ISSN No:-2456-2165

Study of Integrated Applications of SSHS and SSHMS Standards in Indonesian Construction Companies

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Abstract:- The condition of construction implementation in Indonesia, which had been disrupted due to the number of construction accidents in the span of 2017 – 2019, began to bounce back in mid 2019. The Indonesian government has also issued various regulations, standards, systems and protocols to improve construction safety performance in Indonesia. Some of these safety assurance management standards and systems are mandatory in construction work environments. Some of these mandatory standards and systems are the Occupational Safety and Health Management System (SSHMS), as well as the Construction Security, Safety, Health, and Sustainability Standards (SSHS) which in their implementation have the potential to cause various obstacles and challenges in achieving optimal, efficient, effective and integrated.. The research was conducted on twenty-two road infrastructure projects from state-owned enterprise Istaka Karya Inc. Data was collected based on interviews, questionnaires, and supporting documents. Used five independent variables X (SSHMS and SSHS), one dependent variable Y (infrastructure project performance on environmental issues), and one intervening variable Z (employee and workers understanding). Statistical analysis uses Structural Equation Modeling (SEM) - Analysis of the Moment of Structural (AMOS). The result shows a significant relationship between several variables X to Z and Y especially variables Z to Y.

Keywords:- *Environmental Issues, Performance, SSHS, SEM-AMOS, SSHMS.*

I. INTRODUCTION

The construction sector takes an important role in the development of a nation. In 2019 in the 1st quarter, this sector became the fourth largest contributor to Indonesia's GDP (Gross Domestic Product) at 10.37% (growing 5.69%) (Kristianus and Pangastuti, 2019). The amount of labor growth in the construction sector is also quite significant at around 5-7% per year, especially in the last 5 years. Besides, the construction sector in Indonesia has grown rapidly in the last five years (Wirahadikusuhah et al., 2019). In 2014-2019, many achievements have been achieved in terms of road infrastructure development in Indonesia, mainly in the context of realizing connectivity between regions in Indonesia.

The process of implementing, accelerating and achieving the targets for the construction of road infrastructure has been covered by the law, which is through by Presidential Regulation No. 58 of 2017 concerning amendments to Presidential Regulation No. 3 of 2016 concerning to the Acceleration of Implementation of National Strategic Projects (Government of Indonesia, 2017). The high intensity of road construction infrastructure has also impacted on the increase in the number of construction work accidents, especially in the category of road infrastructure work. Recorded in period 2017-2019 can be said to be the year of the most road construction accidents. This is still happening even though in 2017 Law No. 2 of 2017 concerning Construction Services (Government of Indonesia, 2017) which in clause 59 affirms that for each implementation of construction services, service users and service providers must meet Security, Safety, Health and Sustainability (SSHS) Standards. Based on Government Regulation No. 50 of 2012 (Government of Indonesia, 2012), Construction Service Providers are still required to have a certificate and run a SSHMS, even in 20172018 there has been an increase of almost 70% of SSHMS Certificate ownership compared to previous years, this can be seen in **Figure 1**.

[Figure 1]

Government Regulation No. 50 of 2012 explicitly requires all Construction Service Companies to implement SSHMS as an Integration System between OHS Management and Company Management.

OHS regulation in the construction sector, in general, is currently regulated through Law No. 02 of 2017 concerning Construction Services, in which the contents mandate "the implementation of construction services based on security and safety" and "realizing public safety and comfort of the built environment." With consideration of work safety, the Government through Law No. 02 of 2017 again requires Service Providers to meet SSHS Standards. The effective determination of these two systems, the SSHS and SSHMS systems, will begin in mid-2017. The construction world in Indonesia is growing with the number of construction companies in Indonesia. Including the establishment and development of state-owned enterprise (SOE) construction companies in Indonesia, which one of them is Istaka Karya Inc. with operational areas covering all regions of Indonesia.

Istaka Karya Inc. as one of the state-owned enterprise contractors in Indonesia, has several business units in the construction sector. However, there are still some challenges in implementing OHS in a construction project, this can be seen in **Figure 2**.

[Figure 2]

Performance has various meanings relating to economic aspects, welfare, technology, and resources. The discussion on performance is focused more on certain aspects of output (Situmorang, 2009). Performance is said to be higher if the increment in output is higher than the addition of resources as an input factor. Measures on performance can be seen based on aspects of cost, time, and quality in which the three are further according to Alinaitwe et al. (2008), said to be the dimension of productivity. As with the notion of performance in general, performance components for construction projects still rely on the aspect of resources which include Human Resources (HR) and technology. Both of these are then known as input which will later be associated with performance dimensions. According to Adriuli (2017), the results of the research showed that indicators that influenced performance evaluation of contractors were the quality of work, cost, human resources, environment, and time of project implementation. By using the AHP (Analytical Hierarchy Process) method, the order of priorities that are considered in evaluating the performance of the contractor is:

1) Quality of contractor work,
2) Human Resources,
3) Time to work on the project,
4) Environmental Issues, and
5) Costs when running a project.

The sequence of the most important Sub-Indicators in each of these indicators is in the order of conformity in the quality of work, workforce management, project time planning, security and work safety and budget accuracy.

II. METHODOLOGY

This research is intended to evaluate the factors related to the performance of road infrastructure projects in the integrated implementation of SSHS and SSHMS standards (Case Study in Istaka Karya Inc.). The flow of evaluation that will be applied, which refers to Law No. 2 of 2017 and Government Regulation of the Republic of Indonesia No. 50 of 2012 concerning the Implementation of SSHMS.

