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The Influence of Raw Material Inventory Management and Machine Maintenance on the Production Process

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Abstract

This study aims to determine the effect of raw material inventory management and machine maintenance on the All Aluminum Alloy Conductor-Shielded (AAAC-S) cable production process at PT. Pulung Cable Indonesia. The method used in this research is quantitative with a causal associative approach. The population used in this study were all employees of PT. Pulung Cable Indonesia. The sample in this study is part of the population of all employees of PT. Pulung cable Indonesia using non-probability technique by purposive sampling. The data analysis technique used is multiple linear regression analysis using the SPSS 22 software program for windows. The results of this study indicate that: (1) Raw material inventory management has a positive and significant effect on the production process. (2) Machine maintenance has a positive and significant effect on the production process.

Keywords Raw Material Inventory Management, Machine Maintenance and Production Process

INTRODUCTION

The production process is essentially the transformation (conversion) of materials or production inputs into other value-added products.(Heizer and Render 2016). The current production process is developing rapidly which is the effect of rapid technological developments and is supported by efforts to improve production processes and product flexibility. (Desianti 2020). The production process needs to be supported by the availability of sufficient resources and energy and takes place in the long term, because the production and operation process does require a lot of energy and resources in its implementation. (Artaya, 2018)

One factor that plays an important role in the production process is inventory management or raw material inventory control, according to the results of research that has been conducted by Fitriana & Zanah, (2020) It is stated that Raw Material Inventory Control is one of the factors that determine the smoothness of the production process. Furthermore, the results of research from Ramli, (2018) It was stated that inventory control is one of the activities of various sequences of activities which are closely sequential to one another in all production operations. As well as research conducted by Maulana & Puspita, (2022) Inventory control of raw materials plays an important role in the production process. Then according to research conducted by (Fitriani, 2018). Raw material inventory control has a large percentage in influencing the production process. Furthermore, based on research conducted by (Ramadhanty & Evitha, 2021). Raw material inventory plays a dominant role in the production process in the manufacturing industry. Inventories are stored materials or goods that are used for a specific purpose, such as for the purpose of being used in the production process (Desianti 2020). Inventory of raw materials is the key to operating long-term production activities in a company. In addition to quality, the quantity of raw materials must also be maintained as well as possible. (Artaya, 2018).

Another factor that influences the production process is machine maintenance based on several previous studies by previous researchers. That is the result of research Putri, (2014) that there is an influence of machine maintenance on the production process. According to Assauri, (2016) for an optimal production process and according to plan, there must be good and effective machine maintenance. ThenMutaufiq & Aisyyah, (2021). It is important to pay close attention to the machine maintenance mechanism because the machine is one of the other elements that acts as the main support for the production process. In tune with (Jannah, 2019) Machine maintenance has an influence on the production process. further

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research conducted by Atmadani et al., (2021) shows that machine maintenance affects the production process. Then also by Mutaufiq & Aisyyah, (2021) maintenance, namely activities carried out with the aim of maintaining the existing machinery and equipment in the company as a whole so that the machine or equipment remains in a ready-to-use condition. The purpose of maintenance aims to find out whether the company always has optimal production equipment or facilities to ensure the smooth running of a production process.

PT. Pulung Cable Indonesia is one of many domestic companies that produce various types of power cables to support electricity distribution activities in Indonesia. One of the products produced by PT. Pulung Cable Indonesia is an All Aluminum Alloy Conductor-Shielded (AAAC-S) type cable. At PT. Pulung Cable Indonesia often finds obstacles that arise during the production process which result in company losses, obstacles that generally arise during the production process at PT. Pulung Cable is a production process that is often not smooth. It often happens that the AAAC-S cable production process is not smooth in the formation of conductor and insulator parts, such as many broken conductor wires during processing and lots of bumps found and visually lots of damage and torn points on the insulator so that the shape of the cable is not as it should be . Therefore the author intends to examine the problem above because it greatly disrupts the AAAC-S cable production process and certainly slows down the production process and is detrimental to the company in terms of cost and time.

Table 1.*AAAC-S Cable Production Report Data for 2021*

NO	MONTH	PRODUCT OK (%)	PROBLEM PRODUCTS (%)
1	JANUARY	100%	0%
2	FEBRUARY	100%	0%
3	MARCH	62%	38%
4	APRIL	81%	19%
5	MAY	84%	16%
6	JUNE	86%	14%
7	JULY	87%	13%
8	AUGUST	79%	21%
9	SEPTEMBER	85%	15%
TOTAL		84%	16%

Source: PT. Pulung Cable Indonesia

From the table of data on the number of AAAC-S cable production produced from January to September 2021, we can see that the number of AAAC-S cable products experienced obstacles when the production process was out of control, so the authors see this as a production problem that hinders an ongoing production process. will lead to wastage of resources and time due to this problem.

