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The Effect of 5S Culture Implementation (Seiri, Seiton, Seiso, Seiketsu, Shitsuke) on the Effectiveness of Bleaching Earth (BE) Production

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***Abstract*—** Business competition in the global era requires companies to be able to achieve effectiveness and efficiency in every process. However, in processing HPBE products CAI still indicated off quality by findings in May 2021, where as much as 55.6% were off spec for pH levels, 22.2% off spec for acidity levels, and 22.2% off spec for H2O content. This indicates a decrease in the effectiveness of HPBE production. The program taken by CAI company in order to overcome various wastes that occur at the process stages by implementing a continuous improvement program through a 5S culture in the work area. This research was conducted to determine the effect of 5S culture on production effectiveness at PT.CAI using a sample of 100 respondents. Methods of data collection through observation and questionnaires. The results showed that partially Seiri, Seiton, Shitsuke, Seiketsu had a significant effect on the effectiveness of BE production. While Seiso partially has no significant effect on production effectiveness. However, both Seiri, Seiton, Seiso, Shitsuke, Seiketsu together have a significant effect on production effectiveness. The culture of 5S implementation can increase the effectiveness of HPBE production, therefore programs to improve attitudes towards the implementation of 5S culture in the work area must be given more attention by every level of management.

***Keywords*—** Seiri, Seiton, Seiso, Shitsuke, Seiketsu, Production Effectiveness, Bleaching Earth.

I. INTRODUCTION

As a leading provider of specialty Bentonite-based products, the Functional Minerals business unit defines its entire value chain from exploration, mining, processing and refining to customized customer and industry specific solutions. CAI itself has a global mining network, with a safe and sustainable supply, an efficient logistics system, and has 24 production locations around the world, one of which is in Cileungsi, Bogor-Indonesia.

But in the production process, CAI cannot avoid the appearance of waste. Among them, repeated processes often occur due to the material washing process that has been activated, which still contains too much water content in certain products. The washing process is not optimal because it has a high level of acidity or pH, so it cannot be continued at the product drying stage. At the mixing stage it is also often found that there is repetition of product pouring, because the mixing of the ingredients is too runny which indicates the use of fresh water is too high. Not to mention the added leak in the pump engine which keeps repeating itself due to the material being too dense. As a result of damage to the machine, it is not uncommon for the production process to stop for certain lines. The existence of these various problems has an impact on increasing production time and resources that do not match actual needs. Due to waste on nonvalue added activities for the company. In product processing stage of the High-Performance Bleaching Earth (HPBE), CAI requires material support such as water which is used during the process of mixing products with chemicals before being carried out at the product activation stage. The use of freshwater consumption at CAI itself illustrates that every waste will continue to be correlated with other waste. The freshwater consumption reported for BE production can be seen in the following chart:

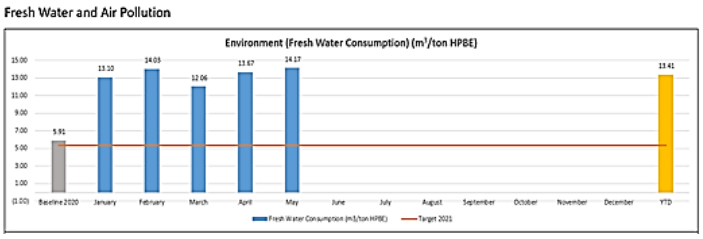

Chart 1. *Fresh Water Consumption 2021*

Chart 1. shows a very significant increase in fresh water consumption compared to the 2020 baseline. This increase in consumption has even started since January-May 2021. And has not shown any decline to reach the 2020 baseline. The various wastes that arise from each of these activities have an impact on decreasing BE production capacity in 2021.

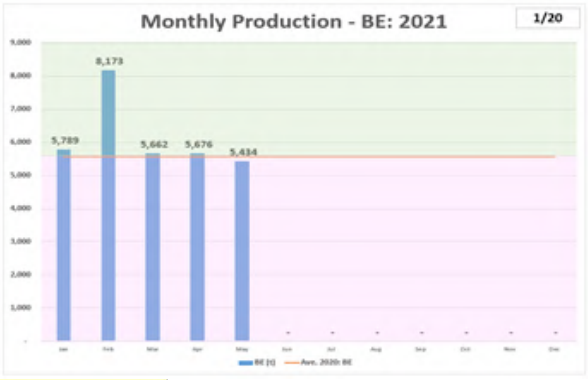

Chart 2. *Decreasing BE Production Capacity in 2021*

The decline in HPBE production can be seen again in the graphic below which shows rework products that appeared in May 2021.