The research uses a quantitative approach, with explanatory research design. While the research method used in this research is a survey, using a questionnaire for the collection of data. Then the data from the questionnaire results will be analyzed using Structural Equation Modeling (SEM) tools. This research is divided into stages as described in **Figure 3**.

[Figure 3]

Variable

According to Sugiyono (2012), a research variable is a tool, attribute, value or nature of people, objects or activities that have certain variations determined by researchers to be studied and then drawn conclusions. Thus, the variable is the object of research, or what is the focus of a study. The research variables are divided into several types, including the following:

- Exogenous Variables / Independent variables.
- Endogenous Variables / Dependent Variables.
- Moderator or extraneous variables.
- Intervening variables are relationships of several variables, in certain situations needed to resolve the causal variables. In this condition, intermediate/interrupting variables are needed, so that the independent variables do not directly affect the dependent variable. This variable cannot be observed and measured (Sugiyono, 2015).

The variables in this research are:

- Independent Variable: SSHS and SSHMS Principle Factors
- Intermediate Variable: The Understanding Level of Employee and Workers towards SSHS and SSHMS
- Bound Variable: Project Performance (Key Indicators on Environmental Issues)

Secondary Data

In gathering secondary data, several reviews were conducted. Literature review sourced from books and journals, both national and international. Regulatory review of several regulations that apply in Indonesia. The results of the collection and evaluation of secondary data are supporting data in determining research variables.

Secondary data was also obtained from Istaka Karya Inc.: SSHS and SSHMS Planning Reports, SSHS and SSHMS Implementation Reports (12 SSHMS Elements, 44 SSHMS Sub Elements, 166 SSHMS Elements), tasks, duration estimation, resource estimation, work drawings, and demolition documentation. From secondary data at this stage, data on infrastructure projects that are implementing OHS implementation can be obtained and interviews and questionnaires can be distributed to the project's workforce.

Primary data

The answers from indepth interviews and questionnaires from selected respondents are the primary data of this research**.**

According to Sugiyono (2012), data collection techniques are the most strategic step in research, because the main purpose of the research is to obtain data. Data collection techniques used in this study are as follows:

Interview

Because the object of research to be studied is the road infrastructure projects of Istaka Karya Inc. which is running and in the maintenance period, this research will conduct direct research, to conduct questionnaires and in-depth interviews. This is intended to get an overview of the

implementation of SSHMS in the project directly and some other important information regarding the obstacles or obstacles that occur when the SSHMS implementation in the project takes place.

Documentation

Documentation is done as a complement, which shows an overview of the implementation of SSHMS. Documents collected in the form of photographs, records, and documents on the implementation of SSHMS in the completed project.

Survey

This survey was conducted to obtain the perspective of the stakeholders (stakeholders) regarding the factors (principles) that influence the application of SSHMS in road infrastructure projects.

Population

In quantitative research, the population is defined as the area of generalization consisting of objects or subjects that have certain qualities and characteristics determined by researchers to be studied and then drawn conclusions. Examples of populations such as residents in certain areas, the number of employees in certain organizations, the number of teachers and students in certain schools and so on (Sugiyono, 2012).

The population in this study are all directors, employees, and workers who are directly or indirectly involved in Istaka Karya Inc. (Persero).

Sample

If the population is a generalized area, then the sample is a portion of that population. Sampling cannot be arbitrary. The sampling technique in this study used purposive sampling.

In this study, the sample used was directors, employees and workers who were directly related to the application of SSHS and SSHMS Standards in Istaka Karya Inc. (Persero) as many as 120 people (100 - 200 samples: Maximum Likelihood (ML)).

Determination of the Number of Respondents

The minimum number of respondents to answer the questionnaire is needed as a limitation in gathering the required results. According to Alaghbari et al. (2017) the needs of respondents can be obtained using the equation below:

$$n = \frac{m}{1+\left(\frac{m-1}{N}\right)} \quad \text{.....(1)}$$

$$m = \frac{z^2 \, x \, p \, (1-p)}{\varepsilon^2} \quad \text{.....(2)}$$

where: n = Minimum number of respondents
m = The number of respondents is not limited
N = Number of Questions
Z = Confidence level
P = Value of Population Proportion
ε = Sample Error Rate

Respondent Target

To fill out the optimal questionnaire, we need to target respondents. The target respondents in this study were: Directors, project managers, site engineers, QS managers, supervisors, project implementation teams and other back-office teams who had a large role in the preparation and technical implementation of SSHS and SSHMS in the project.

Questionnaire Compilation

The preparation of the questionnaire was carried out after the study of literature and looked for the key success factors or critical points of the discussion material. The output of the process will be arranged questionnaire components such as variables, main factors, and subfactors. Then it is compiled into a list of questions that will be asked to the respondents.

Pilot Survey

The pilot survey is the initial stage of testing whether each questionnaire item is understood by respondents. The number of pilot surveys needed is not as much as the minimum number of respondents' needs but must represent the characteristics of the respondent. In this research, a pilot survey of the Top Management of BUMN Istaka Karya Inc. The pilot survey was carried out until the draft questionnaire distributed was fully understood by the respondents.