LITERATURE REVIEW AND HYPOTHESIS

Literature review

According to Heizers and Renders (2016). Production is the manufacture of goods and services. The manufacturing production process is currently growing rapidly due to technological developments driven by efforts to increase product productivity and flexibility. (Desianti, 2020). Then AccordingHerawati and Mulyani (2016), Ahyari in Ramli (2018) Which Becomes An Indicator of a Production Process Namely**:** Production Schedule, Production Amount, Product Quality and Timeliness of production.

In all of the company's production operations, inventory management is a series of activities that are closely related to each other and in accordance with what has been planned in terms of time, quantity, quantity and cost. (Assauri, 2016) The purpose of inventory management is to control inventory so that existing inventory remains ideal in every condition (Heizer and Render 2016). Management of raw material inventory according to Rusdiana (2014) And Ramli (2018) 3 has the following indicators: Safety stock, Reorder Point and Lead Time

Maintenance is all activities related to maintaining the equipment system so that it is in proper working condition (Heizer and Render 2016). There are 5 Engine Maintenance Indicators According (Putri, 2014) as well as (Anggraini and Maulana, 2016) namely: Routine maintenance, Repair, Emergency, Scheduled maintenance and replacement of spare parts.

hypothesis

Hypothesis according (Sugiyono, 2021). in the book Quantitative Qualitative Research Methods and R&D is a temporary answer to the research problem formulation that has been written by the researcher where the

writing of this hypothesis is stated in the form of a statement sentence.

By looking at the results of the relationship between previous journals and journals, the writer can draw the research hypothesis which is stated as follows:

H1: Raw Material Inventory Management Has a Positive and Significant Influence on the PT. AAAC-S Cable Production Process. Pulung Cable Indonesia.

H2: Machine Maintenance Has a positive and significant impact on the AAAC-S Cable Production Process of PT. Pulung Cable Indonesia.

RESEARCH METHODS

This study used quantitative research methods with a causal associative approach. The population of this study were all employees of PT. Pulung cable Indonesia, using a sampling technique, namely Purposive Sampling with criteria, namely 51 production operators in the AAAC-S Cable section, data were collected through field observations and distributing research questionnaires. Then the data obtained was processed using IBM SPSS software Version 22.

To determine the effect of raw material inventory management and machine maintenance on the production process, multiple regression analysis is used with the following equation: Y = a + b1X1 + b2X2+ e

RESULTS AND DISCUSSION

Results

Characteristics of Respondents

Characteristics of Respondents The characteristics of respondents in this study were focused on age, length of work and educational background. Based on the questionnaire that has been distributed to the respondents, the following results are obtained:

Table 2. Long Working Characteristics Test

Length of work	Frequency	Percentage
0 - 3 Years	15	29%
35 years old	9	18%
> 5 Years	27	53%
Total	51	100%

Source: 2022 processed data

Table 3. Testing of Age Characteristics

Age	Frequency	Percentage
< 20 Years	0	0%
21 - 30 Years	30	59%
31 - 40 Years	19	37%
> 40 Years	2	4%
Total	51	100%

Source: 2022 processed data

Table 4. Testing the Characteristics of the Latest Education

Education	Frequency	Percentage
high school	50	98%
junior high school	1	2%
Total	51	100%

Source: 2022 processed data

Validity test

Validity test is a test to measure whether or not a research questionnaire is valid.

Table 5. Validity Test Results

Variable	Indicator	R count	R table	Ket.
Raw material inventory management	X1.1	0.774	0.279	Valid
	X1.2	0.841	0.279	Valid
	X1.3	0.731	0.279	Valid
Machine maintenance	X2.1	0.782	0.279	Valid
	x2.2	0.645	0.279	Valid
	x2.3	0.705	0.279	Valid
	x2.4	0.703	0.279	Valid
	x2.5	0.84	0.279	Valid
Production process	Y1	0.67	0.279	Valid
	Y2	0.713	0.279	Valid
	Y3	0.813	0.279	Valid
	Y4	0.814	0.279	Valid

Source: 2022 processed data

Reliability Test

A questionnaire is said to be reliable if the respondents' responses to statements are consistently stable over time. A variable is considered reliable if its Cronbach's Alpha value is greater than 0.60. (Sujarweni, 2014)

Table 6. Reliability Test

Variable	*Cronbach's Alpha*	*Role Of Thumb*	Ket.
Raw Material Inventory Management	0.677	0.6	Reliable
Machine Maintenance	0.787	0.6	Reliable
Production process	0.743	0.6	Reliable

Source: 2022 processed data

Based on table 6 above, the Cronbach's Alpha value for each variable above is more than 0.6, so all variables are declared reliable.

Multiple Linear Regression Test

is multiple regression analysis. This analysis is used to measure the strength of the relationship between the independent variable and the dependent variable, namely the raw material inventory management variable (X1), machine maintenance (X2) to the production process (Y) (Ghozali, 2018).

