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The Effect Of Lean Tool In Reducing Non-Value Added Activities In Gas Processing PT. Pertamina Hulu Mahakam

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ABSTRACT : *The purpose of this study is to analyze whether the Lean Method has an effect on the efficiency of value-added productivity (non-value added activities), the Lean Method has an effect on the effectiveness of value-added productivity (non-value added activities). This study was conducted on employees in the production division at PT. Pertamina Hulu Mahakam located at Jalan Yos Sudarso, Balikpapan City, East Kalimantan Province with a sampling period of one month in May 2024. The population in this study were employees in the Oil and Gas production division at PT Pertamina Hulu Mahakam (PHM) totaling 100 employees, the researcher used a sampling technique, namely non-probability sampling used in this study is purposive sampling, where this method the researcher took case / participant samples strategically so that the samples were relevant to the research questions asked. The data analysis technique used is the SEM method, namely PLS using PLS 4.0 software.*

Keywords *–AbouTool, Non-Value, Added Activities, Gas Processing*

I. INTRODUCTION

The era of globalization has resulted in no more boundaries between countries, so that companies face increasingly fierce competition, so that every company is required to increase its competitiveness through the production of products and services in a cost-efficient and cost-effective manner. This requires every company to increase its competitiveness by increasing efficiency and effectiveness in the production of products and services. In this context, company management is required to manage various activities that cause waste and are inefficient in the production process in order to produce value for customers.

Efficiency and effectiveness of operational activities can be achieved through the management of non-value-added activities. Reducing the time spent on non-value-added activities will not only speed up the response to customers, but will also have an impact on reducing costs due to more efficient use of resources.

Non-value added activities or also known as waste can be recognized through several activities, namely: overproduction, unnecessary movement, excess inventory, transportation, waiting and defects. Continuous improvement can be done by smoothing the process flow and increasing process capabilities so that they are able to produce quality products that can compete in the market. Therefore, factors that disrupt the flow and process capability must be identified and minimized so that the process flow can run smoothly, process capability increases, and effectiveness and efficiency are achieved.

PT Pertamina Hulu Mahakam (PHM) produces oil and natural gas (oil and gas) through exploration and production activities in supporting PT Pertamina (Persero) in providing energy that is important for the development and economy of Indonesia. As one of the Pertamina Upstream Subholding company entities, PHM manages upstream oil and gas assets located in Region 3 Kalimantan. PT Pertamina Hulu Mahakam (PHM) continues to produce oil from on-shore and off-shore fields in Kalimantan to meet the domestic needs of national energy. Various strategic initiatives in the field of drilling, both exploitation and exploration, maintenance of production facilities, application of technological innovation in operational activities and

synergy with other Pertamina subsidiaries have succeeded in maintaining the sustainability of tens of thousands of barrels of oil production per day for Indonesia.

Continuous improvement in a production process is essential in an effort to increase company productivity. Increasing productivity can be done by eliminating sources of waste in the production process flow. Waste that often occurs in the production process flow is excess production, excess inventory, unnecessary transportation, movement, waiting time, excessive processes and defective products. Efforts to minimize waste at PT. Pertamina Hulu Mahakam can be done in several ways. Minimizing this waste begins by identifying waste that occurs at the source of waste at PT. Pertamina Hulu Mahakam with lean management.

This is in accordance with research (Lakshmanan et al., 2023) showing a typical step-by-step approach where organizations can identify and reduce waste in their operations by reducing costs, time, space, material use, emissions, and digitalization. The novelty of this research is that in addition to environmental benefits such as reduced emissions and reduced material waste, lean management convergence also contributes to economic and social sustainability, for example through on-demand manufacturing that can provide better supply chain efficiency, customized batch production, reduced lead time, etc., as well as reduced fatigue and human error, workplace safety, ergonomic work, respectively.

(Schonberger, 2018) states that Lean, properly supported and executed, makes a significant contribution to excellence: Faster, more flexible and more reliable delivery of goods and services results in increased revenue through increased sales to existing customers, plus market share growth through retention of existing customers and new generation and Based on the results of the study, researchers found indications of barriers to information management of logistics provision and supporting assets at PT. AWU. (Farhan Gumelar & Subhan, 2021) the results of data processing show that the waste that has the largest weight is waiting time with a weight of 0.22 which is then carried out by eliminating non-value added activities and making improvement proposals in the form of a recapitulation of improvement proposals, proposed cycle time tables, proposed OPCs, and future state value stream mapping. From the proposals made, the cycle time was successfully reduced from 1637 seconds to 1031 seconds and reduced the value of non-value added activities by 68.60%.