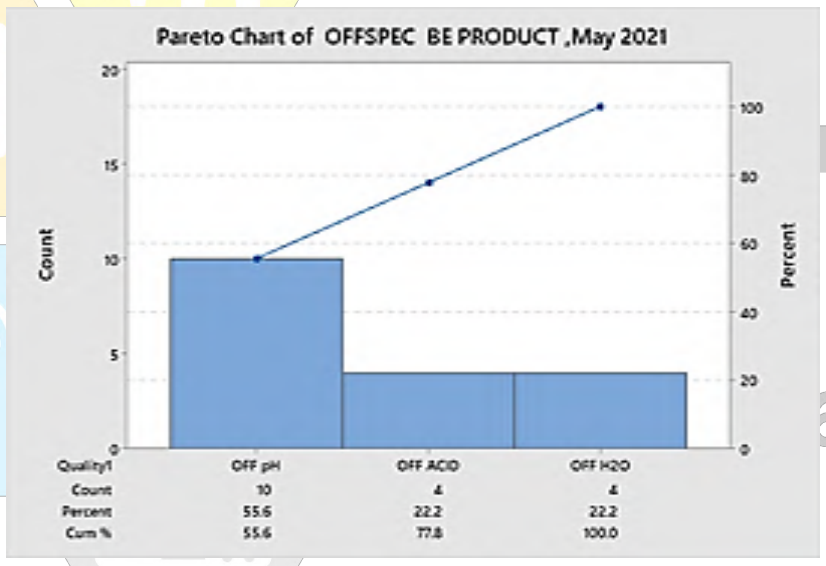

Chart 3. *Offspec BE Products on May, 2021*

The problems that arise from the rework Bleaching Earth (BE) products above are products that do not meet quality standards where as many as 10 jumbo bags (55.6%) of products are off pH levels, 4 jumbo bags (22.2%) of products are off acid levels, and 4 jumbo bags (22.2%) which are also classified as rework due to off H2O levels. This is of course very unfortunate that in one month the average is found to be almost above 10% for products that fall into the off-spec category.

Various efforts were made by PT CAI, in order to reduce waste and rework activities. One of the efforts that has been carried out is by trying to create a 5S-based work culture that adopts the 5S Culture concept namely Seiri, Seiton, Seiri, Seiketsu, and Shitsuke which are expected to create good performance (Sihombing. 2018). effective and efficient way to reduce waste and increase the effectiveness of BE production (Sihotang, 2021). The 5S culture itself is an ongoing improvement effort to achieve work methods, quality and production effectiveness through instilling the concept of discipline for each worker so as to create comfort in the workplace and involve everyone involved in the company (Bentar et al, 2019). The 5S Culture at CAI began to run after the transfer or acquisition of the company from Sudchemi since 2014, this implementation is followed by control through the 5S audit mechanism in the work area which is carried out by the management team at the staff level every month in turn. Implementation of the

5S implementation audit at CAI is carried out not only identifying processes that need to be repaired or improved, but also evaluating existing work procedures and standardization or setting new standards in work.
This is done so that standards for quality, quantity and products can be met to the fullest and defective products can be suppressed as much as possible. In order to achieve this goal, a continuous improvement concept approach was created through the 5S work method. Therefore, this study will focus on analyzing the effect of implementing the 5S program (Seiri, Seiton, Seiso, Seiketsu, and Shitsuke) in increasing the effectiveness of the Bleaching Earth (BE) product production process at CAI site Cileungsi, Bogor.

II. HYPOTHESIS

This study uses endogenous variables that reflect the 5S method consisting of X1 (Seiri), X2 (Seiton), X3 (Seiso), X4 (Seiketsu), and X5 (Shitsuke) as well as one exogenous variable Y (production effectiveness). This research seeks to prove the effect of implementing 5S culture as a method that is expected to increase the effectiveness of bleaching earth (BE) production. Achievement of production quantity, product quality, and defects, then steps are taken to implement 5S improvements in order to have the effect of minimizing waste and defects in the production process (Wijaya, 2018). Several previous studies have shown that the implementation of the 5S or kaizen method mostly has a positive impact. The research is feasible because the company has adopted Kaizen concept in making improvements in the production process involving all departments. One of the aims of this research is to evaluate the application of the 5S culture in order to provide as much input or recommendations as possible to the company. The 5S method implemented is truly on target and efforts undertaken do not add to the waste in the Bleaching Earth (BE) production process. By carrying out improvements using an effective 5S culture so that this culture can be maintained to reduce off-spec products, defective products, and achieve an even production quantity in every condition (Mardiasmo, 2016). So that the expected impact of the 5S method can also be initiated positively on other production performance. Based on this description, the conceptual framework in this study can be described in the chart below:

1. Is there an influence of Seiri (Summarized) on BE Production Effectiveness at CAI?
2. Is there an influence of Seiton (Neatness) on BE Production Effectiveness at CAI?
3. Is there an influence of Seiso (Cleanliness) on BE Production Effectiveness at CAI?
4. Is there any influence of Seiketsu (Cleanliness) on BE Production Effectiveness at CAI?
5. Is there an effect of Shitsuke (Treatment) on BE Production Effectiveness at CAI?
6. Is there an influence of 5S culture together (Seiri, Seiton, Seiso, Seiketsu, and Shitsuke) on BE Production Effectiveness at CAI?

