

The Effect of Time Performance, Design Change, and Interpersonal Skill on the Success of Flexible Pavement Projects

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ABSTRACT

Roads are a part of infrastructure that has an important role in the transportation system. Some of the variables that influence project implementation include field conditions such as unfavorable weather, difficult field conditions, and social problems that often occur in the field. Incorrect implementation, limited equipment, improper equipment, improper selection of the type of equipment, and work methods used can cause problems during work. The planning for completion of implementation on a flexible pavement road project is 5 months, in which the 1st and 2nd months are coordinating, the 3rd and 4th months carry out the execution or implementation of the project, but in the 5th month it has not been completed and asks an additional time of 50 days or 1.5 months because the budget from the APBN has not been disbursed, the contribution of each position holder and project employee is very important in being able to solve problems or constraints that exist in the project field so that they can be synergized and managed appropriately. Project success is a goal that is used to achieve goals in project implementation and stakeholder satisfaction, good management of a project is a condition of achieving the project's success goals. Based on the method of processing and analyzing the data to be obtained, this research can be categorized as survey research, then it is also considered as a quantitative research which aims to describe phenomena quantitatively or analyze how these phenomena can occur in societies that are interconnected with one another and design changes on project success, design changes on time performance, time performance through interpersonal skill and

design changes through interpersonal skill all have a significant influence on project success.

Keywords: Road, Time Performance, Design Change, Interpersonal skill, Project Success

INTRODUCTION

Roads are part of the infrastructure that has an important role in the transportation system. There are several variables that influence the implementation of the project, including the field conditions such as unfavorable weather, difficult field conditions, and social problems that often occur in the field. Incorrect implementation, limited equipment, improper equipment, improper selection of the type of equipment, and work methods used can cause problems during work. Aspects of design and documentation are also risk factors for time mismatches, including specifications that are difficult to understand, unclear work drawings, non-integrated field documentation systems (Algahtany et al., 2016).

Time delays in a project are caused by poor productivity in the distribution of schedules that are not well planned so that it has a bad impact on project implementation (Almohammad et al., 2018). There were material delays due to a lack of budget planning in the implementation of flexible pavement projects so that the available budget was insufficient.

The planning for completion of implementation on a flexible pavement road project is 5 months, in which the 1st and

2nd months are coordinating, the 3rd and 4th months carry out the execution or implementation of the project, but in the 5th month it has not been completed and asks additional time of 50 days or 1.5 months because the budget from the APBN has not been reduced. According to (Barrie & C, 1992) a design change was caused by inappropriate or incomplete planning resulting in an increase in project costs due to delays in design changes, including design and documentation that could not be applied in the design changes. Project implementation, inadequate resources, and planned materials that are not suitable on the market so that there is a delay and requires a design review so that it can be carried out in project implementation. In a flexible pavement road project, there was a change in the initial contract that had been determined to change to MC0 (Mutual Check 0%), then from MC0 there was another change to MC40 where there was an increase of 10% due to the addition of new items on the pavement project. flexibility, this is because the design in the APBD is not in accordance with the APBN design so that the initial design (APBD) must adjust to the standard design (APBN), then from MC40 it changes back to MC-100 or final quantity so that the existing contract value has decreased by 4 billion.

It can be understood that the contribution to each of the job holders and project employees plays an important role in being able to solve problems or obstacles that exist in the project field so that they can be synergized and managed appropriately. In good and proper interaction and communication, it is an important role to be able to reduce or eliminate potential problems that arise as an influence in the construction of flexible pavement road project infrastructure. Interpersonal Skill is a very important factor in determining the communication process, because each individual will behave in accordance with his own concept. Communication can be said to be effective depending on the quality

of the self-concept, whether positive or negative (Binsaeed et al., 2017)

According to (Dang et al., 2012) Individual ability (interpersonal skill) is an ability possessed by a person to interact socially with others, both in verbal and non-verbal communication with the aim of developing optimal performance in project implementation, then one's ability. to work with others who are suitable in relationships such as initiating contacts, support emotional openness, resolving conflicts. Then also means the ability to manage yourself effectively in working with others in order to complete tasks or work together.

