

THE EFFECT OF PRODUCTION PLANNING AND QUALITY CONTROL ON THE FINAL PRODUCT

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ABSTRACT

The purpose of this study was to determine the quality of products in furniture manufacturing companies, in fact, there are always defective products in the production process in the field. In order to achieve a quality final result, continuous planning and control must be carried out using the Quality Control Circle method. The sample taken in this study is the monthly report data available at PT Hema Medhajaya for the 2017-2019 period with a total sample size of 36. The statistical method used is multiple linear regression with calculations through SPSS version 25. The results of this study show that Production Quality Planning has a coefficient value. β regression of -0.189 with a tcount of -23.988 and a significance level of 0.000 <0.05, it can be concluded that production quality planning has a negative and significant effect on the final product. And quality control has a positive and significant effect on the final product result marked with a significance level of 0.000 <0.05 and a regression coefficient value β_2 of 2.493. the results of the simultaneous significance test (Test F) in this study. The results obtained are in the form of Fcount of 323,988 and a significance value of 0.000 <0.05. So it can be concluded that the variables of the Effect of Quality Planning and Quality Control together have a significant effect on the Final Production Result at the Furniture company at PT Hema Medhajaya.

INTRODUCTION

The production quality planning process is a real action and can be seen, and if the production planning is carried out properly it will have an impact on efficient implementation by the company. Thus, a production plan is needed in a company, this planning is carried out as a first step in determining production activities (Nkadimeng et al., 2018). In addition, there is also a need for quality control measures, with the aim of increasing effectiveness to prevent product defects. The lack of product defects in production will have an impact on production productivity, because it can minimize the use of unnecessary materials or the workforce itself (Julaeha et al., 2020). However, even though the company has planned a good production process, the reality on the ground may be different. Product defects can increase the risk of

failure and reduce product quality, quality control has been proven to be an effective way to prevent product damage (Khatab et al., 2019).

One example of the case is what happened to PT Hema Medhajaya, a furniture manufacturing company, in which products are often produced that are not of the company's quality standards. So that product quality control with layered checks is needed by the company in order to increase its efficiency, and can be used as a tool to prevent damage which is done by rejecting and accepting all products from suppliers and the production process, using this method. Then it can also be used as a monitoring tool in the production process (Darsono, 2013). As a basis for making decisions regarding product acceptance, measurement of the level of product damage is carried out through determining the tolerance for product defects produced, so the company uses the Quality Control Circle quality control method.

Fadilla & Adji (2020) has conducted research that quality control is to maintain and direct product quality. The application of quality control using the SQC method is useful in an effort to minimize product failure rates. The results of this research analysis indicate that there is a positive change in the production process, which is proven to have decreased by 3.5% from 7.4% to 3.9%.

Likewise with research by Satyawisudarini et al (2017) has conducted research on how much influence the production process and quality control have on the quality of the products produced either partially or simultaneously. The conclusion of the production process and quality control jointly affect the quality of the resulting product with a coefficient of determination value of 82.8%.

Previous research concerning the production process, raw material quality, product quality control, has been widely carried out, but it is different from this research because the research was carried out directly, namely a case study of a furniture manufacturing company at PT Hema Medhajaya the use of which will be associated with quality planning variables, and previous studies used Statistical Quality Control and Statistical Process Control methods, these two methods are statistical techniques in monitoring and improving process performance to produce quality products. In this study using product quality control with the Quality Control Circle method can analyze the problem, identify the cause, generate alternative solutions, and finally apply the most adequate solution.

Based on the explanation of these problems, this research aims to provide evidence that production quality planning and quality control with the Quality Control Circle method can affect the final product quality, good production planning in the Furniture company.

Relationship Between Variables and Development of Hypotheses

a) The Effect of Production Quality Planning on the Final Product

According to Ahyari (2005) which provides an explanation, production planning is a plan for what and how many products to be produced, which must be decided appropriately and executed according to the plan. This is also related to the production process of raw materials so that the final product is of high quality, besides that it is also necessary for the company to get better production results at reasonable prices, as well as in a systematic way on research. Wei et al (2018) shows that quality planning can be minimized using PDCA and the Seven Tool. The total loss from defects decreased, therefore production planning had a positive effect on the final product. Further supported by Herawati & Mulyani (2016) states that the production process has a significant effect on the quality of the product or the final product.

H1: Production quality planning has a positive and significant effect on the final product

b) Effect of Quality Control on Final Results

The quality control carried out by the company has quite an impact on efforts to reduce product failure rates, so that the company produces quality final products. If the company has good control then the risk of high costs will be low. Meanwhile, according to [Al Choir \(2018\)](#) Control is an act of monitoring and ensuring that performance in the field is in accordance with the plan. On research by [Magar & Shinde \(2014\)](#) that implements 7 Quality control Tools these tools make quality improvements easier to see, implement, and track. Further supported by research by [Fadilla & Adji \(2020\)](#) this study uses the Statistical Quality Control (SQC) method for quality control, and this shows that there is a positive change in the production process, therefore quality control has a positive effect on the final product.