The research hypothesis is the basis for the initial assessment of this research. On the hypothesis that was built to answer the doubts of researchers about a concept that has been applied. According to Sugiyono (2017) states that the answer that was built by the researcher and is temporary to the formulation of the problem that was sparked is a hypothesis. Because this hypothesis is only temporary, the researcher must look for evidence of the correctness of the answers built by the researcher. Therefore, it can be seen from the flow of thinking hypotheses in this study namely:

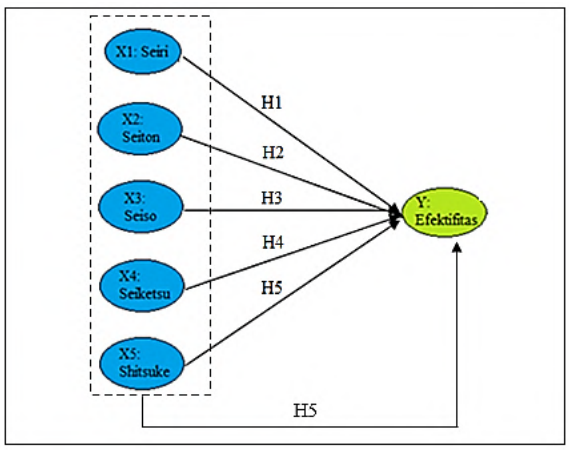

Figure 1. *Basic Framework, Source: Developed Research (2022)*

- H1 = There is a significant influence between Seiri (summary) on the effectiveness of Bleaching Earth Production at CAI
- H2 = There is a significant influence between Seiton (Neatness) on the Effectiveness of Bleaching Earth Production at CAI
- H3 = There is a significant influence between Seiso (Cleanliness) on the Effectiveness of Bleaching Earth Production at CAI
- H4 = There is a significant influence between Seiketsu (Cleanliness) on the Effectiveness of Bleaching Earth Production at CAI
- H5 = There is a significant influence between Shitsuke (Treatment) on the Effectiveness of Bleaching Earth Production at CAI
- H6 = There is a significant influence between the application of the 5S method (Seiri, Seiton, Seiso, Seiketsu, and Shitsuke) on the Effectiveness of Bleaching Earth Production at CAI

III. METHODOLOGY RESEARCH

1. **Design**

The type of research used is descriptive quantitative. This research attempts to describe or describe problems regarding the 5S Culture analysis in reducing non-value added activities in the bleaching earth production process. The steps taken for the quantitative analysis stage are analysis using calculations, comparing and classifying the data obtained through questionnaires in the form of numbers for each dimension of the variable studied (Siregar, 2014).

2. **Population and Sample**

Population According to Sugiyono (2016) population is a generalized area consisting of objects or subjects that have certain qualities and characteristics set by researchers to study and then draw conclusions. The population in this study is 96 people which is then rounded up to 100 respondents from employees who are directly involved in the bleaching earth production process namely the bagging team, filterpress team, activation team, mixing team also supported by site managers, supervisors and quality control.

3. **Definition and Operation Variable**

Endogenous variables treated as dependent variables in a particular set of variables may also be conceptualized as independent variables in relation to other variables. In this case the analysis of production effectiveness (production effectiveness) is the dependent variable that is influenced or is the result of the independent variable. Effectiveness can be realized if it shows a production process that has quality or quality because it can affect the results to be achieved as a whole. According to Yamit (2010) in his book Production and Operations Management, effectiveness is a measure that gives an idea of how far goals are achieved, both in terms of quality and time, orientation to the output produced.

Exogenous variables are any variables that affect other variables and endogenous variables are any variables that are influenced by endogenous variables or also known as independent variables in the analytical method using SPSS software. The exogenous variables in this study are components of the 5S culture of X1 (Seiri), X2 (Seiton), X3 (Seiso), X4 (Seiketsu), and X5 (Shitsuke) which are then processed modeled with the second order reflective modeling structure of SEM PLS Version 4.0 to determine the effect of each of these variables on production effectiveness. The measurement scale in this study uses a Likert scale with several instruments, namely production effectiveness, production planning, raw material requirements, scheduling and production control. The Likert scale is used to measure attitudes, opinions, influences and perceptions of a person or group of people about social phenomena (Sugiyono, 2012).

4. **Data Analysis**

a. Measurement Model (Outer Model)

The measurement model shows how the manifest or observed variable represents the latent variable to be measured (Ghozali & Latan, 2015). The series of tests in the measurement model or outer model are validity and reliability tests. The validity test with the SmartPLS version 4.0 program can be seen from the value of the loading factor for each construct indicator. The conditions that are usually used to assess validity are that the loading factor value must be more than 0.70. The validity testing procedure is also called convergent validity, namely by correlating the item score (component score) with the construct score which then produces a loading factor value (Pekei. 2016). If using a loading factor, the conversion value of the loading factor is said to be high if the component or indicator correlates more than 0.70 with the construct you want to measure. However, for research in the early stages of development, a loading factor of 0.5 to 0.6 is also considered sufficient (Ghozali & Latan, 2015).