According to (Fandopa, 2012) very few projects can be found that do not experience changes in all planned project stages, these changes can occur in every project cycle, starting from the beginning of the project, mid to the completion stage. And things that are taken into account at the planning stage can no longer be used in relation to data in the project field. Success in a project can be said to be successful if the implementation of the project is completed on time, in accordance with the planned budget and good quality, so that it can lead to high customer satisfaction.

According to (Govan et al., Nd) project success is a goal that is used to achieve the objectives of project implementation and stakeholder satisfaction, good management of a project is a prerequisite for achieving the project's success goals, due to not being fully optimal in road construction, then There is often road inconvenience and insecurity, this can be seen from the technical conditions described above, flexible pavement projects must comply with the principles and principles of effective, efficient, directed and controlled in accordance with the Construction Standard Operating Procedure (SOP) or guidelines applicable and planned as well as technical specifications.

LITERATURE REVIEW

Research on stakeholder analysis has been produced by construction management

experts in Indonesia and international researchers. The subjects and objects in previous studies have provided many new insights in the context of stakeholder

interaction, both in construction projects and in other relevant fields. The following is a list and results of previous research, according to the relevant research material.

Table 2. 1 Previous Research

No	Name & Year of Research	Research Title	Research methods	Object of research	Research result
1	(Qian et al., 2019)	Performance evaluation of flexible pavement with a lateritic gravel base using accelerated pavement testing	Validity test, reliability test and lab test	Road and bridge construction	The full-scale test results were used in this study to analyze and compare the criteria for the pavement structure with different base mats and various thicknesses of the asphalt layer.
2	(Luo et al., 2019)	Robust design approach for flexible pavement to minimize the influence of material property uncertainty	Descriptive statistical design approach, validity test, and reliability test	Road Infrastructure Development Project	A robust design approach to flexible pavement considering the developed failure rutting
3	(Keshk et al., 2018)	Special studies in management of construction project risk, risk concept, plan building, risk quantitative, and qualitative analysis	Risk management	Floating project	Risks of all kinds are gaining importance on the consequences that can result from the event
4	(Wu et al., 2020)	Risk management of public-private partnership charging infrastructure projects in china based on a tree dimension framework	Risk management, Delphi method, and ANP method	Infrastructure development in China	Develop a risk management framework to help better implement PPP in infrastructure project filling.
5	(Khameneh et al., 2016)	Offering a framework for evaluating the performance of project risk management system	Project risk management, performance management	Building project on construction	Although there are various risk management matrices for analyzing the performance of a company's risk management system and monitoring risks within a project.
6	(Republic et al., 2019)	The current state of project risk management in the transportsector	Project risk management on transformation	Project risk management in the transportation sector	To recommend project managers increase the level of education in project risk managers, the results are used in the transportation sector
7	(Govan et al., n.d.)	The resource-base view on project risk management	Project management, risk management, with quantitative methods	The construction industry	To provide a link between strategic planning theory i.e. resource-based view (RBV) and project risk management
8	(Hu & Huang, 2014)	The state of art of risk management standards on tunnels and underground works in china	Risk management	State of the art risk management on tunnels and underground works in china	Tunnels and underground works are a kind of high-risk engineering which need to strengthen risk management according to engineering experiments and 2003-2011 accident statistics in china.
9	(Algahtany et al., 2016)	Introducing a New Risk Management Model to the Saudi Arabian Construction Industry	Risk management; risk mitigation	Construction industry projects in Saudi Arabia	Uses literature search and deductive analysis by recognizing how buyers and buyer representatives are considered the main sources of risk in the construction industry
10	(Van Staveren, 2014)	Innovative Ways to Implement Risk Management in Infrastructure Projects	Risk management methods	Risk management in infrastructure projects	For the implementation of risk management has been introduced by combining the theory and practice of risk, innovation, and change management
11	(Mehany et al., 2006)	Risk-Managed Lifecycle Costing for Asphalt Road Construction and Maintenance Project Under Performance-Based Contracts	Risk management	For road construction and maintenance projects using life cycle costs (LCC)	The risks that contributed to the most sensitivity were discussed and indicated in the sensitivity analysis findings.
12	(Wang et al.,	A Comparison between a	UK analytical	Flexible pavement	The thickness design uses both

