; Project.*

I. INTRODUCTION

Delay in construction projects is a problem that often occurs and has a lot of impact on both the internal project itself and the external parties involved in it. In Indonesia, there are around 60% to 70% of projects experiencing delays in the completion process (Kencana, 2019). The LRT is one of the projects experiencing delays in completion where the second service line is planned to be completed in 2020, but until now (2022) the project has not been completed so it requires an addendum renewal regarding the extension of the completion contract time. After the latest agreement was made, this project is still experiencing delays if it is seen from the progress reports of each station with an average of 8% for all stations in second line. This is due to the implementation conditions in the field, the project encountered several obstacles that caused delays in the project completion process.

The delay in the LRT project can occur due to internal constraints which are related to the human resources involved in it. The availability of manpower in the field is still very minimal and of course the impact on the productivity of the workforce is also low. This can also be triggered when there is a delay in the payment of wages to employees owned and payments to sub-sub-projects related to the project. In addition, the knowledge capacity of each individual involved regarding the specifications of the work and the materials used in this project is also different, so it takes time to balance the knowledge possessed by the process in the field. The workers also several times found discrepancies between the plan drawings and the actual in the field, thus requiring a longer approval process so that the implementation of the work can proceed. This of course will also relate to the calculation of material requirements and the preparation of supporting equipment needed to support the activities of more than one station at the same time.

The factors described above are included in internal factors which of course relate to the company's internal conditions such as finances, resources both in terms of human resources and material resources and equipment used, and project managerial activities (Putra et al., 2017). So the purpose of this study is to find out what internal factors are influential and the most dominant factor influencing the delay in the completion of the Jabodebek LRT project.

II. METHOD

In this study, the researcher used a quantitative type of research. The measuring instrument used in this research is in the form of a questionnaire. The analytical tool used in this research is Partial Least Square (PLS). The population of this study is all field staff of the Jabodebek LRT project with a total of 65 people. As for the determination of the number of samples using saturated samples, so that the number of samples in this study were 65 field staff of the Jabodebek LRT project.

The data that has been obtained is processed using SEM-PLS to test the outer model and inner model. The outer model is needed to measure convergent validity (factor loading, AVE, and communality), discriminant validity (cross loading), and reliability (Cronbach's Alpha and composite reliability values), while the inner model is needed to measure R-Square (R2), Q -Square, and path coefficient values. The construct is declared valid if the loading factor value is more than 0.7, the AVE and communality values are more than 0.5, and the crossloading value is more than 0.7. The measuring instrument is declared reliable if the Cronbach's Alpha value is more than 0.6 and the composite reliability value is more than 0.7. In the inner model, it is necessary to follow the following criteria: the value of R2 is closer to 1, then the relationship between variables is getting closer.

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III. DATA ANALYSIS AND RESEARCH OUTCOMES

The results of this study indicate the internal factors that cause delays in the Jabodebek LRT project using structural equation modeling analysis as shown in the figure below:

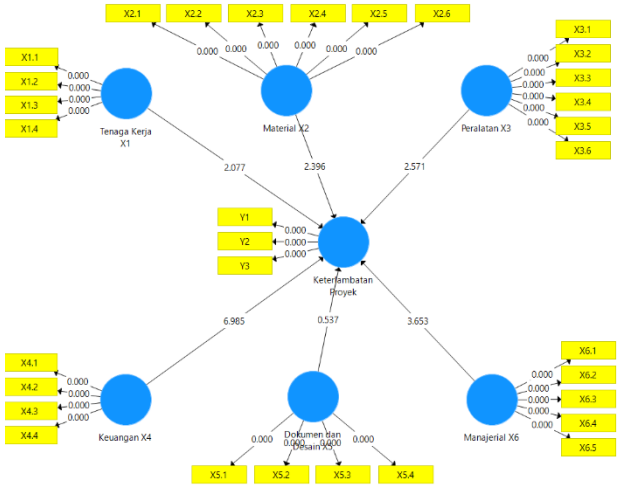

Fig. 1. Structural Equation Modelling PLS

Based on the analysis model that has been carried out above, the following results are obtained:

TABLE I. LOADING FACTOR

	Labor (X1)	*Materials (X2)*	*Equipment (X3)*	*Finance (X4)*	*Document and Design (X5)*	*Managerial (X6)*	*Project Delay (Y)*
X1.1	**0.962**				**0.966**		
X1.2	**0.800**				**0.965**		
X1.3	**0.936**				**0.963**		
X1.4	**0.988**				**0.974**		
X2.1		**0.954**				**0.960**	
X2.2		**0.941**				**0.982**	
X2.3		**0.965**				**0.967**	
X2.4		**0.963**				**0.983**	
X2.5		**0.954**				**0.984**	
X2.6		**0.961**					
X3.1			**0.951**				
X3.2			**0.942**				
X3.3			**0.960**				
X3.4			**0.961**				
X3.5			**0.949**				
X3.6			**0.962**				
X4.1				**0.961**			
X4.2				**0.978**			
X4.3				**0.958**			
X4.4				**0.968**			
Y1							**0.951**
Y2							**0.947**
Y3							**0.933**

It can be seen in Table 1. that the loading factor value of each indicator of the variables of labor (X1), material (X2), equipment (X3), finance (X4), design and documents (X5), managerial (X6), external environment (X7), and project delay (Y) is more than 0.7. So it can be seen that all indicators of each variable are declared valid.