H2: Quality Control has a positive and significant effect on the final product

c) The Effect of Production Quality Planning and Quality Control, Simultaneously Affecting the Final Product

Production planning has been well planned but in reality the field is often not appropriate, so quality control must be carried out in order to get a quality final product. With good production planning and quality control inspection costs can be minimized as small as possible, due to minimal damage because it can be detected early. This will reduce overall production costs. Moreover, [Satyawisudarini et al \(2017\)](#) in his research concluded that the production process and quality control together affect the quality of the resulting product with a coefficient of determination of 82.9%.

H3 : Production quality planning and quality control simultaneously have a positive effect on the final product

METHOD

The research was carried out at PT Hema Medhajaya, which is located in Sukapeace Village, RT.02 RW.03, Cikupa District, Tangerang Regency, Banten 15710, which is a company engaged in the furniture sector. This research was conducted in November-December 2020. The population of this research is the defects and product quality of PT Hema Medhajaya. While the sample used is the production report in 2017 - 2019.

Data were collected by purposive sampling technique (purposed sample), because previously certain characteristics such as disability and quality were determined according to the researcher's objectives ([Sugiyono, 2017](#)). With this, it is hoped that it can provide answers to problems, by taking the subject of the type and quality of PT Hema Medhajaya's products. While the method used to collect data is observation, observing directly at PT Hema Medhajaya as an object in obtaining primary data.

There are several ways that are done in data collection, namely: Observation whose data is obtained by visiting the location to observe directly, this method was chosen because researchers can see directly the condition of the object of research. Documentation is observing and recording some data on the management department, for example, data and types of quality control implementation in 2017-2019. Literature Research (Library Research) is a technique for collecting data with a literature review in order to make a comparison between theory and real conditions in the field ([Creswell, 2017](#)).

Based on the type of research using descriptive quantitative methods in which the type of data can be measured, calculated, and can be described using the data. Classical Assumption Test was conducted to obtain valid results. Multicollinearity test can be detected by showing a tolerance value > 0.01 or equal to the VIF value < 10 . Autocorrelation test is the relationship between data at a time with data at a previous time. Heteroscedasticity test, a good model is

the absence of heteroscedasticity, in this test it can be said that a regression is free from heteroscedasticity symptoms if all the independent variables are not significant to the absolute value of the residual from the regression results (Whydiantoro, 2016).

Sugiyono (2012) states multiple Linear Regression is used by researchers, if it has the intention of predicting how the condition (up and down) of the dependent variable (criteria), if two or more independent variables as predictor factors are manipulated (increase in value). So multiple regression analysis will be carried out if the number of independent variables is at least two. Hypothesis testing basically shows whether all the independent variables included in the model have a joint effect on the dependent variable. So this test consists of Simultaneous Test (F test) is used to test the feasibility of the resulting model using the model feasibility test at the level of 5%. Testing T Test (Partial) the level of confidence used is 95% or a significant level of 5%.

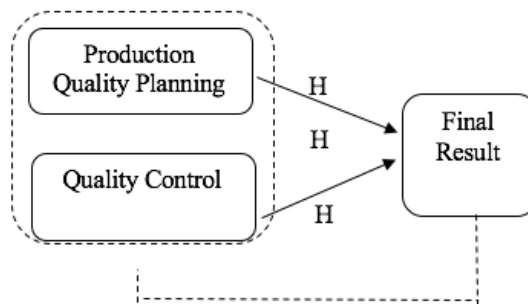


Figure 1. Research Model

RESULTS AND DISCUSSION

A. Results

Descriptive statistical tests are carried out with the aim of being able to provide a description or descriptive of a data seen from the lowest, highest, mean and standard deviation values. In this study, the total sample used was 36 samples. According to the results of descriptive statistical tests, it can be concluded that the production quality planning variable has a minimum value of 18.88 and a maximum value of 53.20 with an average value of 36.5053 and a standard deviation of 8.74780. The results of this study show that the standard deviation value is smaller than the value. the average distribution of good quality planning. While the quality control variable has a minimum value of 1.10 and a maximum value of 3.90 with an average value of 2.5094 and a standard deviation of 0, 68659 the results of this study indicate the standard deviation value is smaller than the average value of the distribution of good quality control. And for the final product variable has a minimum value of 4.49 and a maximum value of 8.89 with an average value of 6.9833 and a standard deviation of 1.29321. The results of this study show that the standard deviation value is smaller than the average value of the distribution of the final product. good.