	2016)	shakedown design approach and the analytical design approach in the UK for flexible road pavements	method and search approach	structural design	the UK analytical approach and the search approach
13	(Jiang et al., 2018)	Design and experiment of thermoelectric asphalt pavement with power-generation and temperature-reduction functions	RTEG Design Thermoelectric-conversion module	Traditional asphalt road structures: heat-conduction, thermoelectric-conversion, and cold-end cooling	A sphalt pavement tends to absorb solar energy and accumulate heat in high temperatures during the summer, which exacerbates sidewalk rutting, aging of pavement materials, and the urban heat-island effect.
14	(Almohammad et al., 2018)	A Review Of Major Causes Of Delay In Road Construction Projects	Risk Management, Road Construction, Causes of Delays	Road construction project	Delays are one of the main problems faced by road construction projects. Thus, a review of the causes of delays and their sources in project types has been carried out.
15	(Mahamid et al., 2012)	Causes Of Delay In Road Construction Projects	Survey and analyzed, Questionnaire design	Road construction project	The delays caused in road building projects in the West Bank in Palestine were discussed in the field survey. It studies the severity of the causes of delay from the viewpoint of contractors and consultants.

MATERIALS & METHODS

Based on the method of processing and analyzing the data to be obtained, this research can be categorized as survey research. This is considered because the data to be used is questionnaire data as the main source, then it is also considered as quantitative research aims to describe social phenomena or phenomena quantitatively or to analyze how these social phenomena or phenomena can occur in communities that are interconnected with one another.

Research Variable

This study will compare the independent variables with the dependent

variable based on the theories about time performance, design changes, and interpersonal skill that have been described in the previous chapter, so the authors focus their research on the following variables:

Independent Variable

The independent variables in this study are the influence of time performance, design changes, and interpersonal skill on project success. So that the independent variable (X) in this study are :

1. Performance time (X1)
2. Design Change (X2)
3. Interpersonal Skill (X3)

Table 3. 1 Independent Variable

Variable	Indicator	Statement items	Code	Literature	Strongly agree	Agree	Disagree	Strongly Disagree
Time Performance								
X1	Productivity	Unclear division of duties and authorities	X1.a	(Zou & Zhang, 2009)				
	Negligence	The amount of material required is not sufficient	X1.b	(Kuang, 2011)				
	Loss	Material is damaged and does not comply with construction requirements	X1.c	(Lukman, 2010)				
Interpersonal skill								
X2	Field data	Poor data distribution	X2.a	(Curtis & Napier, n.d.)				
	Conflict	The flow of coordination between parties is unclear	X2.b	(Zou & Zhang, 2009)				
	Incomplete planning	Project scheduling is not perfect	X2.c	(Lukman, 2010)				

Design changes							
X3	Communication Process	Unclear division of duties and authorities	X3.a	(Zou & Zhang, 2009)			
	Worker ability	Personnel competence is not in accordance with their duties	X3.b	(Zou & Zhang, 2009)			

Dependent Variable

The dependent variable determined in this study is the success of the project, which consists of several categories, namely :

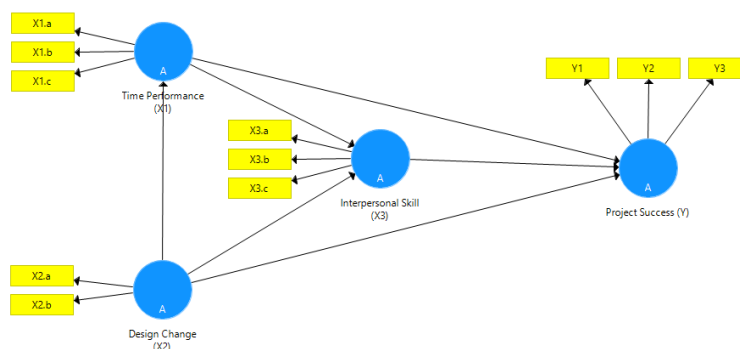
Table 3. 2 Dependent variable

Variable Categorization	Variable	Code	Literature
Project Success			
Y	Time has reached	Y1	(Ekambaram et al., 2005)
	Achieved quality	Y2	(Rogge & RT-153, 2001)
	Reach Cost	Y3	(Curtis & Napier, n.d.)