TABLE II. AVE

	Average Variance Extracted (AVE)	*Conclusion*
Labor (X1)	**0.854**	**Valid**
Materials (X2)	**0.914**	**Valid**
Equipment (X3)	**0.911**	**Valid**
Finance (X4)	**0.934**	**Valid**
Document and Design (X5)	**0.935**	**Valid**
Managerial (X6)	**0.951**	**Valid**
Project Delay (Y)	**0.890**	**Valid**

In Table 2. it can be seen that the Average Variance Extracted (AVE) value of each variable is more than 0.5. So it can be seen that all variables are declared valid.

TABLE III. COMMUNALITY

	Communality	*Conclusion*
Labor (X1)	**0.854**	**Valid**
Materials (X2)	**0.914**	**Valid**
Equipment (X3)	**0.911**	**Valid**
Finance (X4)	**0.934**	**Valid**
Document and Design (X5)	**0.935**	**Valid**
Managerial (X6)	**0.951**	**Valid**
Project Delay (Y)	**0.890**	**Valid**

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In Table 3. it can be seen that the communality value of each variable is more than 0.5. So it can be seen that all variables are declared valid.

TABLE IV. CROSS FACTOR

	Labor (X1)	*Materials (X2)*	*Equipment (X3)*	*Finance (X4)*
X1.1	**0.962**	**-0.021**	**-0.124**	**-0.046**
X1.2	**0.800**	**-0.063**	**-0.175**	**-0.108**
X1.3	**0.936**	***0.006***	***-0.178***	***-0.030***
X1.4	**0.988**	***0.001***	***-0.057***	***0.04***
X2.1	**0.008**	**0.954**	***0.053***	***0.051***
X2.2	**-0.066**	**0.941**	***0.186***	***0.029***
X2.3	**-0.087**	**0.965**	***0.173***	***0.130***
X2.4	**0.004**	**0.963**	***0.074***	***0.018***
X2.5	**0.007**	**0.954**	***0.160***	***0.066***
X2.6	**-0.038**	**0.961**	***0.201***	***0.125***
X3.1	**-0.057**	***0.298***	**0.951**	***0.200***
X3.2	**-0.109**	***0.303***	**0.942**	***0.363***
X3.3	**-0.132**	***0.300***	**0.960**	***0.375***
X3.4	**-0.072**	***0.290***	**0.961**	***0.293***
X3.5	**0.033**	***0.291***	**0.949**	***0.263***
X3.6	**-0.147**	***0.286***	**0.962**	***0.403***
X4.1	**0.009**	***0.078***	***0.171***	**0.961**
X4.2	**0.000**	***0.099***	***0.248***	**0.978**
X4.3	**0.059**	***0.083***	***0.298***	**0.958**
X4.4	**-0.024**	***0.055***	***0.235***	**0.968**
X5.1	**0.188**	***0.105***	***0.290***	***0.162***
X5.2	**0.100**	***0.088***	***0.268***	***0.286***
X5.3	**0.192**	***0.140***	***0.290***	***0.201***
X5.4	**0.139**	***0.054***	***0.474***	***0.375***
X6.1	**-0.073**	***-0.007***	***0.382***	***0.343***
X6.2	**-0.031**	***0.025***	***0.417***	***0.326***
X6.3	**-0.060**	***-0.022***	***0.388***	***0.354***
X6.4	**-0.024**	***0.009***	***0.410***	***0.356***
X6.5	**-0.076**	***0.020***	***0.269***	***0.001***

	Document and Design (X5)	*Managerial (X6)*	*Project Delay (Y)*
Y1	**0.142**	**0.577**	**0.953**
Y2	**0.130**	**0.496**	**0.946**
Y3	**0.099**	**0.558**	**0.935**

It can be seen in Table 4. that the cross loading value of each indicator of the variables of labor, material, equipment, finance, documents and design, managerial, and project delays show a value of more than 0.7. This indicates that all indicators are declared valid.

TABLE V. CRONBACH'S ALPHA AND COMPOSITE RELIABILITY

	Cronbach's Alpha	*Composite Reliability*	*Information*
Labor (X1)	**0.956**	**0.955**	**Valid**
Materials (X2)	**0.984**	**0.986**	**Valid**
Equipment (X3)	**0.980**	**0.983**	**Valid**
Finance (X4)	**0.976**	**0.983**	**Valid**
Document and Design (X5)	**0.977**	**0.983**	**Valid**
Managerial (X6)	**0.987**	**0.990**	**Valid**
Project Delay (Y)	**0.940**	**0.961**	**Valid**

In Table 5, it can be seen that the Cronbach's Alpha value of each variable is more than 0.6. While the Composite reliability value of each variable is more than 0.7. This indicates that all variables are declared reliable.

