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# The Influence of Quality Control Product and Quality Control Production Machine on Operational Performance

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**Abstract:** The purpose of this study to determine how much influence the quality control of products and control of production machinery quality to the operational performance Types of causal associative research. The sampling technique used is probability sampling, which is a sampling technique that provides equal opportunity for each element of the population member to be selected as a sample member. The data used are primary data from questionnaires distributed to production employees from manager level to operator level. Total 150 sample members. Data analysis technique using Structural Equation Model (SEM) method of AMOS. Testing data consist of test of validity and reliability test. Test the classical assumption of normality test, Multicollinearity and Singularity test. Hypothesis Testing and Evaluation of Criteria Goodness of Fit. The test results show that there is an influence between the quality control of the product on the operational performance of the company. Estimate value 0.917 means that each increase of one unit of product quality control will improve the company's operational performance of 0.917. And there is an influence between controlling the quality of production machinery on the performance of the Company's Operations. Estimate value 0.374 means that each increase of one unit of production quality control machine will improve the company's operational performance of 0.374.

**Keywords:** Product quality control, quality control of production machine, operational performance, SEM, AMOS.

## INTRODUCTION

Every business behavior that wants to win the competition will give full attention to product quality. The food industry in people's lives has an important role because food is a basic human need. With the growing understanding of healthy food the food industry is increasingly being demanded to provide quality products for consumers. Every business in high competition always competes with similar industries. In order to win the competition, business people must pay full attention to product quality. Attention to quality has a positive impact on business in two ways, namely the impact on production costs and the impact on income [1], Full attention to quality will have a direct impact on the company in the form of customer satisfaction. Industries that produce goods and services must be able to produce a product that can be accepted by consumers (customers). The development of existing technology can cause a very tight competition between companies. Many companies compete to get maximum profits with low production costs.

The wheat flour industry since 1970 began to emerge which began with the establishment of 5 (five) centers of wheat mills (flour mills) that produce wheat flour. History proves that from the beginning of his birth the national flour industry is not merely a private sector affair but also involves the participation and support of the Indonesian Government. The flour industry sector in turn is able to reach national consumption needs in a sustainable manner, and at the same time opens business opportunities for business people in Indonesia to invest in this sector, as a consequence of a good business climate in the flour industry sector. Until now, the flour industry continues to experience developments marked by the increasing number of wheat flour producers in Indonesia. The flour industry in 2015 amounted to 29 flour mills, which are concentrated in Java as many as 25 flour mills and outside Java 4 Flour Mills.

Production machines that are good in a manufacturing company are important, because if a problem occurs on the machine it will interfere with the production process which results in a break down and the production target set will experience obstacles. For this reason, supervision of production machinery is needed.

## LITERATURE REVIEW

Control can be interpreted as an activity carried out to monitor activities and ensure actual

performance carried out as planned. Classical Definition: Quality is the degree of conformity to standards or direct characteristics of the product: Such as performance (performance), reliability (reability), easy to use (easy to use), aesthetics (esthetics). Quality is the totality of the characteristics of a product that supports its ability to satisfy customer needs that are specified or specified. The aim of quality control is to monitor the level of production through many stages of production. The purpose of quality control is to find out to what extent the processes and results of products (services) are made in accordance with the standards set by the company [2].

Quality control of production machines by means of preventive maintenance Preventive Maintenance is maintenance carried out on a scheduled basis, generally periodically, where a number of maintenance tasks such as inspection, repair, replacement, cleaning, lubrication and adjustment are carried out.

The company's operational performance is a display of the situation as a whole over the company for a certain period of time, which is a result or achievement that is influenced by the company's operational activities in utilizing the resources - resources it has. Performance is a term in general that is used for some or all of the actions or activities of an organization. in a period with reference to the number of standards such as past or projected cost, with the basis of efficiency, accountability or management accountability and the like [3]. The definition of performance there are several opinions from the figures, among others, the opinions expressed by Mulyadi [4] which states that performance is the success of personnel, teams, or organizational units in realizing previously set strategic goals with expected behavior.

Even though the hypothesis proposed is as follows:

- Product quality control has a direct effect on the Company's Operational Performance.
- Control of production machine quality has an effect on the Company's Operational.

The thinking framework can be illustrated in the following scheme.