Reliability test was carried out to prove the accuracy, consistency, and precision of the instrument in measuring constructs. In PLS-SEM using the SmartPLS version 4.0 program, to measure the reliability of a construct with reflexive indicators can be done by calculating the composite reliability value. Requirements that are usually used to assess construct reliability, namely composite reliability must be greater than 0.7 for confirmatory research and a value of 0.6 – 0.7 is still acceptable for exploratory research (Ghozali & Latan, 2015).

b. Inner Model

The purpose of the structural model test is to see the correlation between the measured constructs which is the t test of the partial least squares itself. Structural or inner models can be measured by looking at the R-Square value of the model which shows how much influence the variables have in the model. Tests on the inner model or structural model are carried out to examine the relationship between latent constructs (Sutawidjaya & Rosalendro, 2015) The inner model includes inner relations, structural models and substantive theory describing the relationship between latent variables based on substantive theory. The inner model is tested by looking at the R-square value on the path coefficient (path coefficient) to obtain information on how much the dependent latent variable is influenced by the independent latent variable, as well as a significance test to test the significance value of the relationship or influence between variables (Ghozali, 2006).

If the t-statistic value is greater than 1.96 (significance level 5%) or greater than 1.65 (significance level 10%) for each path relationship. According to Hartono (2011), a significance measure to support the hypothesis can be used to compare the T-table value with the T-statistic value obtained through bootstrapping analysis. The basis for decision making in this test is as follows:

- If the significance probability number is > 0.5 then H0 is accepted and H1 is rejected.
- If the significance probability number is <0.5 then H0 is rejected and H1 is accepted.

c. Interdimensional Correlation Matrix Analysis

Correlation between dimensions is a form of correlation that is used to see the relationship between the dimensions of a variable against the dimensions of other variables, which is indicated by the Pearson Correlation (R) value.

IV. RESULT

In this study, the research used a questionnaire instrument with a total of 40 questions which were considered to represent the 5S method variables (X) and production effectiveness variables (Y).

The questionnaire was converted into a digital form through the google spreadsheet application which was easily accessed by respondents by simply opening the link provided by the researcher.

The link to the questionnaire was distributed to 100 respondents via digital messages and the respondents' answers were automatically captured in excel format.

1. Outer Model Evaluation

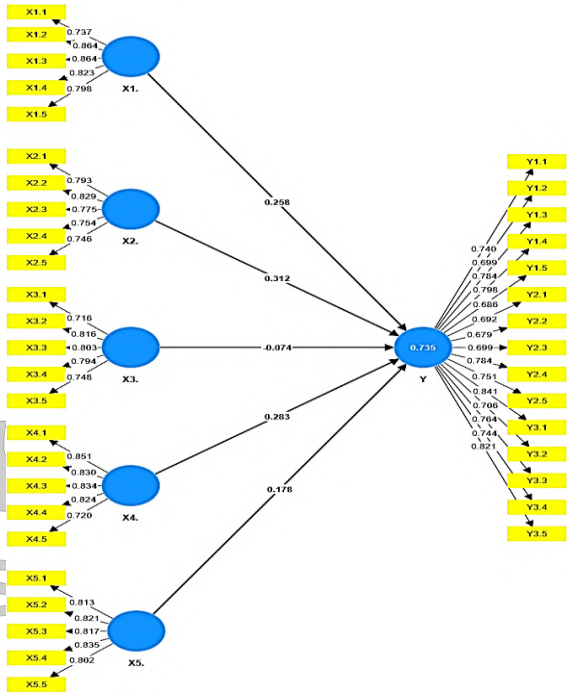

Figure 2. *Variabel Relation with Dimension*

The criteria for assessing convergent validity can be seen from the relationship between the score of the manifest variable and the score of the latent variable (loading factor).

If the loading factor value is greater than 0.70, the correlation between the manifest variable and the latent variable is said to be high.

That is, the indicator can be said to be valid in measuring the constructs made. If the p-value resulting from the correlation is <0.05, then the relationship is considered significant (Widianto & Aryanto, 2018). The loading factor values for each indicator are as follows:

Table 1: Loading Factor

Variable	Factor Loading	Remark
Seiri	0.737	Valid
	0.864	Valid
	0.864	Valid
	0.823	Valid
	0.798	Valid
Seiton	0.793	Valid
	0.829	Valid
	0.775	Valid
	0.754	Valid
	0.746	Valid
Seiso	0.716	Valid
	0.816	Valid
	0.803	Valid
	0.794	Valid
	0.748	Valid
Seiketsu	0.851	Valid
	0.830	Valid
	0.834	Valid
	0.824	Valid
	0.720	Valid
Shitsuke	0.813	Valid
	0.821	Valid
	0.817	Valid
	0.835	Valid
	0.802	Valid
Ketepatan mutu barang jadi	0.740	Valid
	0.699	Valid
	0.784	Valid
	0.798	Valid
	0.686	Valid
Ketepatan kuantitas barang jadi	0.692	Valid
	0.679	Valid
	0.699	Valid
	0.784	Valid
	0.751	Valid
Produksi cacat/rusak yang tidak melebihi standar	0.841	Valid
	0.706	Valid
	0.764	Valid
	0.744	Valid
	0.821	Valid