Of all the variables listed in Table 3.1 and Table 3.2, a pattern of relationships between independent variables and the dependent variable will be arranged according to the rules based on theory and previous studies in the form of Structural Equation Modeling (SEM).

Data Analysis

In this study, several simulations of variable interaction models will be tested to see the magnitude of the influence between the variables from the composition of the independent variables on the dependent variable and on the moderating variable. The interaction model is defined as follows :



Picture 1 : Interaction Model

RESULT

Table 4. 1 Research Object Category

No	Category Name	Information
1	Position	Project owner
		Contractor
		Project Workers
		Project consultant
2	Work experience	<5 years
		5-10 years
		11-20 years
		> 20 years
3	Education	High school
		Diploma (D3)
		Strata 1 (S1)
		Strata 2 (S2)
		Doctorate (S3)

This study will take the population from a flexible pavement road project on Jalan Sudirman, Serang City along 1 km.

With an illustration of the distribution of data through the table as follows :

From the represented image, it can be obtained an overview of the distribution and categorization of the respondents in this study by distributing questionnaires online or online. The total number of questionnaires distributed in this study amounted to 83 respondents, with an average level of education above high school and work experience which in general has exceeded 5 years, so it really illustrates the capacity and qualifications of the respondents enough to be able to represent the object entity in this study.

Table 4. 2 Table of distribution of respondent data

No	Information	Number of Respondents
1	Position	
	Project owner	8
	Contractor	26
	Project Workers	30
	Project consultant	19
2	Work Experience	
	<5 years	2
	5-10 years	3
	11-20 years	9
	> 20 years	5
3	Pendidikan	
	High school	5
	Diploma (D3)	3
	Strata 1 (S1)	54
	Strata 2 (S2)	19
	Doctorate (S3)	2

Loading Factor

The loading factor is used to see how much the indicator contributes in explaining the construct variables. From the estimation of this model, there are indicators that have a loading factor value of less than 0.7, so based on the minimum requirements, it must be removed from the test model and then re-estimate the model. All indicators have a loading factor value > 0.7, it can be concluded that all indicators contribute.

Matrix			
Interpersonal Skills	Project Success	Time Delay	Design Changes
X1.a		0.828	
X1.b		0.860	
X1.c		0.865	
X2.a			0.886
X2.b			0.807
X3.a	0.763		
X3.b	0.841		
X3.c	0.854		
Y1		0.812	
Y2		0.870	
Y3		0.864	

Picture 4. 1 Loading Factor Project Success, Interpersonal skill, Design Changes, on Project Success
Source : Results of Data Processing (2020)

Convergent Validity

In the next process, besides using the loading factor criteria for testing the validity

Table 4. 4 Fornell-Locker Criterion Values

	Interpersonal skill	Project Success	Time Performance	Design Changes
Interpersonal skill	0.820			
Project Success	0.794	0.849		
Time Performance	0.803	0.944	0.851	
Design Changes	0.760	0.851	0.853	0.847

Source : Results of Data Processing (2020)

Composite Reliability and Cronbach's Alpha

model, it can also be seen from the results of the convergent validity value using the AVE value obtained from the SmartPLS output as in the following table :

Table 4. 3 Average Variance Extracted Value (AVE)

Variable	Average Variance Extracted (AVE)
Time performance	0.673
Design changes	0.721
Interpersonal skill	0.725
Project success	0.718

Source : Results of Data Processing (2020)

Table 4.7 shows that all research variables in the sample are above 0.5, it can be concluded that the convergent validity of all the variables is good, that is, one latent variable is able to explain more than half of the variance of the indicators in the average.

Discriminant Validity

In the next process, after carrying out the convergent validity process, the discriminant validity process will be carried out to see whether the measurement indicator does not have an undimensional value, using a discriminant validity measurement instrument by looking at the cross loading value and the Fornell-Locker criteria. The estimation results in the model show that all indicators of the test sample area have a cross loading value on their respective constructs which is higher than the cross loading values for other constructs, so that all indicators can be concluded to have good discriminant validity value. Meanwhile, to strengthen the conclusion of discriminant validity, it is also used by comparing the value of the AVE root to the correlation between latent constructs based on the results of model estimation known as the Fornell-Locker criterion.

