

The Influence of Uncertainty of Raw Material Supply and Production Process on Product Quality in the Rattan Industry In Pekanbaru City

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ABSTRACT

Product quality is an important factor in the production process. So that the production process can run smoothly, an industry ensures the availability of raw materials. Uncertainty in raw materials is often a challenge for industry players. This can affect the quality of the products produced as well as hamper the product manufacturing process. This research aims to determine and analyze the factors that influence product quality in the rattan industry in Pekanbaru. The method used in this research is quantitative with a sample size of 50 rattan industry owners in Pekanbaru using a sampling technique, namely saturated sampling. Data collection in research uses interviews, questionnaires and documentation. The data analysis technique in this research uses multiple linear regression analysis. The results of the first hypothesis research show that if raw material uncertainty increases, the quality of the product produced will decrease. The second hypothesis shows that a smooth production process will improve the quality of the products produced. These findings have the implication that the uncertainty of interrupted raw materials will hamper existing production process activities and the quality of the products produced. The small number of variables used is a limitation in this research. It is hoped that future research will determine the number of samples so that it exceeds the number of samples in this study and that not only industry players but also consumers will become respondents.

Keywords: Uncertainty, Raw Materials, Production Process, Product Quality

Proceeding Medan International Conference Economics and Business

Volume 1, Year 2023

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INTRODUCTION

In the current era of globalization, industrial growth is increasing. Especially in the craft industry. According to research by Munadi (2017), the rattan industry in Indonesia is experiencing challenges related to competitiveness due to the decreasing level of availability of rattan raw materials, which is why exports of raw rattan have been prohibited since 2011. Quoted from Kompas.com (2020) issues faced by the craft industry rattan is a scarcity of supply of rattan raw materials. This has resulted in smuggling of rattan raw materials reaching up to 10,000 tons per month.

One of the rattan craftsman industrial areas is in Pekanbaru. The presence of the rattan industry in Pekanbaru City is certainly a factor in encouraging the economy, both regional and national. Based on data obtained from the Pekanbaru Industry and Trade Service, there are 50 rattan craft industry players. According to research by Husin (2013), the rattan industry in Pekanbaru is still experiencing several obstacles, such as the quality produced has not reached expectations, this is due to uncertainty in the supply of raw materials and the production process is less than optimal. Previous research conducted by Nofrizal et al., (2021) stated that product quality is an important factor in building a rattan craft business. Apart from that, the quality of rattan products produced by the Pekanbaru rattan industry is also less attractive. In fact, if the quality of the products offered meets standards, this will be an opening for acceptance in international markets such as Malaysia or Singapore. It can even penetrate the national market. To get maximum product quality, there are several factors that must be considered, one of which is the unavailability of raw materials. When the availability of raw materials is limited and stock outs occur, this becomes an obstacle to production process activities. So it will affect product results that do not comply with quality specifications. According to Chaudhuri (2014) uncertainty can be defined as a situation where decision makers do not know what will happen and therefore cannot accurately predict external changes.

Based on interviews conducted by researchers with several rattan industries in Pekanbaru, there is a problem of unavailability of raw materials. Mrs. Irna, the administrator of the Pekanbaru rattan crafts cooperative, said that this was caused by weather conditions, during the rainy season the farmers were unable to collect rattan due to unfavorable access. In cloudy and often rainy weather conditions, the texture of rattan also changes, namely it will turn black and even become moldy. The above is proven by Hirdayani's research (2019) which states that there are several problems that occur or phenomena found in the rattan industry in Pekanbaru, namely that raw materials are interrupted so that sometimes consumer orders are not ready on time.

The production process is also one of the factors in producing good quality rattan products. The production process is quite influential in improving product quality, there are problems that often occur such as ensuring materials for production, minimal capital, estimating the availability of materials, untrained labor, machines that are not optimal and determining the production schedule so that it is completed according to demand. According to research by Nofrizal (2020), capital is a problem in carrying out production. Pekanbaru rattan craftsmen admit that it is difficult to carry out the production process if the capital collected has not been met, as a result the industry has not been able to purchase the raw materials and machines needed, thus hampering production process activities.

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LITERATURE REVIEW AND HYPOTHESIS FORMULATION

Supply uncertainty according to Indrajit (2016) explains that activities have been planned but there are supply chain difficulties in the middle of the production process. This is what causes industrial players to often create security for the supply chain. Inventory, time, product quality and transportation are safeguards along the supply chain. Supply uncertainty often becomes a challenge for the manufacturing industry. These challenges are related to the uncertainty of the supply of materials used during the production process. This is because industrial suppliers are uncertain. Problems between industry and suppliers often occur, such as when suppliers want companies to place orders long before the time the goods are needed and do not make changes to the order quantity. Meanwhile, the industry wants to give suppliers the freedom to change the quantity and delivery time of their orders. The company's desired measures will make it difficult for suppliers to meet demand for raw materials, causing supply uncertainty.