Questionnaire Distribution

After the pilot survey was conducted, the draft questionnaire was re-evaluated. If there is a correction, the draft must be revised first. Meanwhile, if the draft questionnaire is considered to have fulfilled the scope studied, the questionnaire can be directly distributed to selected respondents.

Data analysis

Data analysis is the process of systematically searching and compiling data obtained from interviews, field notes, and other materials so that it can be easily understood and the findings can be shared with others (Sugiyono, 2012).

SEM is a path model by involving latent variables. Latent variables are variables that cannot be measured directly. The indicators developed were written down in a questionnaire and distributed to the research unit (selected personnel in Istaka Karya Inc. (Persero)) to obtain a response. To facilitate the selection of answers, the answer column will be given an interval score, which is a Likert Scale (1-5).

ISSN No:-2456-2165

The SEM approach is two-fold:
(a) one stage approach or hybrid model, and
(b) two stages approach.

Both yield the same parameter estimates. One stage approach is used if the SEM model involves measurement indicators that are not too large. All latent indicators and variables can be covered in a path diagram in a single combination. If it involves tiered indicators (2nd order or more); then usually a two-stage approach is used. This research is categorized as 3rd order, because the indicators will reflect 12 elements, and the 12 elements reflect the five principles of SSHMS. Thus, the approach that will become the reference is the two stages approach.

The two stages approach analyzes the measurement model first. Furthermore, if it meets the GOF (conformity index), proceed to the structural model analysis.

Questionnaire Results Test

The measurement model tests the validity and reliability of indicators as a means of measuring latent variables, while also generating estimates of the factor score scores of the relevant latent variables. The approach to estimating the score of latent variables is Confirmatory Factor Analysis (CFA) with the confirmation "only one factor has been developed" (this is the score of the latent variable).

It is suspected that before the SSHMS principle is effective on project performance, it must first develop a level of understanding among employees. Indicators of the level of employee understanding of the urgency of SSHS and SSHMS can be developed. Project performance will be measured by 15 indicators. Principle 5 - 10 will be processed specifically by first reducing 166 criteria to be less, but there is no decrease in the information contained by 166 criteria. This is done by Exploratory Factor Analysis (EFA). Thus, the number of indicators is adequately represented in 75 indicators of exogenous variables.

- Exogenous variables (SSHS and SSHMS factors) = 75 indicators
- Intervening variable (understanding) = 8 indicators
- Endogenous variables (project performance) = 15 indicators

The SEM model that has been discussed, assuming that the model is non-recursive because all of its effects are in one direction, that is to project performance. If we assume that performance is interrelated, the model becomes recursive. This is not a problem for AMOS. The AMOS application can do it (as we have discussed this; it means our model is drawing). Another scenario is AMOS Basic (editor), this does not produce an image. For this, we must declare each equation function in a mathematical format. Likewise, the line of influence is also expressed as a mathematical function. This is not popular, because AMOS BASIC is effective for very complicated SEM models. The computer language used is FORTRAN Nevada Edit.

The SEM model, which has become a solution for estimation calculations, must be tested on three basic assumptions: (a) multicollinearity, (b) normality and (c) outliers. Then the GOF must be evaluated. GOF suitability index: Chi-square (or $\pi 2$), prob ($\pi 2$), GFI, AGFI, RMSEA, NFI, TLI, Cmin / df, ECVI, and many others. But this one is considered enough. If all this has passed the passing grade, then we will narrate the results of the analysis. In the narrative, we must also compare with other research (empirical research) that we use as a reference, thus our research position in filling the research gap does exist.

Structural Equation Model:

a) Exogenous structural equation (X) → intervening (Z):
$Z = ד\ z1\ X1 + ד\ z2\ X2 + ד\ z3\ X3 + ד\ z4\ X4 + ד\ z5\ X5$
b) Exogenous structural equation (X) → endogenous (Y):
$Y = ד\ y1\ X1 + ד\ y2\ X2 + ד\ y3\ X3 + ד\ y4\ X4 + ד\ y5\ X5$
c) Exogenous structural equation (X) → intervening (Z) → ... endogenous (Y):
$Y = ד\ y1\ X1 + ד\ y2\ X2 + ד\ y3\ X3 + ד\ y4\ X4 + ד\ y5\ X5 + \beta yzZ$

Each coefficient in the structural equation has 2 subscripts.

a) For the coefficient that connects each exogenous variable to an intervening variable (Z) called ד zi, where the initial subscript is the destination variable (Z), the next subscript is the origin variable, namely: 1, 2, ... or 5.
b) For the coefficient that connects each exogenous variable to an endogenous variable (Y) called ד yi, where the initial subscript is the destination variable (Y), the next subscript is the origin variable, namely: 1, 2, … or 5.
c) For the coefficient that links the intervening variable to an endogenous variable (Y) called βyz, where the initial subscript is the destination variable (Y), the next subscript is the origin variable, namely: Z.

III. RESULTS AND DISCUSSION

Research variable

In this research, five Exogenous Variables are used (X1), (X2), (X3), (X4) and (X5), where each of the variables is:

1) X1 = Determination and Planning of OHS Policy
2) X2 = Implementation of OHS Plan
3) X3 = Monitoring and Evaluation of OHS Performance
4) X4 = Safety and Health of Construction Work
5) X5 = Construction Sustainability
6) Endogenous Variable is (Y), i.e. Project Performance on Indicators of Environmental Issues
7) Intervening / Intermediate Variable (Z) is the Level of Employee and Worker Understanding of SSHS and SSHMS.