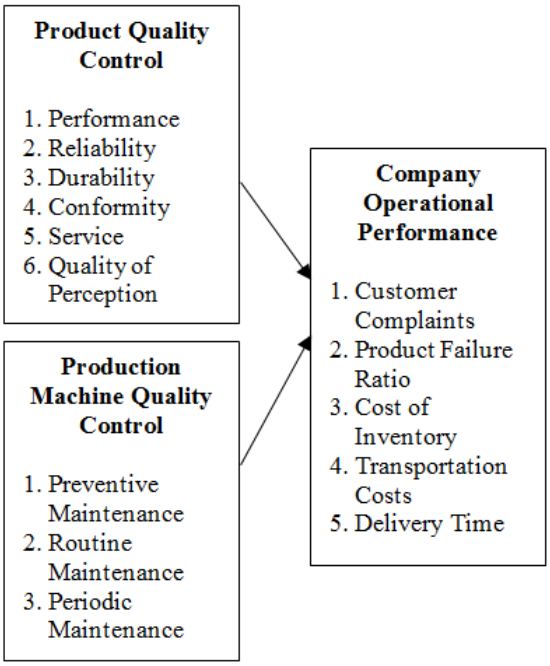


**Fig-1: Thinking Framework**

The frame of mind in Figure-1 shows that the control of product quality and control of the quality of production machines significantly affects the operational performance of the company.

## RESEARCH METHODS

The type of research used is associative causal with a quantitative approach. Causative Associative Research, is a study that aims to determine the relationship between two variables or more. With this research, a theory that can function to explain, predict, and control a phenomenon can be built. The research method is a scientific way to obtain objective, valid and reliable data with the aim of discovering, proving and developing knowledge so that it can be used to understand, solve and anticipate problems [5].

The data used in this study are primary and secondary data. Primary data is data obtained directly from the research subject / respondent contained in the questionnaire, with respondents being employees of the Bogasari production department amounting to 240

people. The questionnaire submitted to the respondent is a reference for getting relevant information about the research subject.

The analysis method in this study uses Structural Equation Modeling (SEM). The use of Structural Equation Modeling (SEM) allows to test the relationship between complex variables, to obtain a comprehensive picture of the overall model [6]. Hypothesis testing is done by using the AMOS program to analyze causality relationships in the proposed structural model between independent and dependent variables while examining the validity and reliability of the overall research instrument.

Validity test is used to measure the validity of a questionnaire. A questionnaire is said to be valid if the question in the questionnaire is able to reveal something that will be measured by the questionnaire. If loading factor> 0.50 it can be said to be valid.

Reliability testing is used to measure the level of consistency of research instruments. Measurement of reliability can be done by Cronbach alpha (α) statistical test. A construct or variable is reliable if it gives the value of Cronbach Alpha> 0.60. The greater the coefficient value, the higher the reliability of the measuring instrument and the level of consistency of the answer. Criteria Evaluation of Goodness of Fit, Evaluation of SEM Assumptions, with Normality Test using critical values at ± 2.58 at the 0.01 significance level. If Z-value is greater than value critical, then that it is suspected that the data distribution is not normal.

Multicollinearity and Singularity, in statistics, multicollinearity (also called collinearity) is a phenomenon where one predictor variable in a multiple regression model can be a linear prediction from the other with a degree of substance of accuracy. It is necessary to observe the determinant of the covariance matrix, the small determinant of the sample or close to zero indicates the presence of multicollinearity or sigularitas, so that the data can be used for research.

Conformity Test and Statistical Test. To carry out a conformity test and statistical tests, several suitability indices and cut-off values are needed to be used in testing a model.

- X2-Chi-Square statistics, the smaller the better the model will be and accepted based on probability with a cut-off value of p> 0.05 or p> 0.10.
- RMSEA (The Root Mean Square Error of Approximation), is an index used to compensate for chi-square in a large sample. A RMSEA value that is small or equal to 0.08 is an index for which the model can be accepted based on the degree of freedom.
- GFI (Goodness of Fit Index), is a non-statistical measure that has a range of values from 0 to 1. A high value in this index indicates a "better fit".
- AGFI (Adjusted Goodness of Fit Index), is a criterion that takes into account the weighted proportion of a variant of a sample covariance matrix. The recommended level is if AGFI has a value equal to or greater than 0.90.
- CMIN / DF (The Minimum Sample Discrepancy Function Devided with Degree of Freedom), is a chi-square X2 statistic divided by the degree of freedom so that it is called X2 relative. The value of X2 is relatively less than 2.0 or 3.0 are indications of acceptable models and data.
- TLI (Tucker Lewis Indeex), is an incremental index that compares a model tested against a baseline model, where the value recommended as a reference for a model is ≥ 0.95 and a value close to 1 is a very good fit.
- CFI (Comparative Fit Index), the range of values is 0-1, where the closer to 1 indicates the highest level of fit index.