Uncertain Factors in the Supply of Raw Materials, namely Climate Factors, natural conditions and a supportive climate will help industry to facilitate business activities, such as during the rainy season because farmers have difficulty finding rattan in the forest because access is not supported. Such things cause supply shortages in the industry. Economic Constraint Factors, These factors include the price of raw materials. Quality raw materials certainly have a higher price than standard raw materials. Government policy, unstable prices apart from affecting the willingness of the blacksmith industry to produce agricultural and plantation equipment can also provoke a transition from other business choices which tend to have relatively normal prices.

According to Chaudhuri and Dukovska-popovska (2014) uncertainty can be defined as a situation where decision makers do not know what will happen and therefore cannot accurately predict external changes. According to research by Negahban and Smith (2016), many companies have had to delay product launches due to supply shortages caused by uncertainty. This change has a significant impact on product quality which leads to product success. The availability of sufficient raw materials will help the production process flow which will result in the quality of the products produced. Research conducted by Liu and Shen (2020) shows that there is a negative and significant influence between raw material supply uncertainty and product quality. This is based on an intermittent supply chain that can provide low quality products that do not meet company standards. Based on the results of previous research, it is formulated as follows:

H₁ : Uncertainty in raw material supply is thought to have a negative and significant effect on product quality.

According to Assauri (2016) the production process is the means, methods and techniques for creating or increasing the usefulness of a good or service using existing resources (labor, machines, materials and funds). Low labor skills will affect product quality. The more skilled you are at weaving rattan, the better the appearance of the rattan product will be. Supported by adequate machines and equipment, this will support the product produced. If a production process runs smoothly and complies with the standards applied, it will definitely produce a good quality product. Thus it is clear that the production process greatly influences the results of good product quality.

This can be proven by research by Hilary and Wibowo (2021) which states that there is a positive and significant influence between the production process and product quality. This is proven by the support of a skilled workforce, able to work together with a team, and work according to applicable regulations. The results of other research conducted by

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Purnomo et al (2023) also stated that the production process has a positive and significant influence on product quality. This means that if the production process increases, the quality of the product produced will also increase. According to research conducted by Herawati and Mulyani (2016), it was concluded that production process variables have the dominant or greatest influence on product quality. Because the production process is one of the factors that really determines the quality of the products produced by the company. Based on the results of previous research, it is formulated as follows:

H₂ : The production process is thought to have a positive and significant effect on product quality.

METHOD

According to Sugiyono (2016), this type of quantitative research is a research method based on the philosophy of positivism, used to research certain populations or samples, collecting data using research instruments, quantitative or statistical data analysis with the aim of testing predetermined hypotheses. Operational variables are a concept that has an explanation of the variables determined in research with the aim of ensuring that the variables studied provide an explanation of the indicators that have been determined.

Table 1. Variable Operational

Variable	Indicator	Scale
Product Quality (Y)	Aesthetics; Durability; Feature; Quality of Conformity (Kasmiruddin, 2016).	Likert
Uncertainty in Raw Material Supply (X 1)	Uncertainty in the availability of raw materials; Raw material prices ; Waiting time unpredictability (Pujawan and Mahendrawati, 2017).	Likert
Production process (X 2)	Labor; Equipment (Machine); Supporting Materials; Capital (Hilary and Wibowo, 2021).	Likert

Source: Reworked, 2022

The population in this research is all 50 rattan industry business actors in Pekanbaru. The type of non-probability sampling used in this research is saturated sampling or census. According to Sugiyono (2016) saturated sampling is a sampling technique when all members of the population are sampled, this is done when the population is relatively small or this research wants to make generalizations with very small errors. In this study, the researcher used two data sources, namely primary data in this study sourced from the results of a questionnaire that would be given to rattan business craftsmen in Pekanbaru. Secondary data is a data source that does not directly provide data to data collectors. This secondary data collection technique is carried out to strengthen findings and complete the information that has been collected (Sugiyono, 2013). The data collection process for this research was carried out using interviews, document studies and questionnaires.