Questionnaires for each variable refer to the dimensions and indicator variables that have been formulated based on secondary data processing. Respondents in this study were 120 people. The survey results and their scores were tabulated using SPSS tools ver.22. Questions made based on dimensions and variable indicators have five alternative answers available for each respondent. Divide the questionnaire questions for variables

X and Y namely; 1 = not very important; 2 = not important; 3 = doubtful; 4 = important; and 5 = very important. As for the questionnaire questions for variable Z, namely; 1 = strongly disagree; 2 = disagree; 3 = doubtful; 4 = agree; and 5 = totally agree.

Secondary Data

This study obtained secondary data through several methods:

1) Literature Review,
2) Regulation Review,
3) Evidence Implementation of SSHS and SSHMS
4) Direct Survey Project

Overall results from secondary data collection are used as part of the conceptual and operational dimensions in determining variable indicators that will be used in compiling questionnaires or questionnaires.

Primary data

Before the primary data collection process was carried out, several preliminary processes were carried out:

Pilot In-depth Interview

That is a process in which researchers meet with the main stakeholders of the state-owned Istaka Karya Inc. Persero, namely the President Director, and the HSE Manager. The significance of this meeting is as follows:

a) Obtain a total number of employees and employees of Istaka Karya Inc.
b) Obtain all information on the Road Infrastructure Project, Regional Infrastructure and Transportation Infrastructure that have been and are being implemented by Istaka Karya Inc. In 2017-2019.
c) Obtain macro explanations related to the implementation or implementation of SSHS and SSHMS in BUMN Istaka Karya Inc. Persero.
d) Request permission to enter the project site above, to request data on SSHS and SSHMS implementation of the project and conduct indepth interviews and distribute questionnaires to 120 employees and employees of Istaka Karya Inc. Persero (out of a total population of 169 people).

Purposive Sampling

In this process, purposive sampling was carried out, namely directors, employees and workers who were in direct contact with the application of SSHS and SSHMS and the determination of correspondents to be carried out in-depth interviews and requests for filling out questionnaires with the following composition:

a) Directors of 10 people.
b) Project Managers, SEMs and SOMs from 22 Projects, there are 66 people.
c) HSE Officer and Safety Keeper from 22 Projects, there are 66 people.

Pilot Survey Questionnaire

In this study, a pilot survey questionnaire was conducted because the researcher needed some information earlier as a result of sufficient depth and detail of the questionnaire questions (98 questions) as a positive impact of the implementation of the quantitative explanatory method on the part of government regulations, and the information needed earlier was:

1) early warning about where the main research might fail or can continue
2) instructions on which part of the protocol will fail to run,
3) certainty the method or instrument proposed or planned is quite good, simple, appropriate or too complicated
4) And from the results of the pilot survey questionnaire carried out in 10% of the correspondent plans of 120 people (out of a total population of 169 people), the results were quite satisfying and the questionnaire could be continued for distribution.

Questionnaire Distribution and In-depth Interview

The questionnaire distribution process was mostly carried out directly by the author to 120 correspondents (out of a total population of 169 people), both in 22 state-owned infrastructure projects of Istaka Karya Inc. Persero and 10 directors at the head office of BUMN. Istaka Karya Persero in Jakarta. A small proportion of correspondents in the provinces of Papua and NTT distributed the questionnaire through email and in-depth communication via video call. Data of 22 BUMN infrastructure projects, Istaka Karya Inc. Persero can be obtained well. The Indepth Interview process in this study is necessary given the urgency and sensitivity of the material under study that is a little in line with government regulations that are very intense to be required to implement.

[Figure 5.]
[Figure 6.]
[Figure 7.]

Statistical Analysis of Research Data

The total number of questionnaire data included 120 pieces, of which after manual tabulation was found there were 5 extreme or odd data from 4 projects as follows:

1) Adisumarmo Airport Central Java Runway and Taxiway Project Overlay, totaling 3 extreme data.
2) Legundi-Planjan (LOAN) MYC New Road Project, Bantul DIY, as much as 2 extreme data.

Related to the existence of these 5-extreme data, In-depth Interview has been carried out to be able to try to correct the perception of the correspondent. If the extreme data cannot be corrected, the perception will be excluded from the data tabulation, but if it can be corrected, the perception will still be entered into the data tabulation. Tabulate the total data using SPSS statistical tools ver.22.

One Stage Approach or Hybrid Model Analysis

In the initial analysis phase, testing will be carried out for all indicator variables using SEM AMOS. Ver. 22 with a one stage approach or hybrid model method.

[Figure 8.]

There are three variable indicator tests at this stage:

1) Normality Test

The value of CR skewness and CR kurtosis on each indicator (98 indicators) shows some indicators do not meet the assumption of normality, it is indicated through the value of several indicators that CR skewness and CR kurtosis are not in the range ≥ +1.96 or ≤ -1.96.

2) Outlier Test

This test is to ensure the data are grouped well / there are no extreme conditions. Based on the list of Mahalanobis distances in each observation, it can be seen that the 14th observation (118,244) is the observation with the farthest distance from the centroid, then compared with the chi-square value (20.05,119 = 145,461). Because the maximum value of the Mahalanobis distance is smaller than the chisquare value, there is no indication of extreme data. Outlier test output data using SEM AMOS. Ver. 22 with the one stage approach method or hybrid model.