Source: Processed Data, 2022

Furthermore, after the indicator validity value is obtained, an evaluation is carried out on the Average Variance Extracted (AVE) value. The assessment criteria refer to Ghozali's statement (2014) that the AVE value for declaring a valid indicator cannot be less than 0.50. Following are the results of the AVE obtained through the PLS Algorithm calculation. The AVE value can be seen in the following table:

Table 2. *Average Variance Extraacted Value*

Variable	Average Variance Extracted (AVE)
Seiri	0,670
Seiton	0,608
Seiso	0,603
Seiketsu	0,661
Shitsuke	0,669
Production effectiveness	0,559

Source: Processed Data, 2022

From the table, it can be seen that the AVE (Average Variance Extracted) value is > 0.50. This shows that each value of the Seiri, Seiton, Seiso, Seketsu, and Shitsuke variables and production effectiveness has a high level of validity marked by an interpretation value of Average Variance Extracted (AVE) > 0.50 which meets the requirements of convergent validity.

The reliability test with Cronbach's alpha measures the lower limit of the reliability value of a construct with the rule value of Cronbach's alpha greater than 0.7 (Ghozali, 2016). The evaluation results of Cronbach's alpha can be seen from table below:

Table 3. *Cronbach's Alpha Value*

Variable	Cronbach's Alpha
Seiri (X1)	0,876
Seiton (X2)	0,839
Seiso (X3)	0,835
Seiketsu (X4)	0,871
Shitsuke (X5)	0,876
Production effectiveness (Y)	0,943

Source: Processed Data, 2022

Based on the table above, the results of calculating the Cronbach's Alpha value for each indicator and variable are > 0.70.

Thus, these results indicate that each research variable has met the Cronbach's Alpha value requirements, so it can be concluded that all variables have a high level of reliability and can be used in this study.

After testing the outer model has been complied. The next step is testing the inner model (structural model). The Inner Model shows the power of estimation between latent variables or constructs.

The inner model can be evaluated by looking at the r-square (indicator reliability) for endogenous constructs and the t-statistical value of the path coefficient test.

The higher the r-square value means the better the prediction model of the proposed research model.

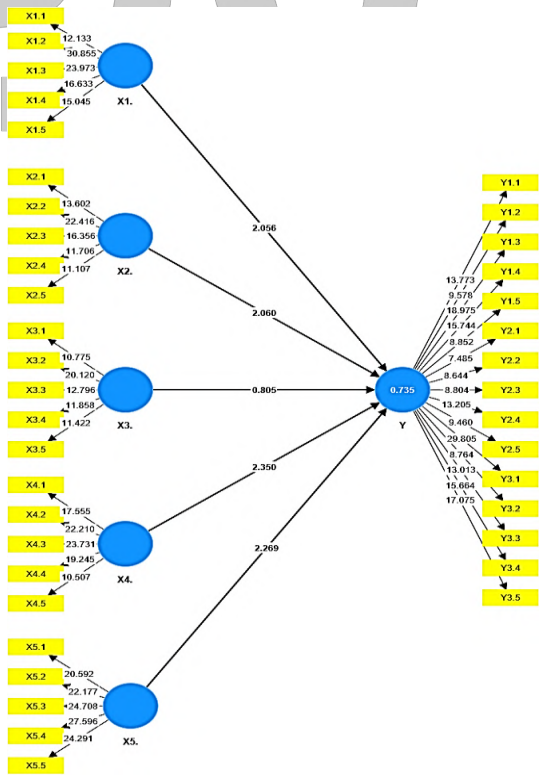

Figure 3. *Result of Bootstrapping Path*

The path coefficient test is useful in testing the strength of the effect or influence of the independent variable on the dependent variable. Meanwhile, the determination coefficient or R-Square is useful in measuring how much the endogenous variables are influenced by other variables. Chin in Ghozali (2016) states that if the value of R2 > 0.67 is obtained, it is in the Good category. As for the results of data processing using Smart PLS Version 4.0 software with 500 times randomization (running sample) the path coefficient value is obtained as follows:

Table 4. *Path Coefficient Value (Mean. STDEV)*

	Original sample (O)	Sample mean (M)
Seiri → Production effectiveness	0,258	0,272
Seiton → Production effectiveness	0,312	0,294
Seiso → Production effectiveness	-0,074	-0,062
Seiketsu→ Production effectiveness	0,283	0,279
Shitsuke → Production effectiveness	0,178	0,182

Source: Processed Data, 2022

Based on table 4.9 above, it shows a positive number from the results of the path coefficient or original sample for all variables in this model. That is, if the greater the value of the path coefficient on one exogenous variable on the endogenous variable, the stronger the influence that exists between the exogenous variables on the endogenous variable.