Data analysis in this research uses descriptive statistical test analysis, data quality test (validity test and reliability test), classical assumption test (normality test, multicollinearity test and heteroscedasticity test), multiple linear regression analysis, model feasibility test

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and hypothesis test. The tools used to process the data are SPSS version 24. The multiple linear regression analysis model used is as follows:

$$Y = a + b_1 X_1 + b_2 X_2 + e$$

Where :

- Y = Product Quality
- a = Constant or fixed value
- b₁ , b₂ = Partial Regression Coefficient
- X₁ = Uncertainty in Raw Material Supply
- X₂ = Production Process
- e = Error

RESULT AND DISCUSSION

The respondents in this research were the owners of the rattan industry in Pekanbaru City. As a result of distributing questionnaires to 50 respondents, the characteristics of the respondents were obtained based on gender, level of education, how long they have been in business and based on business income. The rattan industry is engaged in crafts and often works in the field so it requires more labor, so men dominate. Economic conditions are poor so they continue the family business, so their education level is still relatively low. The average rattan industry business in Pekanbaru is more than 10 years old and the nominal business income is 2 million to 4 million more because it is still in the transition period for economic recovery during the Covid-19 pandemic.

Data Quality Test

After distributing the questionnaire, the researcher then tested the quality of the data through validity and reliability tests. And from the results of validity testing, it is known that all statements have a value of $r_{count} > r_{table}$ (0.2787) with a significant value (p value) < 0.05 so that all statements used in this research are declared valid.

Table 2. Validity Test

Number of Statement Items	Variable	R table	Note
6	Uncertainty in Raw Material Supply (X ₁)	0.2787	Valid
8	Production Process (X ₂)	0.2787	Valid
8	Product Quality (Y)	0.2787	Valid

Reliability tests are carried out to determine the extent to which the measurement instrument can be trusted. In this research, researchers used the Cronbach Alpha statistical test. A variable is said to be reliable if the Cronboach Alpha value is > 0.6 .

Table 3. Reliability Test Table

Variable	Cronbach Alpha	Critical Value	Note
Uncertainty in Raw Material Supply (X ₁)	0.752	0.60	Reliable
Production Process (X ₂)	0.839	0.60	Reliable
Product Quality (Y)	0.795	0.60	Reliable

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Based on the reliability test results seen in the table above, it can be seen that all statements from each variable are declared reliable. This is proven by the Cronbach Alpha value of each variable being more than 0.6.

Classic assumption test

After all items met the validity and reliability requirements, the researcher then carried out the classic assumption test.

Table 4. Normality Test

	Unstandardized residuals
N	50
Mean	.000000
Std. Deviation	1.65714818
Absolute	.070
Positive	0.64
Negative	-.070
Statistical Tests	.070
Asymp. Sig. (2-tailed)	.200

From the results of the One Sample Kolmogorov Smirnov table above, it produces a significance value of 0.200 or greater than 0.05, meaning that the data in this study is normally distributed.

Table 5. Multicollinearity Test

Variable	VIF	Tolerance
Uncertainty in Raw Material Supply (X 1)	1,807	,554
Production Process (X 2)	1,807	,554

The multicollinearity test aims to test whether there is a linear relationship between the independent variables in the regression model (Ghozali, 2013). From the table above, the uncertainty of raw material supply (X 1) and the production process (X 2) shows that the VIF value is smaller than 10.00 ($VIF < 10$) and the tolerance value is greater than 0.10 ($TOL > 0.10$). It was concluded that there was no multicollinearity interference.

The heteroscedasticity test in this research uses a scatterplot . The heteroscedasticity test aims to test a regression model where there is an inequality of variance from the residuals of one observation to another. Likewise, the results of the heteroscedasticity test show that each variable has a sig value > 0.05 , which means that each variable does not contain heteroscedasticity.

Multiple Linear Regression Test

To determine the influence between the uncertainty of raw material supply and the production process on product quality, multiple linear regression analysis was carried out.

Table 6. Multiple Linear Regression Test Results

Model	Coefficients a		Q	Sig.
	Unstandardized Coefficients	Standardized Coefficients		
1 (Cons)	B	Beta		
	Std. Error			
1 (Cons)	24,169	3,893	6,209	,000
X1	-.435	.111	-.354	,000
X2	,530	,078	,611	,000

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Table 1 shows the results of the analysis. Based on the analysis carried out, it was found that the significance value of the raw material supply uncertainty variable was 0.000 (< 0.05) so that this variable contributed significantly to increasing product quality. The production process variable shows a significance value of 0.000 (< 0.05) so that this second variable has a significant impact in improving product quality.