3) Multicollinearity Test

This test is to ensure there is no series relationship between variable indicators and variable/correlation. From the sample covariant determinant value of 0,000, it is indicated that the data matrix is singular or in other words, there is multicollinearity between exogenous variables (X1-X5). This is a violation of the assumptions that may cause the estimation of structural coefficients to be less accurate. Data from the multicollinearity test output using SEM AMOS. Ver. 22 with the one stage approach method or hybrid model.

From the test results above, the structural equation based on the estimation results of the model as follows:

a) exogenous structural equation (X) → intervening (Z):
Z = -0.104 X1 + 0.577 X2 - 0.241 X3 + 0.023 X4 + 0.371 X5
b) exogenous structural equation (X) → endogenous (Y):
Y = 0.195 X1 + 0.386 X2 - 0.158 X3 - 0.046 X4 + 0.431 X5
c) Exogenous structural equation (X) → intervening (Z) → endogenous (Y):
Y = 0.195 X1 + 0.386 X2 - 0.158 X3 - 0.046 X4 + 0.431 X5 + 0.166 Z

A condition where several things indicate an imperfect indication of the variable relationship model and variable indicators using SEM AMOS. Ver. 22 one stage approach or hybrid model as mentioned above, cannot be used as a conclusion because of SEM AMOS. Ver. 22 one stage approach or hybrid models sometimes experience an output distortion if the model involves a large number of indicator variable relationships. For more certain, it must be carried out modeling and tiered statistical

Analysis using SEM AMOS. Ver. 22 two stages approach.

[Figure 9.]

There are three variable indicator tests at this stage, namely:

1) Normality Test

[Table 1.]

Judging from the value of CR skewness and CR kurtosis on each indicator (98 indicators), it appears that several indicators have fulfilled the normality assumption, this is indicated by the value of several indicators that CR skewness and CR kurtosis are in the range ≤ +1.96 or ≥ -1.96. The complete output data is a normality test using SEM AMOS. Ver. 22 with the two stages approach method.

2) Outlier Test

[Table 2.]

Based on the list of Mahalanobis distances in each observation, it appears that the 20th observation (35,666) is the observation with the farthest distance from the centroid, then compared with the chi-square value (χ20.05,119 = 145,461). Because the maximum value of the Mahalanobis distance is smaller than the chi-square value, there is no indication of extreme data. The complete output data of the outlier test uses SEM AMOS. Ver. 22 with the two stages approach method.

3) Model Conformity Test

[Table 3.]

From the GFI value (1,000) is greater than the good fit criteria that is ≥ 0.9; indicates that this model in terms of its suitability index is in a good category.

4) Model Significance Test

[Table 4.]

From the table above, a significant status is obtained if the value of P ≤ 0.05, the value α = 0.05 illustrates the maximum data of 5% experiencing a deviation from the normal distribution. Significant status is obtained when the value of P α α (Sham, 2014). The value *** indicates that the significance value is very small close to 0 so that it can be interpreted as data experiencing a very small deviation from the normal distribution. Model significance test results can be translated as follows:

a) Variable X2, which is the Implementation of OHS Plan, influences SIGNIFIKAN approaching 100% to Variable Z, namely the Level of Understanding of Employees and Workers towards SSHS and SSHMS.

b) Variable X5, Sustainability of Construction has a SIGNIFICANT effect of 99.9% on Variable Z, namely the Level of Employee and Worker Understanding of SSHS and SSHMS.
c) Variable X1, which is the Determination and Planning of OHS Policy, has a SIGNIFICANT effect of 96.3% on Variable Y, namely Project Performance (Environmental Issues).
d) Variable X2, which is the Implementation of OHS Plan, influences SIGNIFIKAN approaching 100% to Variable Y, namely Project Performance (Environmental Issues).
e) Variable X5, namely Construction Sustainability Construction has a Significant effect approaching 100% to Variable Y, namely Project Performance (Environmental Issues).
f) Variable Z, which is the Level of Employee and Worker Understanding of SSHS and SSHMS, has a significant effect of 99.7% on Variable Y, namely Project Performance (Environmental Issues).

[Figure 10.]

From the test results above, the structural equation based on the estimation results of the model as follows:
a) exogenous structural equation (X) → intervening (Z):
Z = 0.023 X1 + 0.558 X2 - 0.069 X3 - 0.027 X4 + 0.315 X5
b) exogenous structural equation (X) → endogenous (Y):
Y = 0.180 X1 + 0.358 X2 - 0.016 X3 - 0.040 X4 + 0.348 X5
c) exogenous structural equation (X) → intervening (Z) → endogenous (Y):
Y = 0.180 X1 + 0.358 X2 - 0.016 X3 - 0.040 X4 + 0.348 X5 + 0.195 Z

IV. CONCLUSION

After analyzing and testing statistics through the significance test of the SEM-AMOS model, it is found that there are a relationship and influence of variables X1, X2, X3, X4, and X5. Both directly to the Y variable and through the intervening variable.

Further details can be described as follows:

1. A significant relationship is identified between the implementation of SSHMS and SSHS integration on the Performance of Road Infrastructure Projects, especially on Indicators of Environmental Issues through variable X1, namely the Establishment and Planning of OHS Policy, variable X2, namely the Implementation of OHS Plan, and variable X5, namely Sustainability of Construction.