Testing of construct reliability on the model is carried out using measuring instruments composite reliability and

Cronbach's alpha. From the model estimation results, the composite reliability value is above 0.7 and Cronbach's alpha is above 0.7 so that all constructs have good reliability.

Table 4. 5 The results of the reliability test value and Cronbach's Alpha

	Composite Reliability	Cronbach's Alpha
Interpersonal skill	0.860	0.758
Project Success	0.885	0.806
Time Performance	0.888	0.810
Design Changes	0.835	0.612

Source : Results of Data Processing (2020)

Ukuran Pengaruh f2

The values at (f2) are equal to 0.02, 0.15 and 0.35. It can be interpreted that the predictors of latent variables have small,

medium and large influences at the structural level, here are the results :

Table 4. 6 Top 10 influence of f2

Hubungan	f sq.	Conclusion
Interpersonal skill -> Project success	0.016	Small
Time performance -> Interpersonal skill	0.262	Big
Time performance -> Project success	1.252	Big
Design changes -> Interpersonal skill	0.062	Small
Design changes -> Project success	0.056	Small
Design change -> Time performance	2.681	Big

Source : Results of Data Processing (2020)

Evaluasi Inner Model

The results of the analysis on this measurement model with the SmartPLS application are shown in the image below, which can explain the results of the R Square value and the t-statistic.

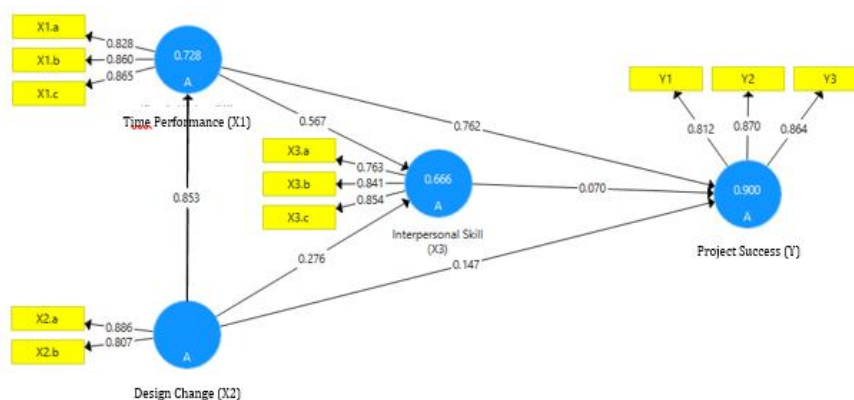


Figure 4. 7 Standardized Measurement Models for Test Samples

Source : Results of Data Processing (2020)

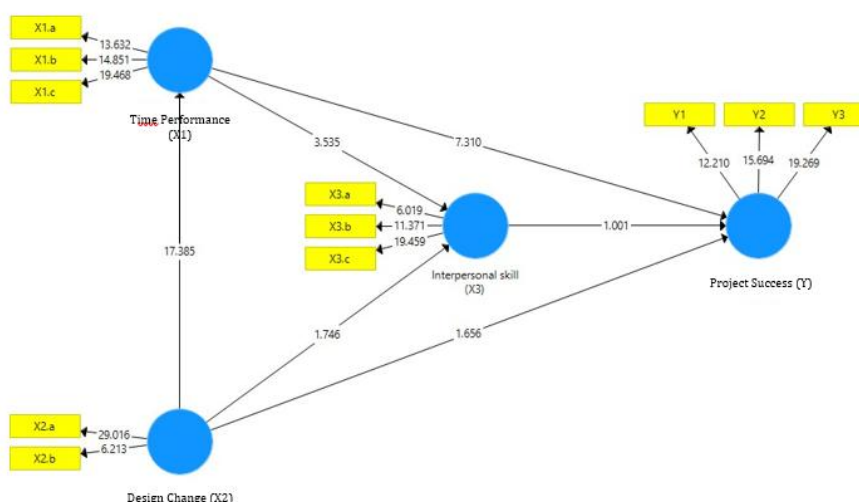


Figure 4. 8 Measurement t-value model for the test sample

Source : Data Processed Results (2020)