The structural model is then evaluated using R-square for endogenous constructs. The influence of variables can be seen from the ability of exogenous variables to predict variation of endogenous variables through the necessary information, then assessed with the criteria of R-Square value, which must be greater than 0.50 (Alfidella et. al, 2015). The R^2 value can be used to assess the effect of certain exogenous variables and whether they have a substantive effect. The R^2 result of 0.67 is in the good category, 0.33 is included in the medium category, and 0.19 is included in the weak category (Ghozali, 2014). The following table (R-Square) is presented using Smart PLS Version 4.0 software:

Table 5. *R-Square Value*

Variable	R-Square
Production effectiveness	0,735

Source: Processed Data, 2022

Based on the table above, it shows that the R-Square value of the production effectiveness variable (Y) is 0.735 > 0.50, which means that it can be categorized as fulfilling the R-Square value requirements. Where 73.5% of the variation or change in production effectiveness is influenced by the 5S culture (Seiri, Seiton, Seiso, Seiketso, Shitsuke) while the remaining 26.5% is influenced by other factors or causes. So it can be said that the R-Square on the production effectiveness variable (exogenous variable) is included in the good category. Therefore, the results of this study are feasible to proceed to the stages of hypothesis analysis and verification.

After conducting convergent validity testing. discriminant validity. and reliability. the next test is testing the hypothesis. The value of the path coefficient or inner model shows the level of significance in hypothesis testing. significance test was carried out using the Bootstrapping method (Hudin & Riana, 2016). According to Latan & Ghozali (2014) hypothesis testing is done by looking at the magnitude of the T-statistics value which uses a significance level of 95% (α = 0.05). The T-table value with a significance level of 95% is 1.96. The limit for rejecting and accepting the proposed hypothesis refers to the value of 1.96. Where a hypothesis will be accepted if it has t-statistics greater than 1.96 and if it has t-statistics less than 1.96 then a hypothesis will be rejected (Perdana et al., 2018).

Test the validity of the indicators analyzed using degrees of freedom or df (degree of freedom) with the formula: df = n – k. n is the number of observations (number of samples) and k is the number of variables (free and dependent) (Hudin & Riana, 2016). The number of observations in the study was 100 samples. while the number of variables studied were 2 variables. So that the results can be obtained df = 100 – 2 = 98. For the t-table value with a significance level of 5% using a two-way test and a degree of freedom of 98 is 1.980.

The following is a table of coefficients for each path hypothesis (Path Coefficients) and the t-Statistics values obtained from the SmartPLS bootstrapping output results as follows:

Table 6. *Path Cofficient value*

	Original sample (O)	T statistics	P values
Seiri → Production effectiveness	0,258	2,056	0,040
Seiton → Production effectiveness	0,312	2,060	0,040
Seiso → Production effectiveness	-0,074	0,805	0,421
Seiketsu→ Production effectiveness	0,283	2,350	0,019
Shitsuke → Production effectiveness	0,178	2,269	0,024
Budaya 5S → Production effectiveness	0,844	21,704	0,000

Source: Processed Data, 2022

Based on the results of hypothesis testing using the path coefficient above, the following are the results of each hypothesis test:

a. The influence of Seiri's 5S culture on the effectiveness of BE production produces a t-statistic of 2.056 > 1.980. From these results, it can be concluded that the implementation of the Seiri culture in processing BE products has a significant effect on the effectiveness of BE production at CAI. Based on these results, the hypothesis (H1) which suspects that Seiri has a significant effect on the effectiveness of BE products means that H1 is acceptable. Seiri's influence on the effectiveness of BE products is also positive, as indicated by the original sample value of 0.258. This means that Seiri has a positive and significant effect on the effectiveness of BE products at CAI.

b. The influence of Seiton's 5S culture on the effectiveness of BE production produces a t-statistic of 2.060 > 1.980. This means that it can be concluded that the implementation of Seiton has a significant effect on the effectiveness of BE production. Based on these results, the hypothesis (H2) which suspects that Seiton has a significant effect on the effectiveness of BE production so that H2 can be accepted. The influence of Seiton on the effectiveness of BE products is also positive as indicated by the original sample value of 0.312. This means that Seiton has a positive and significant effect on the effectiveness of BE products at CAI.

c. The influence of Seiso's 5S culture produces a t-statistic of 0.805 <1.980. From these results, it can be concluded that the implementation of Seiso, on the other hand, has no significant effect on the BE production process. Based on these results the hypothesis (H3) which suspects that Seiso has a significant effect on the effectiveness of BE production, cannot be accepted or H3 is rejected. The influence of Seiso on the effectiveness of BE production is negative, which is indicated by the original sample value of -0.074. This means that Seiso has a negative and insignificant effect on the effectiveness of BE production at CAI.

d. The influence of Seiketsu's 5S culture produces a t-statistic of 2.350 > 1.980. It can be concluded that the implementation of the Seiketsu method has a significant effect on BE production. Based on these results the hypothesis (H4) which suspects that Seiketsu has a significant effect on the effectiveness of BE production can be accepted. The influence of Seiketsu on the effectiveness of BE products also shows a positive value which can be seen from the original sample value of 0.283. This means that Seiketsu (Maintenance) has a positive and significant effect on the effectiveness of BE products at CAI.