The operational definitions of the variables used in this study, namely:

- Exogenous Variables (exogenous) are variables that act as predictors of causal variables on other variables. This variable is in the form of product quality control (QCP) and production machine quality control (QCMP).
- Endogenous variable (endogenous), which is a result of a causal relationship. This variable is in the form of Corporate Operations Performance (KOP).

The main data needed in this study came from respondents, which were obtained through questionnaires. So, the data used in this study is primary data, namely data collected or obtained directly at the research site. In addition, the data used is also related to secondary data because it is a company performance data at the time of the study. The data needed in this study was collected through field surveys, interviews or questionnaires, and literature studies as a complementary method for collecting secondary data. The population in this study were employees of PT. BS of production is 240 people. This study used a sample of 150 people. The sampling technique used is probability sampling, which is a sampling technique that provides equal opportunities for each element (member) of the population to be selected as members of the sample. Hair *et al*., [7] which states that the number of samples follows the formula 5 x the number of indicator variables so that in this study the number of samples taken at least is 5x14 = 140 people. Validity test is to determine the level of validity of the questionnaire instrument used in data collection. Validity test is used to measure the validity of a questionnaire. A questionnaire is said to be valid if the

question in the questionnaire is able to reveal something that will be measured by the questionnaire. If loading factor> 0.50 it can be said to be valid. Reliability testing of this questionnaire uses many times different times the reliability test for this questionnaire uses the Cronbach test (alpha) where an instrument can be used reliably (reliable) [8].

The model used is the SEM method with path diagrams can be used to analyze together or simultaneously complex research variables. That is the influence of one variable with other variables without being limited by the number of variables. In the path diagram the relationship between constructs is expressed through arrows. A straight arrow shows a causal relationship that is directly between one construct and another.

## RESULTS AND DISCUSSION

PT. BS is the first and largest wheat flour milling company in Indonesia. The main industry of this company is the processing or grinding of wheat seeds into wheat flour. Bogasari first carried out the wheat mill production process in the Cilincing area, Tanjung Priok, North Jakarta with an area of 33 hectares. The second BS is located on Nilam Timur road. 16 Tanjung Perak area, Surabaya, East Java with an area of 3.3 hectares. Bogasari equips organizations with the Textile Division that produces flour bags in Citeureup, Bogor.

In addition to producing wheat flour also produces byproducts, such as products from leftover processed wheat mill products or failed results from the production process. The by-products are in the form of bran, pollard, pellet, and Industrial Flour. Bran, pellets and pollard are used for animal feed, while industrial flour is generally used for adhesives in the wood industry layer and also as food for fish and shrimp. In this study respondents were production employees with frequency of questionnaire research data, Respondents' Frequency Based on Working Time.

CFA test or construct validity test, intended to know that each indicator can explain the existing construct. The indicators used to measure the research variables are indicators that have p value <0.05 and loading factor> 0.5, while indicators that have p value> 0.05 and loading factor <0.5 are eliminated from the model. According to Ghozali [9], the first thing that needs to be seen is the significance value (P value) if more than 0.05, the indicator is released from the model, the second sees the standardized loading factor (Estimate value), if below 0.50 the indicator excluded from the model because it is considered invalid to measure the latent construct. The following is presented data processing with IBM SPSS Amos 22 on each variable.

**Table-1: Validity and reliability**

| Variable | AVE | Construct Reliability |
|---|---|---|
| Product Quality Control | 0,654 | 0,919 |
| Quality Control of Production Machir | 0,636 | 0,839 |
| Company Operational Performance | 0,734 | 0,932 |

From Table-1 shows all variables both exogenous and endogenous, reliable and valid, because if value Variance Extract (AVE), where the acceptable value is ≥ 0.50 and Reliability test, where the value of reliability received is ≥ 0.70.

The following is presented with Amos data processing on each variable: Standardized Regression Weights Variabble controls product quality, controls production machine quality and company operational performance.