The normality test will use a probability plot test, the results of this probability plot test are the data or points spread around the diagonal line and follow the direction of the diagonal line, the data is said to be normally distributed. To see the normality of the residual data, the Kolmogorov-Smirnov statistical test will be used. The results of the one-to-one test of Kolmogorov Smirnov's production quality planning show that the Asym value. Sig. (2-tailed) is $0.200 > 0.05$, quality control is $0.200 > 0.05$, and the final product shows that the

value of Asym.Sig. (2-tailed) 0.200 > 0.05, it can be concluded that the residual value of production quality planning, quality control and final product is normally distributed and this research can be continued to the next stage.

Furthermore, a multicollinearity test will be carried out, to see whether there is a multicollinearity test by looking at the Tolerance and VIF values. If the tolerance value is > 0.10 and VIF has a value < 10, then there is an indication of high multicollinearity between independent variables. Based on the multicollinearity test results seen from the production quality planning variable, it has a tolerance value of 0.854 > 0.10 and a VIF value of 1.170 < 10 so it can be concluded that the production quality planning variable does not occur multicollinearity. Furthermore, the quality control variable has a tolerance value of 0.854 > 0.10 and a VIF value of 1.170 < 10. So it can be concluded that the quality control variable does not occur multicollinearity.

Then the heteroscedasticity test will be carried out, using the scatterplots method. The results of the heteroscedasticity test graph can be seen that the data points spread in all directions and do not form a certain pattern, so that in this case there is no heteroscedasticity problem and this research can be continued to the next stage.

Furthermore, an autocorrelation test will be carried out using the Runs Test, which is part of non-parametric statistics which can also be used to test whether there is a high correlation between residuals. Based on the results of autocorrelation using Runs Test when viewed from Asymp.Sig. (2-tailed) obtained 0.237 > 0.05, it can be concluded that there is no autocorrelation problem in this study, so it can be continued to the next stage.

Table 1
Test Results of Multiple Linear Regression Analysis and Partial Test (T Test)

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error			
1 (Constant)	5.324	.987		5,393	,000
Quality Planning	-.012	.987	-.083	-.484	.631
	.839	.322	.446	2,608	.014

Based on the results of the table above the data, the regression equation can be arranged:

$$Y = a + b_1 x_1 + b_2 x_2$$

$$Y = 5.324 - 0.012 + 0.839$$

Where the regression equation is interpreted at a constant value of 5.324, it means that if the variables of production quality planning and quality control are assumed to be zero, then the quality variable of the final product will have a positive value of 5.324. The value of the regression coefficient of the production quality planning variable is -0.012, meaning that if the other independent variables are fixed and the X1 variable has an increase of 1%, then the final product (Y) will decrease -0.012. A negative coefficient means that there is a negative relationship between the X1 variable and the Y variable. For the regression value of the X2 variable of 0.839, it means that if the other independent variables have a fixed value and quality control (X2) has increased by 1%, the final product (Y) will increase by 0.839.

The hypothesis test carried out is the T test, at $T \text{ table} = (\alpha/2; nk-1) = (0.05/2; 36-2-1)$ then the value of $T \text{ table} = 2.035$ is obtained and based on the test results that the Production Quality Planning variable (X1) $-0.484 < 2.035$ and the Tcount value of -0.484 lies between the negative effect, meaning that it can be concluded that H1 or the first hypothesis has a negative effect on production quality planning on the final product, then Tcount for the Quality Control variable (X2) $2.608 > 2.035$ with a significant value of $0.000 < \text{probability } 0.05$ so it can be concluded that H2 or the second hypothesis is accepted, meaning that there is a positive effect of Quality Control on the Final Product. So it can be concluded that the variable of Production Quality Planning partially has a negative and insignificant effect on the Final Product,

Table 2
F Test Results

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	10.373	2	5.187	3.554	.040b
Residual	48,161	33	1,459		
Total	58,534	35			

Based on the results of the simultaneous significance test (Test F) obtained 3,554. The value of $F \text{ table}$ is obtained through the $F \text{ table}$ method with $df = 2$ and $n = 36$ when the formula is entered, $F \text{ table} = (k; nk)$ then produces numbers $(2; 36-2) = (2; 34)$, the distribution of the table F value is 3.28 so $F \text{ count } 3.554 > F \text{ table } 3.28$ then H_0 is rejected, thus meaning that there is a significant effect of the independent variable (Production Quality Planning and Quality Control) on the dependent variable (Final Product Results).

