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# The Effect of The Implementation Construction Occupational Health and Safety on The Implementation Time of the Muaro Mais – Lubuk Gobing Bridge Construction Project Using Smart PLS

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## ABSTRACT

*The high number of work accidents in Indonesia shows that there are still many workers who ignore the issue of Health, Safety, and Environment (HSE) and its implementation procedures because they prefer to work based on experience. In the implementation of the Muaro Mais - LubukGobing Bridge Construction Project, it is necessary to apply HSE in the project environment because of environmental factors that are at risk of causing work accidents such as high rain intensity, the use of heavy equipment, and river flow that can change at any time so that it can be risky for the implementation time of the project. To reduce the rate of work accidents, it is necessary to have a safety system and work health system to create safety and workhealth systems for workers with It is hoped that the construction project can proceed on time. This study aims to determine the effect of the application of HSE on the Muaro Mais – LubukGobing Bridge Construction Project, West Pasaman Regency on the project implementation time by analyzing data using SmartPLS software version 3.2. This research was conducted by distributing questionnaires to workers on bridge construction projects. The results of this study show the Leadership and Administration Indicators of construction service providers (X1) on Punctuality (Y) with a p-value of 0.28 1 > 0.05, a t-statistic value of 1.079 < 1.96, and an original sample O = 0.272. Work Safety Inspection Indicator (X2) against the variable Punctuality (Y) with a p-value of 0.677 > 0.05, t-statistic 0.416 < 1.96, and original sample O = 0.143. Occupational Safety Management Indicator (X3) on Punctuality (Y) with p-value 0.269 > 0.0 5, t-statistic 1.105 < 1.96, and original sample O = 0.272. The R-Square result for the punctuality variable (Y) is 0.198, meaning that the effect of implementing occupational safety and health (X) on punctuality (Y) is 19.8%. The remaining 80.2% was influenced by other factors outside this study.*

***Keywords:*** *HSE Construction; Punctuality; HSE aplication,SmartPLS Software.*



## INTRODUCTION

Occupational Safety and Health is a field related to the health, safety and welfare of humans working in an institution or at a project site. The purpose of implementing Occupational Safety and Health is to maintain the health and safety of the work environment, as well as protect colleagues, workers' families, consumers, and others who will be affected by working environment condition [1]. Construction work ranks first as the most dangerous job in the world. In the construction industry, the risk of fatal occupational accidents is 5 times higher

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http://cived.ppj.unp.ac.id/index.php/CIVED

and the risk of major injuries is 2.5 times higher than the manufacturing sector, resulting in the highest mortality rate among other sectors [2].

The high number of work accidents in Indonesia shows that there are still many workers who ignore the issue of Occupational Safety and Health and its implementation procedures because they prefer to work based on experience [3]. To prevent work accidents, a Construction Safety Management Systemis needed and can be a reference for consultants, contractors and construction workers, it has been stated in PUPR ministerial regulation no. 10 of 2021, namelythat every Service User and Service Provider in the implementation of Construction Services must apply [4]. In the implementation of construction projects, some unexpected and unanticipated things can occur and affect the required completion time. A project consists of a collection of several work activities that are interrelated with one another. Delays in the completion of a job can occur due to the late start of the activity or the extension of the duration of the activity. Delay in an activity can cause a delay in the overall project [5]. The application of occupational safety and health in construction implementation that is not paid attention to can also cause a decrease in project completion time performance such as work accidents which will affect the duration of the project [6].

One of the ongoing construction projects in Ranah Batahan District, West Pasaman Regency, West Sumatra, Indonesia is the Muaro Mais Bridge Construction Project. In its implementation, this bridge uses heavy equipment that has great potential to endanger the safety of the area around the project. In the implementation of the Muaro Mais Bridge Construction Project, it is necessary to apply HSE in the project environment because environmental factors are at risk of causing work accidents. High intensity rain at any time can cause a drop in rock material during the excavation of the bridge *abutment* which results in accidents of workers who are working under the excavation. In the installation of piles on the bridge, it is also necessary to pay attention because considering the flow of the river under the bridge is not always calm, at any time when it rains with high intensity it can cause the flow to increase and endanger workers.