e. The influence of the 5S Shitsukei culture produces a t-statistic of 2.269 > 1.980. It can be concluded that the implementation of Shitsukei has a significant effect on BE production in the work area. Based on these results H5 which suspects Shitsukei has a significant effect on the effectiveness of BE products is acceptable. The effect of Shitsukei (Craft) on the effectiveness of BE products is positive as indicated by the original sample value of 0.178. This means that Shitsukei has a positive and significant effect on the effectiveness of BE products at CAI.

f. The influence of the 5S (Kaizen) culture as a whole on the effectiveness of BE production produces a t-statistic of 21.704 > 1.980. From these results, even though there is one of the 5S criteria, namely Seiso, it does not have a significant effect, but overall the implementation of 5S culture has a significant effect on BE production. Based on these results the hypothesis (H6) which suspects 5S culture (Kaizen) has a significant effect on the effectiveness of BE production, so that H6 is concluded to be acceptable. The influence of 5S (Kaizen) culture on the effectiveness of BE production also shows a positive original sample value of 0.844. This means that the 5S (Kaizen) culture as a whole has a positive and significant effect on the effectiveness of BE production at CAI.

Table 7. *Conclusion of Hypothesis*

Hypothesis		Remark
H1	Seiri has a significant effect on BE Production Effectiveness at CAI	Diterima
H2	Seiton has a significant effect on BE Production Effectiveness at CAI	Accepted
H3	Seiso has no significant effect on BE Production Effectiveness at CAI	**Rejected**
H4	Seiketsu has a significant effect on BE Production Effectiveness at CAI	Accepted
H5	Shitsuke has a significant effect on BE Production Effectiveness at CAI	Accepted
H6	The 5S Culture (Kaizen) jointly has a significant effect on BE Production Effectiveness at CAI	Accepted

To find out which variable has the most influence in increasing the effectiveness of BE production, the researchers also display the results of the latent correlation correlation of variables so that in providing suggestions or recommendations for improvements to companies that are basic and right on target, it is hoped that they will be able to have a positive impact on increasing the effectiveness of BE production in the future. The latent variable correlation test results are as follows:

Table 8. *Laten Variable Correlation*

Variable	*Seiri*	*Seiton*	*Seiso*	*Sei-ketsu*	*Shit-suke*
Production effectiveness	**0,762**	**0,782**	0,652	**0,765**	**0,713**

Source: Processed Data, 2022

Based on the table above, it can be seen that there are three 5S cultures that have the highest correlation value with BE production effectiveness, namely Seiton of 0.782, followed by Seiri of 0.762, and the third, namely Shitsuke of 0.713, and finally, Seiso with the smallest value of 0.652.

V. DISCUSSION

Based on the results of the t-statistic test using SMART PLS Version 4.0 software, a value of 21.704 was obtained which was greater than 1.980 with an original sample value of 0.844. This shows the implementation of the 5S culture (Kaizen) as a whole has a positive and significant effect on the effectiveness of BE products at CAI. That is, Shitsuke culture has not provided evidence where the quality, quantity and low defects of BE products can be minimized when hygiene procedures are carried out to the maximum extent possible by each BE production line.

The results of this study are supported by the results of research conducted by Lastiwarni & Lestari (2019) which also obtained the result that the implementation of the 5S culture (Kaizen) together had a positive and significant effect on Service Effectiveness at Bank Central Asia in Gianyar and KCP. In addition, the results of previous research by Handayani (2016) also showed similar results using simple linear regression analysis and t-test where Kaizen culture (5S) was concluded to have a significant influence on the work effectiveness of employees at the Toyota Sales Operation Auto 2000 company, Medan Branch. Next is Priyanka Rai's research (2016) entitled Effectiveness of 5S Implementation on Organizational Performance where the research aims to identify the effectiveness of implementing 5S culture in organizations, employee performance, and employee attitudes towards 5S culture itself. The results of the research show that the implementation of 5S culture is proven to be effective in improving employee performance. This study has similarities, namely that both have the same research variable, namely 5S culture using the Smart PLS quantitative analysis method.

The results of this study and several supporting studies are consistent with what was stated by Akter, et. at. (2015) in their research that by implementing kaizen, line efficiency has been increased by up to 7% and defects per hundred-units have also been reduced. For the industry, to remain competitive and maintain market share in this global market, continuous improvement of manufacturing system processes is essential. Kaizen strives to empower workers, increase worker satisfaction, facilitate a sense of accomplishment, thus creating work pride. This not only ensures that manufacturing processes are leaner and fitter, but also eliminates waste where value added activities increase compared to nonvalue added activities.