- Conclusion of this study reinforces previous research which states that an integrated or systematic approach in practice needs to be done to predict how the allocation of resources and the safety policy of a construction project can affect safety performance. This has proven to be able to assist companies in developing proactive strategies designed to improve safety performance (Pereira et al., 2018).
- Conclusions of this study corroborates previous research which states that the five influential factors of the management process identified by hierarchical descriptions based on OHSAS 18001 affect management performance in different ways (Li et al., 2016).
- Conclusion of this study also adds information to previous research which states that the weak factors for implementing OHS are OHS training, safety in contract documents, routine OHS meetings, and employee involvement (Choudhry and Zahoor, 2016).

2. From the results of the test of the significance of the model through SEM-AMOS, the indicator variable X2 can be evaluated, namely the Implementation of the OHS Plan and X5 variable, namely Construction Sustainability, which significantly influences the Z intervening variable, namely the Level of Understanding of Employees and Workers towards SSHS and SSHMS.

3. Analyzing the results of the test of the significance of the model through SEM-AMOS, obtained a significant effect between the Z variable, namely the Level of Understanding of Employees and Workers Against SSHS and SSHMS against the Y variable, namely Project Performance (Environmental Issues).

- Conclusion This study corroborates previous research which states that a good understanding of work safety will affect the achievement of safety conditions at worksites (Hasanzadeh, 2019).
- Conclusions This study also corroborates previous research which states that the important role of safety competencies or understanding in safety behavior, as well as the need for safety management methods to improve worker safety behavior and safety conditions at work (Li and Meng Fan, 2018).
- Conclusion This study also corroborates previous research which states that having the correct number of safety personnel with the necessary educational and professional qualifications can help reduce the incidence rate of construction companies. Also, an adequate staff of safety personnel with the necessary educational and professional qualifications can improve safety management in construction (Awolusi and Marks, 2016).

RECOMMENDATION

1. For Istaka Karya Inc., to increase the socialization and promotion of SSHMS and SSHS to all employees and workers within the state-owned Istaka Karya Inc. (Persero) is especially related to the principle factors for the Establishment and Planning of OHS Policies, Monitoring and Evaluation of OHS Performance and the principles of Construction Safety and Health because these two factors are principles in the application of SSHMS and SSHS.

- In its implementation, it can be supported by awarding rewards directly to individuals or teamwork for good performance of OHS implementation, rewards can be in the form of financial rewards and responsibility rewards (Azeez et al., 2019).

2. To General Construction Service Performers, even though SSHMS (2012) is a longer system compared to SSHS standard (2017), it does not mean that SSHMS is no more important than SSHS because both standards and systems are currently required to be implemented side by side, so It is expected that construction service operators are always able to improve the understanding of all employees and workers related to SSHS and SSHMS.

- In the previous research, it was also emphasized that one of the causes of work accidents was the failure of workers to identify the hazards and the employee's ignorance of potential hazards (Pereira et al., 2017).

3. Further researchers, to develop research on the integration of SSHS and SSHMS implementation concerning construction performance on cost, quality, time and human resources indicators, using wider population data by involving several other Construction SOEs.

- By developing a set of key indicators by following a systematic process consisting of conceptualization, operationalization, indicator making, and validation and revision. The pressure-state-practice (PSP) model provides an overall framework for developing key indicators (Guo, 2016).
- The proposed multidimensional safety performance model can be supported by structural equation modeling (SEM) analysis. Besides, 16 latent dimensions to relative weights and recommendations for construction safety professionals are provided to improve construction safety performance (Gunduz et al., 2016).

Figure 1. Graphic Comparison Number of SSHMS Recipient Companies and Number of Work Accidents (2013 - 2018) [6]

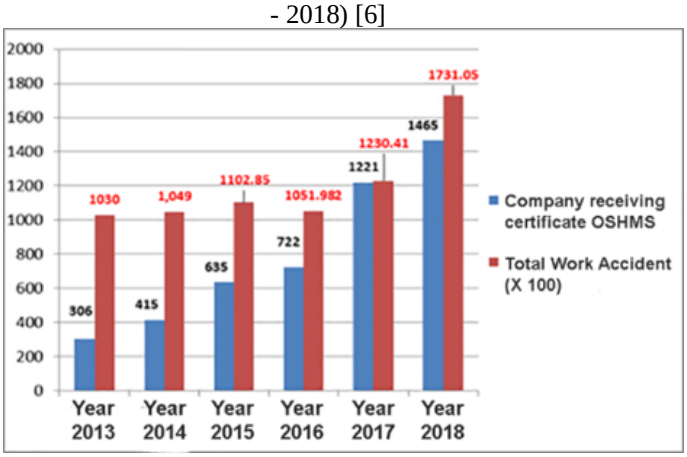


Figure 2. Types and Number of Infrastructure Projects Istaka Karya Inc. and Work Accident Rates in 2014-2019