From the results of Figure 4.7 above, the equation obtained from this measurement model is as follows :

$$\begin{aligned}
 \text{Project Success (Y)} &= 0.762 (X1) + 0.147 (X2) + 0.070 (X3) & R^2 = 0.900 \\
 \text{Performance Time (X1)} &= 0.853 (X2) & R^2 = 0.728 \\
 \text{Interpersonal skill} &= 0.276 (X2) + 0.567 (X1) & R^2 = 0.666
 \end{aligned}$$

Based on the above equation, it can show that time performance (X1), design changes (X2), and interpersonal skills (X3) have an effect of 90% on project support. While the other 10% are obtained by other factors not included in this study. Large is in accordance with the coefficient equation of 0.762 in a positive and unidirectional direction, which means that a decrease in time performance (X1) will directly influence the increase in the increase in project (Y) by 0.762. Meanwhile, design changes (X2) gave a positive value of 0.147 and interpersonal skills (X3) contributed to project success (Y) of 0.070.

In the time performance equation (X1), design changes (X2) have an effect of 72.8%, while those obtained by other factors are not examined. Design change (X2) has an effect of 0.853 in a positive direction.

Another equation is design changes (X2), time performance (X1) on

interpersonal skills (X3) has a R2 value of 0.666 which means that interpersonal skills (X3) are influenced by design changes (X2) and time performance (X1) is 66 % which is helped by other factors not examined in this study. The time performance equation (X1) has the greatest effect in accordance with the equation at the coefficient of 0.567 in a positive and unidirectional direction, while the design change (X2) gives a positive value of 0.266 in the interpersonal skill equation (X3).

Hypothesis Test

This test is carried out to test the significance relationship partially or individually on each predictor variable against the criterion variable. This hypothesis testing uses a comparison between the t-value and the t-table and its significance value.

Table 4. 12 Path Coefficient, t-count, and Partial Hypothesis

Relationship	Path Coefficient	t-Count	Significance	Conclusion
Time Performance → Project Success	0.762	7.310	0.000	H1 accepted
Design Changes → Project Success	0.147	1.656	0.000	H2 accepted
Design changes → Time Performance	0.853	17.385	0.000	H3 accepted

Source : Data Processed Results (2020)

From the results of the estimation of the model in Table 4.12 which is in the sample measurement area, it can be concluded that time delay on project success (H1), design changes on project success (H2), and design changes on time delay are stated to have a significant effect on this study.

Mediation Hypothesis Test

In addition to testing the partial significance of each predictor variable on the criterion variable, hypothesis testing is also carried out on the significant effect of the mediating variable. This test uses a comparison between the t-value with the t-table and its significance value.

Table 4. 13 Hypothesis of the mediating variable

Relationship	Path Coefficient	t-Count	Significance	Conclusion
Time delay → Interpersonal skill → Project Success	0.637	4.536	0.000	H4 accepted
Design Changes → Interpersonal skill → Project Success	0.346	2.747	0.000	H5 accepted

Source : Data Processed Results (2020)

In the estimation model contained in Table 4.13, this measurement can prove that there is a significant influence on hypothesis 4 (H4) in which interpersonal skill (X3) is a

mediating variable between time performance (X1) and project success (Y) and hypothesis 5 (H5).) stated that there is also a significant influence on interpersonal

skill (X3) as a mediating variable between design changes (X2) and project success (Y).

DISCUSSION AND IMPLICATION

Based on the results of hypothesis testing on the interaction model for the sample data, it can be seen that the hypothesis H1 is time performance on project success, H2 design changes on project success, H3 design changes on time performance, H4 time performance through interpersonal skill on project success, H5 changes in design through Interpersonal skill on project success can be stated that there is a significant influence relationship.