If viewed the problems of several factors in the field, it is very possible that there is a risk of work accidents that can affect the implementation of construction projects so that there is a possibility of delays in project time and will affect the success of the project. The success of the project is the main goal for companies engaged in construction services. A project is said to be successful if the project can be completed at a competitive cost, can be completed on time even faster than the scheduled time, and with quality achieved. If one of them is not fulfilled then the project has not been fully said to be successful. To reduce the rate of work accidents, it is necessary to have a safety and health system to create safety and health work for workers in the hope of creating a safe and efficient work environment and productive.

## METHOD

This research is a quantitative research. Based on the analytical methods used, this study includes descriptive research. The data collection method used in this study was by questionnaire method with a sample of 30 people. The questionnaire in this study used a Likert

EISSN: 2622-6774
Vol 10 No.3 September 2023
http://cived.ppj.unp.ac.id/index.php/CIVED

scale containing 4 answer choices, namely "Strongly Disagree", "Disagree", "Agree" "Strongly Agree" [7].

Based on Government Regulation numb. 50 of 2012 where there are 64 criteria for the level of achievement of HSE implementation, it can be concluded that there are three indicators included in these criteria [8]. Below is a research instrument with variables in the application of HSE construction with indicators referring to Government Regulation numb 50 of 2012, which are as follows:

This study used a questionnaire with variables divided into 2, namely as follows:

1. Independent Variables (X), including indicators of Construction Service Administration (X1), Work Safety Inspection (X2), and Work Safety Management (X3).
2. Dependent variable (Y), punctuality indicator (Y).

The calculation technique used in this study is the Structural Equation Modeling (SEM) method, which is a multivariate technique which is a collaboration between factor analysis using regression analysis (correlation), which aims to examine the interaction between variables contained in a model, whether the relationship between indicators with constructs and the relationship between constructs and constructs [9]. Data processing in this study uses SmartPLS *software* version 3.2 with an analysis of the influence of the independent variable (X) on the dependent variable (Y) with the framework of the research model as follows:

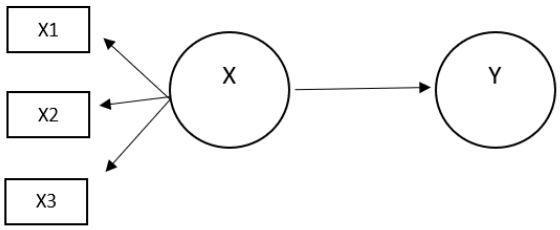


Figure 1. Research model outline chart

In the SmartPLS application, hypothesis testing is carried out by comparing the values of T-table and Tstatistics. If T-statistics has a higher value than the value of T-table (1.96) with a significance level below 5% or 0.05 then the hypothesis is declared accepted [10].
Based on the problem formulation, theoretical studies and frameworks described above. Then the research hypothesis can be formulated as follows:

Ha : The application of Construction Occupational Safety and Health in the Muaro Mais - Lubuk Gobing bridge construction project has a major effect on the time of implementation of the construction project.

Ho : The application of Construction Occupational Safety and Healthin the Muaro Mais -

EISSN: 2622-6774
Vol 10 No.3 September 2023
http://cived.ppj.unp.ac.id/index.php/CIVED

Lubuk Gobing bridge construction project has little effect on the implementation time of the construction project.

## RESULTS AND DISCUSSION

The frequency of response assessment for the measurement of this variable is carried out by distributing questionnaires to respondents. The assessment of numbers used for data processing is the result of each indicator which has a total of 2 variables, 3 indicators and 61 questions and a measurement scale from one to four foreach question.

From the results of the respondent assessment, recharting will be carried out to adjust the data needed with the csv format function so that the data obtained can be calculated with smart-pls software [11]. after the data storage format from excel is changed to csv, the data is ready to be processed using SmartPLS software. After we have verified the data in Smart PLS, then we form the construct of each variable according to the following figure:

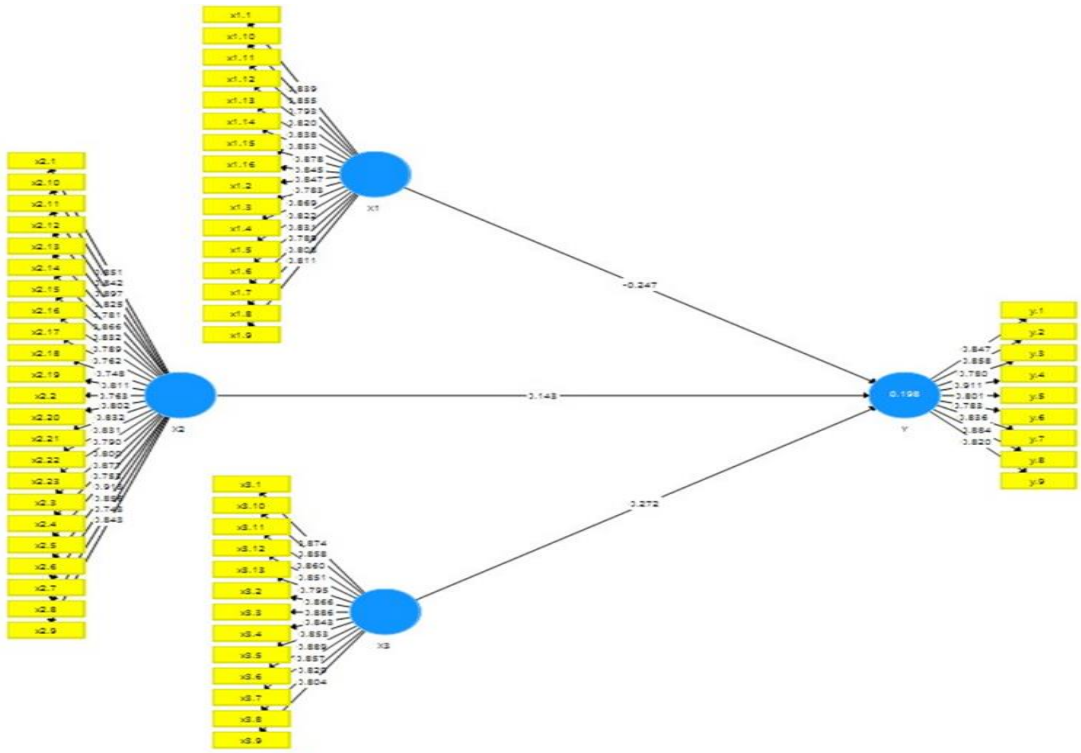


Figure 2. Latent construct SmartPLS

After the formation of constructs from each variable, the next stage is carried out calculations one by one starting from before moderation then after moderating with the calculate stage to *pls algorithms*, it will output the results of each construct that has been formed.

1. Calculating the Outer Model

   The loading factor value is said to be high if the correlation between the component or indicator and the structure to be measured is greater than 0.70, with the construct to be measured. However, for early stage research development, loading factors of 0.5 to 0.6 are considered sufficient [12] Outer model or indicator test is a test conducted to assess the

Journal of Civil Engineering and Vocational Education
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Vol 10 No.3 September 2023
http://cived.ppj.unp.ac.id/index.php/CIVED

validity and reliability of the model. The validity test consists of convergent validity (loading factor & AVE).