Based on the background of the problem and previous research, the researcher took the title Lean Management in Reducing Non Value Added Activity in Gas Processing at PT. Pertamina Hulu Mahakam

II. LITERATURE REVIEW

Lean tools

Lean tools in the context of gas processing PT. Pertamina Hulu Mahakam refer to various techniques and approaches used to identify, reduce, or eliminate waste in production and operational processes. The main goal is to improve efficiency, productivity, and quality of services or products produced. The following is an operational definition of lean tools that can be applied in the context of gas processing

a. Just in time is a management approach that aims to minimize inventory by producing goods only when needed and in the quantities needed. In gas processing, this means managing the supply of raw materials and finished products in such a way that there is no overproduction that can cause waste.
b. Continuous improvement is an approach to finding ways to continuously improve products, services, or work processes incrementally.
c. Total Productive Maintenance (TPM) is a maintenance approach to improve equipment efficiency where the benefits are reducing downtime and increasing equipment longevity.

Non value added activity

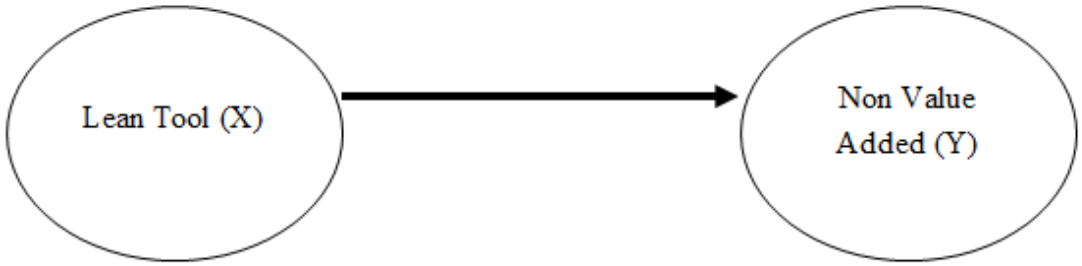
Non value added activity in the context of gas processing at PT. Pertamina Hulu Mahakam refers to any activity or process that does not directly contribute to increasing the value of the final product, either in terms of quality or quantity. These activities often only add costs and time, without providing significant benefits to customers or the production process.

a. Waiting Time: Time spent waiting for raw materials or equipment needed to continue the production process.
b. Inefficient Transportation: Unnecessary or excessive movement of raw materials or semi-finished products within a production facility.

c. Reprocessing: Additional activities required to correct defects or errors in previously processed products.
d. Excess Inventory: Storing more raw materials or finished products than necessary, which can lead to increased storage costs and risk of damage.
e. Excessive Inspection and Testing: Performing repetitive or excessive inspections or tests that do not add significant value.
f. Inefficient Movements: Unnecessary operator or machine movements during the production process.
g. Ineffective Processes: Steps in the production process that are not optimal or can be eliminated without reducing the quality of the final product.

III. CONCEPTUAL FRAMEWORK AND HYPOTHESIS

Figure 1 Conceptual Framework



Based on Figure 1 Above, The Relationship Between Variabel in this study can explained, namely:

1. Lean method has a positive and significant effect on the efficiency of value-added productivity (non-value added activities) at PT. Pertamina Hulu Mahakam.
2. Lean method has a positive and significant effect on the effectiveness of value-added productivity (non-value added activities) at PT. Pertamina Hulu Mahakam.

IV. RESEARCH METHODS

Research design or design is very useful in the research implementation process. This research design or design uses quantitative methods. According to Hair and Brunsveld (2020:161), "quantitative data refers to measurements in which numbers are used directly to represent the characteristics of something, because this method is recorded directly with numbers that are suitable for statistical analysis. Furthermore, Hair and Brunsveld (2020:162) explain that in addition to using quantitative methods, this research design is carried out with an explorative approach.

Location and Time of Research

This research was conducted on production employees at PT. Pertamina Hulu Mahakam located at Jalan Yos Sudarso, Balikpapan City, East Kalimantan Province with a sampling period of one month in May 2024.

Population and Sample

The population that will be used as a sample in this study are employees of the Oil and Gas production division at PT Pertamina Hulu Mahakam (PHM). Not all populations in this study are given the opportunity or chance to be used as samples. Therefore, the researcher uses a sampling technique, namely non-probability sampling. The non-probability sampling technique used in this study is purposive sampling, where this method the researcher takes a sample of cases / participants strategically so that the samples are relevant to the research questions asked. Therefore, the researcher provides inclusion criteria to limit the respondents who will be samples in this study. The following are the inclusion criteria, namely.

1. Respondents as employees at PT Pertamina Hulu Mahakam (PHM).
2. Respondents specifically for employees of the production division at PT Pertamina Hulu Mahakam (PHM) totaling 100 people.

Research Instrument

The instrument as a measuring tool used in this study uses a Likert scale. This scale is used to measure attitudes; perceptions; responses and answers of respondents regarding agreement or disagreement about a statement on the variables to be measured or observed based on the measurement items that have been determined.