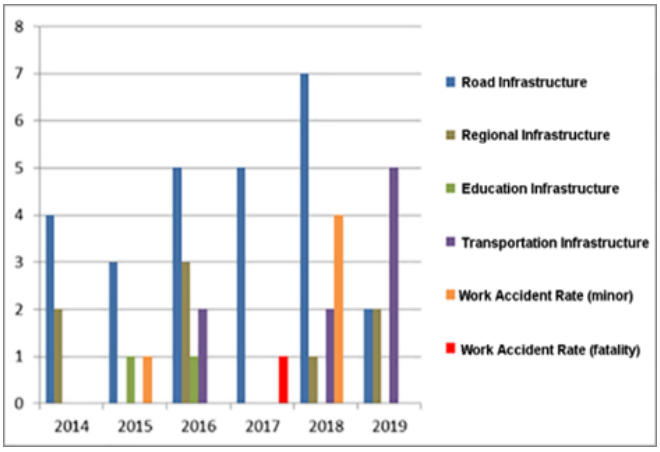


Figure 3. Research Flowchart

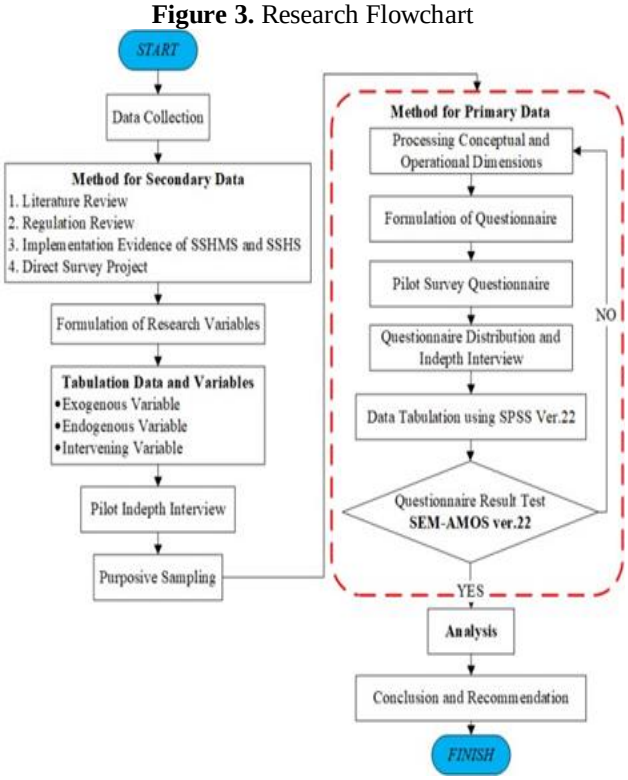


Figure 4. Research Structural Equation Model Approach

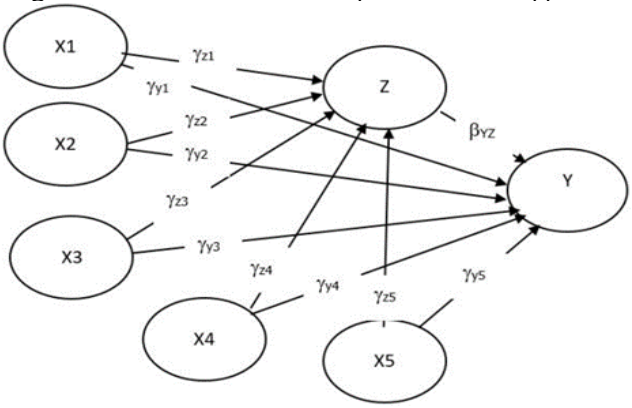


Figure 5. Composition of Questionnaire Results in the Gender Category

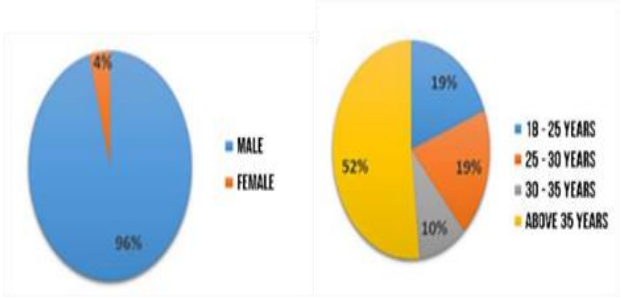


Figure 6. Composition of Questionnaire Results in Education Level Category and Length of Work at BUMN Istaka Karya Inc

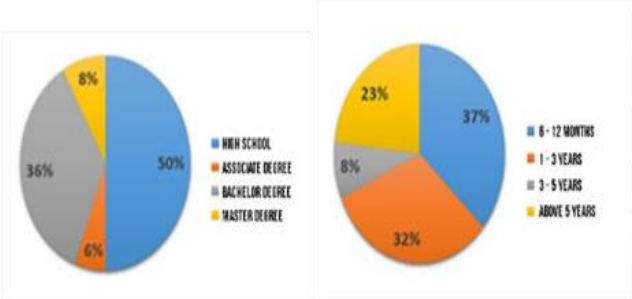


Figure 7. The Composition of Questionnaire Results in the Structural Position Category at BUMN Istaka Karya Inc.