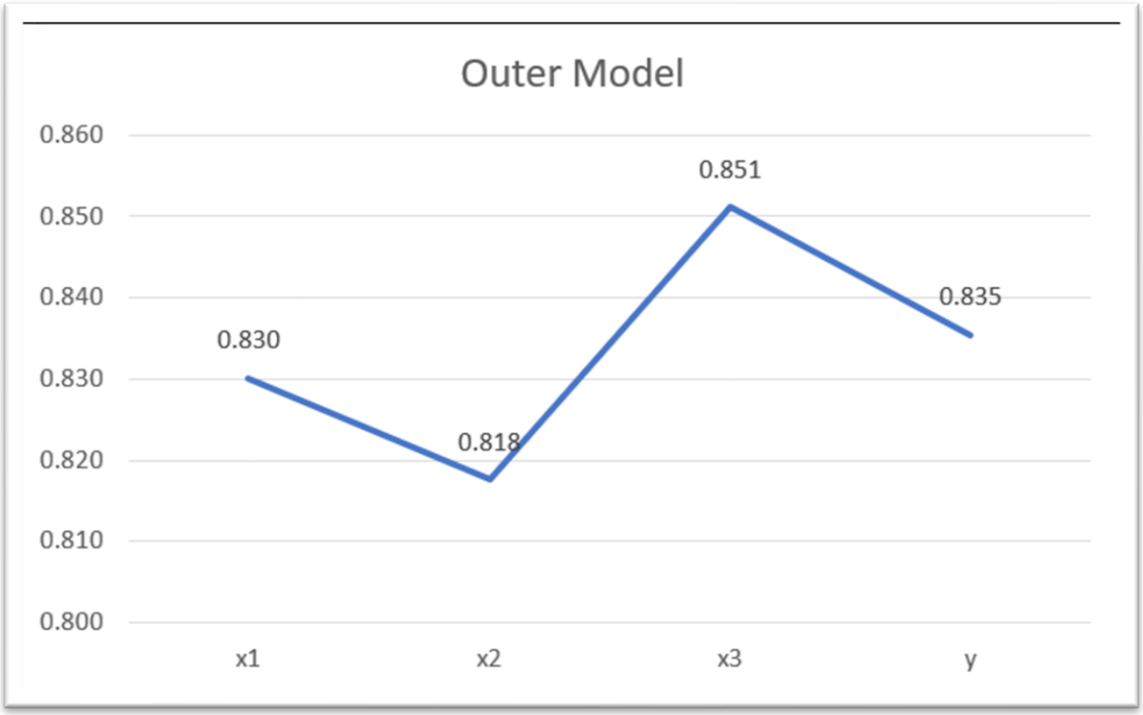



Figure 3. Outer Loading value

Based on figure 3, the *loading* factor results are obtained with a high value and qualify because they have a *loading factor* value of > 0.5. In addition to looking at the *loading factor*, there is another method that can be used, namely by looking at the *value of average variance extracted* (AVE).

Table1. AVE Value

| **Indicators** | **Average Variance Extracted (AVE)** |
|---|---|
| Leadership and Administration of construction service providers | 0,690 |
| Work Safety Completeness Inspectiona | 0,671 |
| Occupational Safety Management | 0,725 |
| Timeliness | 0,700 |

From table 1 it can be seen that the AVE value of Leadership and Administration of construction service providers, Work Safety Completeness Inspection, and Punctuality has good *discriminant validity*, because the AVE value is >0.5

2. Reliability Test

CIVED Journal of Civil Engineering and Vocational Education
EISSN: 2622-6774
Vol 10 No.3 September 2023
http://cived.ppj.unp.ac.id/index.php/CIVED

The reliability test used is the Cronbach's Alpha value and the r table value to see whether the data is reliable [13].The reliability value of each indicator - variable indicators can be tested using composite reliability. Variables that have a composite reliability value >0.7 and a cronbach alpha value >0.6, then the variable meets composite reliability. Here are the results of composite reliability and cronbach alpha values :

Table2. Composite reliability dan cronbach alpha results

| **Indicators** | ***Cronbach's Alpha*** | **rho_A** | ***Composite Reliability*** |
|---|---|---|---|
| Leadership and Administration of construction service providers | 0,971 | 0,986 | 0,973 |
| Work Safety Completeness Inspectiona | 0,982 | 0,924 | 0,979 |
| Occupational Safety Management | 0,969 | 0,989 | 0,972 |
| Timeliness | 0,950 | 0,971 | 0,954 |

From table 2, it can be seen that the value of composite reliability and cronbach alpha from the Leadership and Administration of construction service providers, Work Safety Completeness Inspection, Work Safety Management, and Punctuality has high reliability because the value of composite reliability >0.7 and the value of cronbach alpha >0.6.

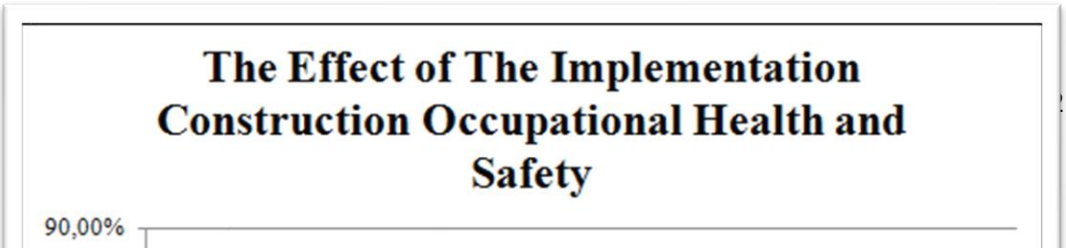
3. Coefficient of Determination

The determinant coefficient (R-Square) is a test tool used to determine how much influence the independent variable exerts on the dependent variable. Here are the results of data processing using SmartPLS 3.2, obtained R-Square value.