**Table-2: Loading Factor (Estimate) Product Quality Control (QCP)**

| | QCP | | Estimate |
|---|---|---|---|
| QCP6 | <--- | QCP | 0,717 |
| QCP5 | <--- | QCP | 0,780 |
| QCP4 | <--- | QCP | 0,822 |
| QCP3 | <--- | QCP | 0,760 |
| QCP2 | <--- | QCP | 0,872 |
| QCP1 | <--- | QCP | 0,889 |

**Table-3: Loading Factor (Estimate) Production Machine Quality Control**

| QCMP | | | Estimate |
|---|---|---|---|
| QCMP3 | <--- | QCMP | 0,776 |
| QCMP2 | <--- | QCMP | 0,840 |
| QCMP1 | <--- | QCMP | 0,774 |

**Table-4: Loading Factor (Estimate) Company Operational Performance (KOP)**

| | KOP | | Estimate |
|---|---|---|---|
| KOP1 | <--- | KOP | 0,869 |
| KOP2 | <--- | KOP | 0,841 |
| KOP3 | <--- | KOP | 0,877 |
| KOP4 | <--- | KOP | 0,856 |
| KOP5 | <--- | KOP | 0,840 |

The results of convergent validity analysis show that all values of the loading factor (Estimate) are all above 0.5, indicating that all of these indicators are all valid.

The Normality Assumption Test and the Outlier Test aim to test whether in the regression model the disturbance or residual variable has a normal distribution [6].

**Table-5: Assesment of Normality**

| Variable | min | max | skew | c.r. | kurtosis | c.r. |
|---|---|---|---|---|---|---|
| QCMP1 | 7,000 | 10,000 | -,297 | -1,484 | -,478 | -1,195 |
| QCMP2 | 7,000 | 10,000 | -,379 | -1,893 | -,522 | -1,306 |
| QCMP3 | 7,000 | 10,000 | -,690 | -3,450 | -,035 | -,088 |
| KOP5 | 7,000 | 10,000 | -,616 | -3,082 | -,183 | -,458 |
| KOP4 | 7,000 | 10,000 | -,463 | -2,314 | -,497 | -1,242 |
| KOP3 | 7,000 | 10,000 | -,489 | -2,444 | -,778 | -1,945 |
| KOP2 | 7,000 | 10,000 | -,460 | -2,299 | -,494 | -1,235 |
| KOP1 | 7,000 | 10,000 | -,493 | -2,465 | -,638 | -1,595 |
| QCP1 | 7,000 | 10,000 | -,724 | -3,619 | -,694 | -1,734 |
| QCP2 | 7,000 | 10,000 | -,594 | -2,971 | -,328 | -,820 |
| QCP3 | 7,000 | 10,000 | -,416 | -2,078 | -,456 | -1,140 |
| QCP4 | 7,000 | 10,000 | -,452 | -2,258 | -,950 | -2,376 |
| QCP5 | 7,000 | 10,000 | -,281 | -1,405 | -,365 | -,913 |
| QCP6 | 7,000 | 10,000 | -,491 | -2,453 | -,254 | -,635 |
| Multivariate | | | | | 1,794 | ,519 |

Table-5 multivariate data distribution is normal, because the multivariate number 0.519 is in the range –2.58 to 2.58. Interpretation of the results if the data is not normal, it is necessary to delete the outlier data so that later it is expected to obtain data that meets the assumptions of normality.

Goodness of Fit test or model feasibility test. The purpose of the model fit or Goodnest of fit test is to find out how precisely the manifest variables (indicator variables) can explain the latent variables that exist. The Goodness of Fit test is used to measure the accuracy of the sample regression function in estimating the actual value.

Model Modification According to Ghozali [10] overall Goodness of fit can be assessed based on a minimum of 5 criteria. In empirical research, a researcher is not required to fulfill all the criteria of goodness of fit, but depends on the judgment or decisions of each researcher.

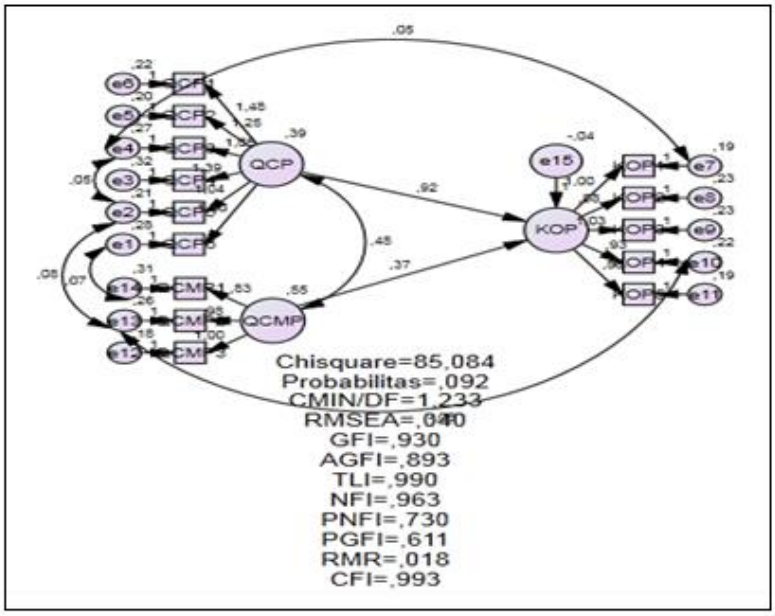


**Fig-2: Full SEM Model after Modification**

After doing elimanasi and connecting as recommendations from modification indices then the model can be seen in figure-2.