Table 3
Coefficient of Determination Test Results

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.421a	.177	.127	1.20806

Furthermore, the Coefficient of Determination Test, based on the results of the test calculations, it can be seen that the R number is 0.421. So it shows a very strong relationship between Production Quality Planning (X1) and Quality Control (Y). The value of R^2 (R Square) of 0.177 or 17% shows the percentage contribution of the influence of the independent variable on the dependent variable is 17%. And the remaining $100\% - 23.6\% = 76.4\%$ is influenced by other variables that are not included in the model.

Table 4
Hypothesis Test Results

Hypothesis	Score		description
	Beta	Sig	
H1	-0.484 (T Test)	0.631	REJECTED
H2	2608 (T Test)	0.014	RECEIVED
H3	3554 (Test F)	0.040	RECEIVED

B. DISCUSSION

1. The Effect of Production Quality Planning on the Final Product

Based on the testing that has been done, the production quality planning has a negative and insignificant effect on the final product, so it can be concluded that the first hypothesis or (H1) is rejected. This is inconsistent with or contrary to the research conducted by [Herawati & Mulyani \(2016\)](#) which states that the production process has a significant effect on the quality of the product or the final product. Production quality planning at PT Hema medhajaya is not good because the planning that has been set by the company's management is not in accordance with the reality of the final product. If the final product decreases from the production quality plan, it is caused by inappropriate factors because the raw materials in the warehouse are empty and often the raw material components that come are not on schedule. And if the final result of the product increases from the planning of the production quality, it is caused by the factor of customer demand who wants to be sent quickly

2. Effect of Quality Control on Final Product

Based on the testing that has been done, production quality control has a positive and significant effect on the final product, so any improvement in quality control will increase the final product. Then the second hypothesis or (H2) can be accepted. This is in accordance with the research conducted by [Fadilla & Adji \(2020\)](#) stated that there was a positive change in the production process, therefore quality control had a positive effect on the final product. The formulation of the hypothesis proposed in this study is suspected that quality control using the Quality Control Circle (QCC) method can be minimized by product failure because it can be said that quality control of the furniture company at PT Hema Medhajaya is said to be successful or effective because it can reduce the minimum limit of deviations in the number of products that occur in production process, and the product fails is still within reasonable limits. The higher the level of quality control, the lower the failure of the resulting product.

3. Production Quality Planning and Simultaneous Quality Control of the Final Product

Based on the results of the simultaneous significance test (Test F) it can be concluded that the variables of the influence of quality planning and quality control together have a significant effect on the final production result in the furniture company at PT Hema Medhajaya. This is because from the outset good production quality planning always pays attention to the defective components even though there are some components that pass due to employee negligence, and quality control using the Quality Control Circle method focuses more on controlling product quality in making repairs and minimizing damage. Therefore, good production quality planning and quality control that are carried out properly will produce a quality final product. In line with the research conducted by [Satyawisudarini \(2017\)](#) which states the conclusion that the production process and quality control together affect the quality of the resulting product.

CONCLUSION

The results of research at PT Hema Medhajaya can be concluded that production quality planning activities must be checked from the beginning of production in order to get quality results, and the final product is controlled for defects based on product standards including specifications. From the test results Partially, the production quality planning has a negative and significant effect on the final product until the first hypothesis testing is accepted. And the partial test results of quality control have a positive and significant effect on the final product.

The second hypothesis is accepted. The concept of Quality Control Circle is applied to quality control which is responsible for the implementation of production quality planning. Factors that cause disability are, first is human resources, most employees do not understand the standards set by the company, mainly new employees, besides that each employee has different competencies from one another, as a result, the number of reworks increases. Then the second is equipment, there is no equipment that can perform accurate detection of product defects, as a result many defects in products occur in the production process.

Based on the conclusions that have been presented, get the following suggestions: Balanced Quality Control Circle is the application of Total Quality Control, where the company's focus is in the management system on integrated quality control. All things that become elements in production must set minimum standards for product defects, understand the several factors that lead to the failure of a product, and the main reason for the product to fail, remain with an awareness of the importance of improving quality as well as productivity. Moreover, it is suggested to the company to pay more attention to the operator's performance, discuss a lot and provide training to improve its quality.

The study was conducted using only 2 independent variables namely Production Quality Planning and Quality Control without considering other factors that affect the Final Product Results, on the other hand the sample entered was only 3 years from 2017 - 2019, and only 36 sample data were obtained, so suggestions for researchers Next, you can add other variables.

More than that, it is hoped that it can provide various benefits to all parties concerned, some suggestions can be given to the management of PT Hema Medhajaya, the results of this research can be used for consideration and evaluation in producing a quality final product. Besides that, it can also be used as a reference in improving or increasing employee performance in the future, management is also required to be able to provide a work environment where employees can freely express their opinions, participate in decision making, increase employee enthusiasm for their duties and responsibilities, and ensure that employees work carefully, organized, effectively and efficiently while still upholding the attitude and K3 (Occupational Health and Safety).

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