The indicators that have the greatest contribution in explaining the variables in this study are as follows :

Table 4. 7 the value of the highest indicator contribution in all samples

Variable	Indicator	Loading Factor
Time Performance (X1)	Productivity (X1.a)	0.828
	Negligence (X1.b)	0.860
	Loss (X1.c)	0.865
Design Changes (X2)	Communication process (X2.a)	0.886
	Worker ability (X2.b)	0.807
Interpersonal skill (X3)	Field data (X3.a)	0.763
	Conflict (X3.b)	0.841
	Incomplete planning (X3.c)	0.854
Project Success (Y)	Time has reached (Y1)	0.812
	Achieved quality (Y2)	0.870
	Reachable costs (Y3)	0.864

In accordance with Table 4:14, the calculation results on the outer loading above can be analyzed that:

Productivity, negligence and losses have a considerable influence on project success because the level of influence relations has a percentage of 90%. With the unclear division of tasks and authority, it will affect the productivity of workers, so that it will cause negligence to workers and will result in losses in flexible pavement projects resulting in time performance in the project implementation process and has a great influence on the success of flexible pavement projects.

The communication process and the ability of workers have an influence on the success of flexible pavement projects by

80%. With a good communication process and good employee skills it will affect the success of the project. With the ability of workers who have competencies that match the needs and poor communication processes, it will result in small and large design changes, this is due to the ability of workers who do not have competence in planning and lack of poor communication processes, the design that has been planned may change at any time.

Field data, conflict, and incomplete planning had an influence through interpersonal skill on project success by 66%. This is because the field data is incomplete to carry out the implementation of flexible pavement projects, there is conflict between workers, and incomplete planning so that it has an influence through interpersonal skill on project success.

The achievement of time, quality, and cost greatly affects the success of the project because it gives an effect of 80%. This is because the completion of the project on time according to the planned schedule, the achievement of costs with no additions or losses and the achievement of satisfaction with stakeholders can have the effect that the project owner approves and accepts part or all of the workers.

CONCLUSION AND SUGGESTIONS

5.1 Conclusion

Based on the results of research that has been carried out, this study provides an overview of the success of the existing flexible pavement road project in the Tangerang area measured by time performance variables, design changes, and interpersonal skill on the success of flexible pavement projects. From all samples that have been processed in this study, the following conclusions can be given :

Time performance on project success has a significant effect, whether measured in indicators of productivity, negligence and losses in project implementation so that it shows a significant effect on project success. Thus, the better the productivity of the workers involved in

project implementation, the greater the impact on the success of the project and will not cause negligence which results in losses to the success of the flexible pavement project.

Design changes on the success of the project have a significant effect too, both measured in the indicators of the communication process and the ability of workers, this is because if the communication process is not good and the workers' abilities are inadequate, there can be design changes in the implementation that was previously planned, in a flexible pavement project so that it greatly affects the success of a flexible pavement project.

Design changes to time performance have a significant influence on the success of the project because it can slow down the work completion process so that the initial design must be changed to a new design according to existing needs, so it must be re-measured so that the new design can be used and applied to the success of flexible pavement road projects.

Time performance through interpersonal skill has a significant effect on the success of flexible pavement projects both measured in field data indicators, conflicts, and incomplete planning in the implementation of flexible pavement projects.

Design changes through interpersonal skill have a significant effect on project success because they can influence each other, through the skills possessed by workers can minimize design changes in project implementation so as to make and produce appropriate designs, but if the workers do not have the skills then there is a high chance that the design change is not what was expected.

Suggestions

Based on the results of research that has been carried out on the effect of time performance, design changes, and interpersonal skill on the performance of this flexible pavement project, there are suggestions that can be used and

suggestions in further research, namely as follows :

In the current research that is only within the scope of Jalan Sudirman, Serang City along 1000 km, it is hoped that the next research can provide a wider scope for conducting research on flexible pavement projects.

In accordance with the conclusions that have been made, time performance is the factor that has the greatest influence on the success of the project so that it is expected that in carrying out a flexible pavement project, the error rate can be minimized so that the level of influence on time performance is not too large.

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How to cite this article: Febri A, Syafwandi. The effect of time performance, design change, and interpersonal skill on the success of flexible pavement projects. *International Journal of Research and Review*. 2021; 8(1): 112-123.