Table3. R-Square Result

| | **R Square** |
|---|---|
| **Timeliness** | **0,198** |

Based on table 3, it can be seen that the R-Square value for the punctuality variable is 0.198. This means that the application of occupational safety and health to punctuality can be explained by the Leadership and Administration of construction service providers, Work Safety Completeness Inspection, Work Safety Management by 19.8%. The remaining 80.2% was influenced by other factors outside this study.



CIVED Journal of Civil Engineering and Vocational Education
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Figure 4. R-Square Result

4. Hypothesis Testing

A hypothesis is a temporary conjecture so it must be proven. Researchers need to collect a lot of data in order to prove whether their conjectures are correct. The proof to be achieved by the hypothesis is an effort made in order to answer the problem that has been formulated previously [14].

To be said to be an accepted hypothesis, all three criteria must be met. If one or more criteria are not met, then the alternative hypothesis (Ha) is rejected [15]. Hypothesis testing in the SmartPLS application can be seen in the Path Coefficient table, which isa measuring tool used to see how much influence one variable has on another. The results of the path coefficient value in this study can be seen in the table below.

Tabel 4. Coefficient Path Results

| Influence of Indicators | Original Sample (O) | T Statistics (\|O/STDEV\|) | P Values |
|---|---|---|---|
| Leadership and Administration of construction services -> Punctuality | -0.247 | 1,079 | 0,281 |
| Work Safety Completeness Inspection -> Punctuality | 0,143 | 0,416 | 0,677 |
| Work Safety Management -> Punctuality | 0,272 | 1,105 | 0,269 |

CIVED Journal of Civil Engineering and Vocational Education
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Vol 10 No.3 September 2023
http://cived.ppj.unp.ac.id/index.php/CIVED

1. The effect of Leadership and Administration of construction service providers on the implementation time (timeliness)
   The results of the analysis in table 5,The effect of Leadership and Administration of construction service providers on the implementation time (timeliness) can be seen that the t-statistical value in this construct relationship is **1.079 < 1.96** and the results of the path coefficient hypothesis test between the application of occupational safety and health on timeliness have an original sample of (**O = -0.247**) with a p-value of **0.281 > 0.05**. This means that it is insignificant and has little influence of the leadership and administration of construction services on punctuality, **Ha's hypothesis is rejected**.

2. The Effect of Work Safety Completeness Inspection on Implementation Time (Punctuality)
   The results of the analysis in table 5, 2.The Effect of Work Safety Completeness Inspection on Implementation Time can be seen that the t-statistical value in this construct relationship is **0.416 < 1.96** and the results of the path coefficient hypothesis test between the application of occupational safety and health on timeliness have an *original sample* of (**O = 0.143**) with a p-value, namely **0,677 > 0.05**. This means that it shows that there is no significant and little effect of Work Safety Completeness Inspection on Timeliness, **Ha's hypothesis rejected**.

3. The Effect of Work Safety Management on Punctuality

   The results of the analysis in table 5, 3.The Effect of Work Safety Management on Punctuality can be seen that the t-statistical value in this construct relationship is 1.105 < **1.96** and the results of the path coefficient hypothesis test between the application of occupational safety and health on timeliness have an *original sample* of (**O = 0.272**) with a p-value of **0.269 > 0.05.** This means that it is not significant and there is little influence of Work Safety Management on Punctuality, **Ha's hypothesis is rejected**

## CONCLUSION

Based on the results and discussion of the research conducted on the Muaro Mais – LubukGobing Bridge Construction Project, it was concluded that the Indicators of Leadership and Administration of construction service providers (X1) on Timeliness (Y) with a p-value of 0.281 > 0.05, a t-statistic value of 1.079 < 1.96, and the original sample O = 0.272. The Occupational Safety Inspection Indicator (X2) to the Timeliness variable (Y) with a p-value 0.677 > 0.05, t-statistic 0.416 <1.96, and original sample O = 0.143. Work safety management indicator (X3) on timeliness (Y) with a p-value of 0.269 > 0.05, t-statistic 1.105 <1.96, and original sample O = 0.272. The results of the path coefficient values of the three indicators show that there is no influence from the Leadership and Administration of construction service providers (X1), Inspection of Work Safety Equipment (X2), and Work Safety Management (X3) on timeliness (Y). The application of OSH to the project went well and had no disruption to the project implementation time with an influence percentage of only 19.8%. This shows that this research is in accordance with the research objectives in this final project.

EISSN: 2622-6774
Vol 10 No.3 September 2023
http://cived.ppj.unp.ac.id/index.php/CIVED

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