Table 7. Multiple Regression Analysis Test Table

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-,029	,010		-2,816	,007
	Raw Material Inventory Management	,443	,181	,117	2,444	,018
	Machine Maintenance	,735	,040	,883	18,488	,000

a. Dependent Variable: Production Process

Source: SPSS data processing results

Based on table 7 the multiple linear regression analysis equation is obtained as follows:

Y = -0.029 + 0.443 X1 + 0.735 X2 + e

Where:
Y = Production Process
X1 = Raw Material Inventory Management
X2 = Machine Maintenance

1. A constant value of -0.029 means that if the value of raw material Inventory Management (X1) and Machine Maintenance (X2) is constant or has a value of 0 then the production process has a value of -0.029
2. The raw material inventory management coefficient (X1) has a value of 0.443. This indicates that if the raw material inventory management (X1) increases by 1 unit, the production process (Y) will increase by 0.449, in this case the coefficient is positive, meaning that raw material inventory management is positively related to production process.
3. The engine maintenance coefficient (X2) is 0.735. This indicates that if the engine maintenance (X2) increases by 1 unit, the production process (Y) will increase by 0.735, in this case the coefficient is positive, meaning that engine maintenance is positively related to the production process.

Hypothesis testing

T test

The t statistical test basically shows how far the influence of the independent variables, namely raw material inventory management and machine maintenance variables individually, in implementing variations in the dependent variable, namely the production process.

Based on the data obtained from table 7, the results of the partial test show the effect of raw material inventory management on the production process. It can be obtained t count, raw material inventory management > t table (2.444 > 2.011) and is significant at 0.018 <0.05, so it can be concluded that raw material inventory management has an effect significantly to the production process according to hypothesis 1 or H1.

Based on the results of the partial test of the effect of Machine Maintenance on the production process in table 7, it can be obtained t count Machine Maintenance > t table (18.488 > 2.011) and a significant value of 0.000 <0.05, it can be concluded that Machine Maintenance has a significant effect on the production process in accordance with hypothesis 2 or H2.

Determination Coefficient Test

The coefficient of determination test (R2) was carried out with the aim of measuring how far the model's ability to explain the variation of the dependent variable (Ghozali, 2018).

Table 8. Determination Coefficient Test

Summary models

Model	R	R Square	Adjusted R Square	std. Error of the Estimate
1	,989a	,978	,977	,00909

a. Predictors: (Constant), Machine maintenance, Raw material inventory management

Source: Results of SPSS data processing

From table 8 the value of the coefficient of determination is 0.978, this shows that 97.8% of the variation in raw material inventory management and machine maintenance is able to explain the variation in the production process and indicates a strong correlation, while the remaining 2.2% is explained by other factors outside this study.

Discussion

a. **The Effect of Raw Material Inventory Management on the Production Process**

Based on the partial test results of the effect of raw material inventory management on the production process, it can be obtained t count of raw material inventory control > t table (2.444 > 2.011) and is significant at 0.018 <0.05, it means that raw material inventory management has a significant effect on the production process in accordance with hypothesis H1. Then the raw material inventory management/control coefficient (X1) has a value of 0.443. This indicates that if the raw material inventory management (X1) experiences an increase of 1 unit, the production process (Y) will experience an increase of 0.449, in this case the coefficient is positive, meaning that raw material inventory management positive effect on the production process. So that if the level of raw material inventory management is higher, the production process will be better.

b. **Effect of Machine Maintenance on Production Process**

Based on the partial test results of the effect of Machine Maintenance on the production process, t count Machine Maintenance > t table (18.488 > 2.011) and a significant value of 0.000 <0.05 means that raw material inventory control has a significant effect on the production process according to hypothesis H2. Then the Machine Maintenance Coefficient (X2) is 0.753, this shows that if the machine maintenance (X2) experiences an increase of 1 unit, the production process (Y) will experience an increase of 0.753 in this case the coefficient is positive, meaning that machine maintenance is positively related to the production process. So that if the machine maintenance level is higher then the production process will be better,

CONCLUSION

Based on research conducted with the aim of knowing the effect of raw material inventory management and machine maintenance on the production process. Then conclusions can be drawn that are expected to answer or be an answer to the hypotheses that have been formulated in the previous discussion so that it can be concluded as follows:

A Raw material inventory management has a positive and significant effect on the production process. So the better the raw material inventory management, the better the production process. Thus the first hypothesis (H1) is ACCEPTED.

B. Machine maintenance has a positive and significant effect on the production process. So the better the machine maintenance mechanism that is carried out will have an impact on the production process that is getting better. Thus the Second Hypothesis (H2) is ACCEPTED.

Based on the first conclusion and implications which explain that the better the raw material inventory management, the better the production process will be. For this reason, the production manager of PT. Pulung Cable Indonesia can use the raw material inventory management variable to improve the production process so that it is better.

Based on the conclusion and the second implication which explains that the better the handling of machine maintenance, the better the production process will be. For this reason, the production manager of PT. Pulung Cable Indonesia can use Machine Maintenance Variables to improve the production process to make it better.

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