The 5S culture is still foreign, but several companies have implemented this culture so that they are able to improve employee discipline, increase performance and welfare because work is carried out in an effective and efficient manner. In addition, the implementation of 5S culture can create improvements through various innovations on an ongoing basis. This process is carried out continuously so that it can bring big changes in the company (Silitonga. 2016). The 5S culture focuses on caring for the work environment by creating a habit of caring for conditions in the work environment at least in each work area. So that the 5S culture is then believed to be one of the methods that can make the work environment much better than before and supports the creation of simultaneous improvements (Nurhadi, 2022).

Based on the results of the variable latent correlation test, two values with the highest correlation were obtained from the basic principles of 5S culture on the effectiveness of BE production, namely Seiton of 0.782, and Seiri of 0.762, and the third, namely Shitsuke of 0.713. From the results of this correlation can be concluded that the company can maintain the Seiton procedure in processing BE production related to materials, machines, or process stages. This is inversely proportional to the correlation results on the Seiso component on production effectiveness with the smallest value of 0.652. This strengthens the null hypothesis which is accepted where Seiso has no significant effect on production effectiveness and has a negative value.

This result is a turning point for the company to evaluate the implementation of the 5S culture in its entirety. So that workers do not have assumptions or build negative assumptions about the application of 5S culture to 4S culture. This means that cleanliness is considered not to have a major influence in increasing production effectiveness (production quality, production quantity and in reducing defective products) in the BE production process. Meanwhile in the overall analysis the 5S culture is proven to be able to contribute to production effectiveness seen from the t-statistic value that meets the criteria of significant influence.

In this case the company needs to evaluate the indicators of achievement of SOP implementation or appropriate cleaning procedures to be applied in the BE production process so that it is hoped that production effectiveness can be achieved on an ongoing basis with a 5S culture as a form of simultaneous improvement (Kalla Group, 2018). These results also show that there are assumptions from workers because the raw material comes from clay or clay, the storage process, and the drying process which then produces dust in the work area, sticks to machines, tools, accumulates in various building structures is considered normal and normal. which then impacts the level of cleanliness in the work area is considered not to contribute anything in the production process (Kumbara & Agustinus, 2020).

This is also supported by the results of documentation in the field which shows that Seiso's 5S culture has not been implemented optimally. One of them is where workers do not pay attention to dust that has accumulated on cable lines, building installations, machines or tools. In fact, it is not uncommon for processed products that spill from conveyor machines or silos to be considered clay soil or materials that no longer need to be processed and are left as is. This can actually reduce the quantity of production, and create a chain of waste at the process level (Assauri, 2016).

The results of this study can have positive implications for the continuous improvement program expected by the company to be implemented in a measurable and evaluated manner. To support the sustainability program running according to the expected track, it is necessary to identify various problems that arise both at the input, process and output stages.

VI. CONCLUSION

Based on the results of the study, there is a variable with the lowest t-table value but shows a significant relationship in improving the BE production process, namely Shitsukei. So that the application of the Kaizen method will be better in the future in achieving BE production effectiveness. programs are needed that can be developed to increase employee awareness of the implementation of the Kaizen method based on the Standards. So in this case. companies need to develop better assessment tools. socialization of SOP to employees. and where possible provide rewards to stimulate workers in implementing standards-based Kaizen.

To increase employee participation in the application of the Kaizen method, CAI companies can involve every employee in making decisions to organize each value-added and non-value-added activity based on Kaizen. Companies can involve employees in the improvement

process to reduce any activities that do not add value and only generate waste.

In maintaining consistency and discipline in implementing 5S as a whole, it is suggested that top management can develop the implementation of the Seiso culture in the work area. This development must be effective and on target, where management must further study these findings. Because from the results of the study there are external factors that influence the implementation of Seiso such as machine design and work area design that do not support Seiso activities in the work area, especially in the product bagging area and drying area as well as the vacuum system or venting unit (Fahmi, 2012). This will involve crossfunction, therefore the researchers suggest that a study be carried out on the implementation of preventive maintenance and corrective maintenance programs in the work area involving all parties. So that this will assist the management team in making decisions and carrying out appropriate planning and design in integrating 5S activities to improve product quality, product quantity and reduce product defects (Yusep & Agustinus, 2022). Furthermore, management can set targets for achieving Seiso in the work area. This is done so that it will be able to help management increase work productivity and effectiveness, which is done through early identification of abnormal conditions in the work area, so that preventive measures can be taken to prevent the production process from being hampered due to damage or malfunction of the machine or tool.

The work environment should be in line with improvement ideas, if discrepancies are found, the work environment can be evaluated, both physical and non-physical work environment. Besides that, the company must also be able to facilitate complaints from every worker by innovating in the production process both innovations in machines or tools, as well as innovations in the work environment so that it is hoped that the principles or concepts of the Seiso culture (cleanliness) can be implemented as much as possible, and provide positive contribution to the BE production process (Rochman. 2022).

For further research, it is hoped that other factors or confounding variables can be involved in the application of the Kaizen method to production effectiveness such as the physical environment and preventive maintenance to production effectiveness. So as to provide a more specific description of the results in providing suggestions for research sites.

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