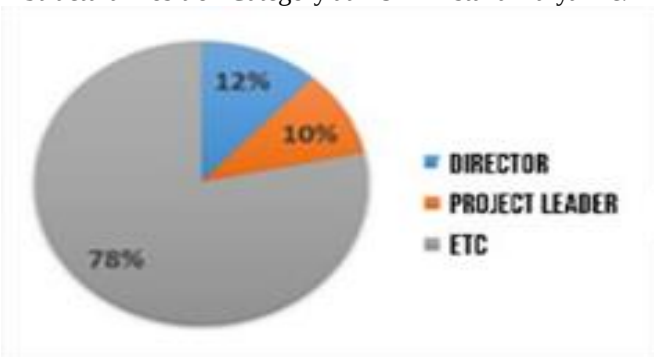


Figure 8. Variable Relationship Model and Indicator Variables One-Stage Approach or Hybrid Model)

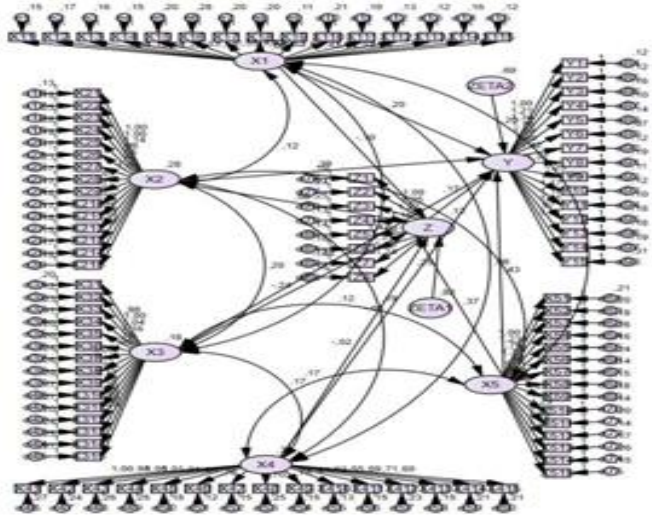


Figure 9. Variable Relationship Model and Variable Indicators

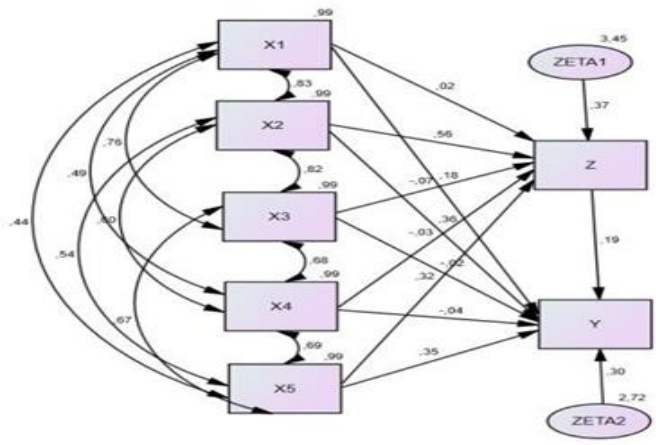


Table 1: Output Normality Test

Variable	min	max	skew	c.r.	kurtosis	c.r.
X5	-3,184	1,629	,078	,349	-,216	-,482
X4	-2,817	1,436	-,193	-,861	-,581	-1,299
X3	-2,744	1,483	-,127	-,567	-,504	-1,128
X2	-3,770	1,287	-,291	-1,300	,127	,284
X1	-2,638	1,218	-,207	-,926	-1,010	-2,258
Z	-2,387	1,190	-,144	-,642	-1,125	-2,516
Y	-2,433	1,398	,214	,956	-1,025	-2,292
Multivariate					16,233	7,921

Table 2: Outlier Test Output

Observation number	Mahalanobis d-squared	p1	p2
20	35,666	,000	,001
11	25,917	,001	,002
70	23,277	,002	,001
86	22,078	,002	,000
15	19,679	,006	,001

Table 3: Model Conformity Test Output

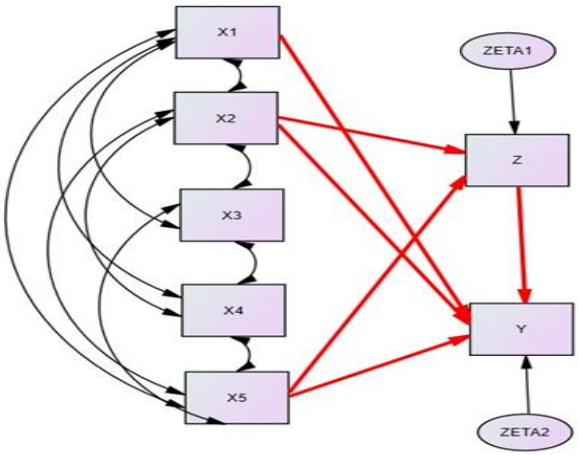
Model	RMR	GFI	AGFI	PGFI
Default model	,000	1,000		
Saturated model	,000	1,000		
Independence model	,568	,276	,035	,207

Table 4: Model Significance Output

	Estimate	S.E.	C.R.	P	Status
Z <--- X1	,023	,122	,192	,848	Tidak Signifikan
Z <--- X2	,558	,138	4,040	***	Signifikan
Z <--- X3	-,069	,141	-,492	,623	Tidak Signifikan
Z <--- X4	-,027	,098	-,280	,780	Tidak Signifikan
Z <--- X5	,315	,098	3,230	,001	Signifikan
Z <--- ZETA1	,375				
Y <--- X1	,180	,086	2,080	,037	Signifikan
Y <--- X2	,358	,105	3,417	***	Signifikan
Y <--- X3	-,016	,100	-,158	,874	Tidak Signifikan
Y <--- X4	-,040	,070	-,574	,566	Tidak Signifikan
Y <--- X5	,348	,072	4,808	***	Signifikan
Y <--- Z	,195	,065	2,986	,003	Signifikan
Y <--- ZETA2	,300				

Figure 10. The Significance Model of Variable Relationships and Variable Indicators

ISSN No:-2456-2165



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