Model Feasibility Test Results (F Test)

Table 7. Model Feasibility Test Results

		ANOVA a				
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	501,619	2	250,810	87,604	,000 b
	Residual	134,561	47	2,863		
	Total	636,180	49			

Source: SPSS Processed Data, 2022

The results of this test show a calculated F value of $87,604 > F$ table (3.19) with a significance value of $0.000 < 0.05$, so it can be concluded that uncertainty in the supply of raw materials and the production process together influences the quality of rattan industry products in Pekanbaru.

Hypothesis Test Results (T Test)

Raw material supply uncertainty on the quality of rattan industry products in Pekanbaru shows that the calculated t value = $(-3.930) < t$ table (2.01174) with the resulting significant value of 0.000 is still below 0.05. So the result is significant and means that H_0 is rejected and **H 1** is accepted. The t value is marked negative, indicating that uncertainty in the supply of raw materials has a negative influence on the quality of rattan industry products in Pekanbaru City.

Calculated t value $(6.778) > t$ table (2.01174) with a significant value of 0.000 is still below 0.05, so H_0 is rejected and **H 2** accepted. This shows that the production process has a positive and significant influence on the quality of rattan industry products in Pekanbaru City.

Coefficient of Determination Results

Next, the coefficient of determination test (R^2) is used to measure how far the ability of the independent variable to explain the dependent variable. The F test is carried out to determine the feasibility of the model with the simultaneous relationship between the independent variable and the dependent variable.

Table 7. Determination Coefficient Test Results

Model Summary b				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,888 a	,788	,779	1,692

In this research, it is known that the R Square value is 0.788, which means that the variability of the independent variable can be explained by the independent variable by 78.8%. This means that the independent variable consisting of Uncertainty in raw material

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supply and production processes affects product quality by 78.8% and the remainder is influenced by other variables which are not in the domain of this research.

DISCUSSION**Raw Material Supply Uncertainty on Product Quality**

The results of this research indicate that uncertainty in raw material supply has a negative effect on product quality. This can be seen in table 4.15 where the t value is -3.930 with a significance level of 0.000 or still below 0.05 and the coefficient value is -0.435 so that H 1 is accepted. This means that uncertainty in the supply of raw materials has a negative and significant effect on product quality. Raw materials have an important role in product quality. Raw materials are difficult to obtain, resulting in low product quality. Each rattan industry has its own product standards. If raw materials are difficult to obtain, the resulting product will not meet industry standards and result in changes to the product's appearance.

This statement is similar to research by Nagahban (2016) which states that uncertainty in the supply of raw materials has a negative effect on product quality. Therefore, the availability of sufficient raw materials will help the flow of the production process which will result in the quality of the products produced. This was also explained by Yang Liu (2020). A discontinuous supply chain can provide low quality products, meaning that uncertainty in the supply of raw materials has a negative effect on product quality.

The Influence of the Production Process on Product Quality

The analysis results show that the production process has a positive and significant effect on product quality. This can be seen in table 4.15 where the t value is 6.778 with a significance level of 0.000 or less than 0.05 and a coefficient value of 0.530, so that H 2 is accepted. This means that the production process has a positive and significant effect on product quality. If there is an improvement in the production process, the quality of rattan products will increase. The main key to quality products lies in the production process which is integrated with the variable availability of raw materials and labor. A reliable workforce with the availability of selected raw materials will expedite the production process which is guarded by strict quality control . This will ultimately produce a high quality product. In order for the production process to be more effective and efficient, workers are needed who are experts in weaving, use sophisticated machines and have sufficient capital to later purchase raw materials or other supporting materials.

This is in accordance with research conducted by Noerpratomo (2018) with research results showing the influence of the production process on product quality. This can be seen from the production process of making good products which will produce good quality products too. Because the production process is one of the factors that really determines the quality of the products produced by the company. Apart from that, according to Hilary and Wibowo (2021) also stated that the production process has a positive effect on product quality.

RESEARCH LIMITATIONS

The limitation of this research is that in determining the object or adding variables it is still not small enough, so it is hoped to add other variables that can influence product quality and determine the number of samples so that it exceeds the number of samples in this research and not only industry players but consumers are also used as samples because time, cost and energy limitations so that the sample in this study only numbered 50 respondents.

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CONCLUSION

Uncertainty in raw material supply partially has a negative and significant effect on the quality of rattan industry products in Pekanbaru. This explains that if uncertainty in raw material supply increases, product quality decreases. The production process partially has a positive and significant effect on the quality of rattan industry products in Pekanbaru. This means that the smoother the production process of the business, the more quality it produces.

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