TABLE VI. R-SQUARE AND Q-SQUARE

	R Square	*Q Square*
Project Delay (Y)	**0.8122**	**0.812**

In Table 6, It can be seen that the results of the R Square value of project delays are 0.812 or 81.2%. This shows that the relationship between project delay variables is considered good. The R Square value indicates that the structural model made provides a good prediction. While the value of Q Square is 0.812 or 81.2% (Q Square > 0). This shows that the model in this study has predictive relevance, where the model used in this study can explain the information contained in the research data by 81.2%.

TABLE VII. PATH COEFFICIENT VALUE

	T Statistics (|O/STDEV|)	*Information*
Labor (X1)→Project Delay (Y)	**2,464**	**Positive and significant**
Materials (X2)→Project Delay (Y)	**1,995**	**Positive and significant**
Equipment (X3)→Project Delay (Y)	**2,361**	**Positive and significant**
Finance (X4)→Project Delay (Y)	**8,527**	**Positive and significant**
Document and Design (X5)→Project Delay (Y)	**0.087**	**Negative and insignificant**
Managerial (X6)→Project Delay (Y)	**3,799**	**Positive and significant**

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In Table 7, it can be seen that the T-Statistics value between labor, material, equipment, finance, managerial, and external environment on project delays is above 1.96. This shows that labor (X1), materials (X2), equipment (X3), finance (X4), managerial (X6) have a positive and significant influence on project delays (Y). The following is a sequence of project delay factors from the most positive and significant, namely financial (X4), managerial (X6), labor (X1), equipment (X3), material (X2). While the document and design (X5) has a T-Statistics value below 1.96. This also shows that the document and design (X5) have a negative and insignificant effect or in other words it can be said to have no effect on project delays (Y) LRT Jabodebek or the fifth hypothesis is rejected.

IV. DISCUSSION AND CONCLUSION

Manpower is one of the factors that need to be considered by the company where this is related to the number of skilled workers required by the project, the productivity of the workforce, differences in traditions/cultures among fellow workers, and the absence of the workforce they have. The results of this study have similarities with the journals made by Putra et al. (2017) and Natalia et al. (2017). This LRT project of course always strives to meet the required number of workers, but there are situations where sometimes the planned number of workers is different from the actual conditions, causing work delays.

The company also needs to review for the specified schedule to bring in the materials and control the materials needed so that their needs can be fulfilled at the planned time and place (Krismayana, 2020). The results of this study support the research conducted by Lee-hoai in Putra, et al. (2017), Maktoumi et al. (2020), and Krismayana, et al. (2020). In the implementation of a construction project, of course, it is necessary to pay attention to indicators of material such as lack of required construction materials, changes in material specifications, delays in material delivery, scarcity of a material, and inaccuracy in ordering the required material.

In addition, equipment is also a resource that is used directly in project implementation so that the planning for the type and amount of equipment needed needs to be adjusted to the size of the project to the working capacity of the equipment itself. The results of this study have similar results with the research conducted by Putra, et al. (2017) and Natalia, et al. (2017). This LRT project needs to pay attention to the equipment factor, especially the indicator with the highest mean, namely the productivity of the equipment owned.

Then the financial factors have similarities with the results of research Oktra, et al. (2019) and Putra, et al. (2017) where finance is the dominant factor affecting project completion delays. Therefore, companies need to pay great attention to every indicator that exists on financial factors such as financial availability during the project implementation process, delays that occur in the payment process from project contractors to stakeholders, lack of incentives, and the national economic situation so that it has an impact on delay in the implementation of related projects.

Document and design factors have a negative and insignificant effect on the variable delay in this project and these results support the research conducted by Immanuel et al. (2020) which in the study revealed that there were design problems that did not affect the work in the field because the project could still do other things before entering the work items that did require design changes. In the actual implementation of this project, when there is a change such as the ceiling design that is owned, the implementer can wait for the work on the design change and carry out other work that can be done at the same time.

These managerial factors have similar results to support the research conducted by Noumeiry and Mursadin (2017) and Triarman and Sekarsari (2018). In this case the company needs to pay great attention to indicators from the managerial side, especially the conflicts that occur between contractors and consultants. However, other things such as the lack of cooperation between the two parties, work disputes in different divisions, poor communication, and the lack of control of the main contractor management over the sub-contractors owned also need attention so as not to cause delays in the project. Conflicts that occur in this project are also an unavoidable part because of course there will be differences of opinion between individuals and others. If this conflict persists in a project,

Based on the results of data analysis, it is concluded that the internal factors that cause delays in this LRT project are labor, material, equipment, financial, and managerial factors. In addition, it can also be seen that financial factors are the most dominant factors that have a positive and significant impact on the delay in the Jabodebek LRT project.

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