Data Collection Techniques

The type of data used in this study is primary data obtained directly through respondents with a measurement scale using intervals or ratios. Based on data obtained directly from respondents, the researcher uses field work research techniques, which are methods used to obtain real data in the field through questionnaires. Questionnaires are techniques used to collect data or distribute a list of questions with a questionnaire model, namely a closed questionnaire. Closed questionnaires are used to limit certain answers chosen by researchers.

Data Analysis

The data analysis used in this study uses PLS-SEM with statistical data processing using SmartPLS 4 to process the dataset for both descriptive statistical analysis and inferential statistical analysis.

Table1*Outer Loadings*

	Lean Tool	Non Value Added
x.1	0.876	
x.2	0.836	
x.3	0.723	
y.1		0.759
y.2		0.790
y.3		0.781
y.4		0.770
y.5		0.828
y.6		0.788
y.7		0.718

Based on table 1 above, it can be seen that all outer loading values for all variables have a value > 0.7. So all variable items pass the outer loading test.

Table2
Cross Loading

	Lean Tool	Non Value Added
x.1	0.876	0.581
x.2	0.836	0.511
x.3	0.723	0.592
y.1	0.571	0.759
y.2	0.580	0.790
y.3	0.468	0.781
y.4	0.563	0.770
y.5	0.542	0.828
y.6	0.533	0.788
y.7	0.508	0.718

Based on the table above, all variables still have a greater correlation result than other variables, so it is stated that they have been tested for cross loading.

Table3
HTMT

	Lean Tool	Non Value Added
Lean Tool		
Non Value Added	0.847	

Based on the table above, it is known that the value of each variable is <0.9. So it has passed the HTMT test.

Table4
Hasil *Average Variance Extracted*

Variabel	AVE	Nilai Kritis	Keterangan
Lean Tool	0.663	> 0,5	Valid
Non Value Added	0.603	> 0,5	Valid

Sumber: SmartPLS

Table 4 shows that the three variables used in this study are valid because they produce an AVE value > 0.5.

Table5
Hasil *Cronbach's Alpha*

	Cronbach's Alpha	Rule of Thumb	Result
Lean Tool	0.742	>0.7	Reliabel
Non Value Added	0.890	>0.7	Reliabel

Sumber: SmartPLS

Table 4.5 shows that all variables used in this study are reliable because they produce a Cronbach's alpha value > 0.7.

Table6

Variable	Composit Reliability	Rule of Thumb	Result
Lean Tool	0.854	>0.70	Reliable
Non Value Added	0.914	>0.70	Reliable

From the table above, the Composite Reliability value of all variables has a Composite Reliability value > 0.7

Table 7
Hasil nilai rata – rata AVE dan rata – rata R^2

Variabel	Nilai *Average Variance Extracted* (AVE)	R^2
Lean Tool	0.838	0.484
Non Value Added	0.887	
Rata-Rata	0.633	**0,484**

Sumber: SmartPLS

The calculation results above show that the GoF value produced by this research model is 0.5535, which concludes that overall the performance of the prediction model reviewed at the level of suitability between the inner model and the outer model has a high level of feasibility because it produces a GoF value above 0.36.

Table 8
Fit Model

	Saturated Model	Estimated Model
SRMR	0.089	0.089
d_ULS	0.437	0.437
d_G	0.197	0.197
Chi-Square	112.73	112.73
NFI	0.797	0.797

The model fit test can be seen from the SRMR value of the model. In the pls model, it is stated that it has met the criteria if the SRMR value is <0.10. From the table above, it is known that the SRMR value is 0.089 (<0.10), so the model is stated to be fit and suitable for testing the hypothesis.

Table 9
Bootstrapping

Kode	**Hipotesis**	***Original Sample***	**T *statistics***	**P *values***	**Kesimpulan**
H1	Lean Tool -> Non Value Added	0.696	12.974	0.000	Diterima

Sumber: SmartPLS

There is a significant positive influence of the Lean Tool -> Non Value Added variable, because the P-value is 0.000 < 0.05 or in other words H0 is rejected and Ha is accepted.

V. CONCLUSION

Based on the results of data analysis in this study, it can be concluded that the implementation of Lean Tools has a positive and significant effect on reducing non-value added activities in gas processing at PT. Pertamina Hulu Mahakam. This is evidenced by the results of the hypothesis test which shows a T-statistics value of 12.974 and a P-value of 0.000, which means that H0 is rejected and Ha is accepted. In other words, the implementation of Lean Tools significantly reduces non-value added activities

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This heading is not assigned a number.

A reference list **MUST** be included using the following information as a guide. Only *cited* text references are included. Each reference is referred to in the text by a number enclosed in a square bracket (i.e., [3]). References **must be numbered and ordered according to where they are first mentioned in the paper,** NOT alphabetically.

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