Table-6 shows the goodness of fit after modifying the model. The indicator is more than 5 that matches the expected criteria.

**Table-6: Goodness of Fit After Model Modification**

| Goodness of Fit | Cut of Value | Hasil sesudah modifikasi | Keputusan |
|---|---|---|---|
| Probabilitas Chi Square | ≥ 0,05 | 0,094 | Good fit |
| CMIN/DF | ≤ 2,00 | 1,233 | Good fit |
| GFI | ≥ 0,90 | 0,930 | Good fit |
| AGFI | ≥ 0,80 | 0,893 | Good fit |
| CFI | ≥ 0,90 | 0,993 | Good fit |
| TLI | ≥ 0,90 | 0,990 | Good fit |
| NFI | ≥ 0,90 | 0,963 | Good fit |
| PNFI | ≥ 0,90 | 0,730 | Marginal |
| RMSEA | ≤ 0,08 | 0,040 | Good fit |
| RMR | ≤ 0,05 | 0,018 | Good fit |

Hypothesis Test (Inter Variable Effect Analysis). After an overall structural model can be considered fit, the next process is to look at the influence between the independent variable and the dependent variable.

The basis of decision making is if the value of P (Probability)> 0.05 then H0 is accepted or there is no influence, if the value of P (Probalitias) <0.05 then H0 is rejected or there is influence [11]. Based on Table-7. it can be concluded as below:

- There is the influence of Product Quality Control on Operational Performance Company. This is because the probability value is less than 0.05, which is equal to 0.001. A positive estimate value of 0.917 means a positive effect.
- There is the influence of Production Machine Quality Control on Performance Company Operations. This is because the probability value is less than 0.05, which is equal to 0.018. Positive estimate value of 0.374 means that the effect is positive.

Path analysis or path analysis is an extension of linear regression analysis. The structural models formed are:

$$KOP = 0.917\ QCP + 0.371\ QCMP + e$$

Based on the model, it can be seen that each increase in product quality control by one unit will increase the Company's Operational Performance by 0.917 units. If the quality control of a production machine rises by one unit, it will improve operational performance as much as 0.371 units.

**Table-7: Regression Weights: Modified Models.**

| | | | Estimate | P |
|---|---|---|---|---|
| KOP | <--- | QCP | 0,917 | *** |
| KOP | <--- | QCMP | 0,374 | 0,018 |
| QCP6 | <--- | QCP | 1,000 | |
| QCP5 | <--- | QCP | 1,043 | *** |
| QCP4 | <--- | QCP | 1,387 | *** |
| QCP3 | <--- | QCP | 1,046 | *** |
| QCP2 | <--- | QCP | 1,248 | *** |
| QCP1 | <--- | QCP | 1,482 | *** |
| KOP1 | <--- | KOP | 1,000 | |
| KOP2 | <--- | KOP | 0,877 | *** |
| KOP3 | <--- | KOP | 1,030 | *** |
| KOP4 | <--- | KOP | 0,931 | *** |
| KOP5 | <--- | KOP | 0,876 | *** |
| QCMP3 | <--- | QCMP | 1,000 | |
| QCMP2 | <--- | QCMP | 0,979 | *** |
| QCMP1 | <--- | QCMP | 0,827 | *** |

**Table-8: Direct Effect**

| | Control Product Quality | Production Machine Quality Control |
|---|---|---|
| Company Operational Performance | 0,917 | 0,374 |

Regression coefficient of direct influence of product quality control on the company's operational performance is 0.917 and control of the quality of production machinery on the company's operational performance is 0.374

## RESULTS AND DISCUSSION

Product quality control affects the company's operational performance. This is known from the regression coefficient of 0.917. Each increase in one product quality control unit will increase the company's operational performance by 0.917. Thus the first hypothesis which states the control of product quality has an effect on the company's operational performance is stated to be accepted

Control of the quality of the production machine has an effect on the Company's Operational performance. This is known from the regression coefficient of 0.374. Each increase in one production machine quality control unit will increase the operational performance of the company by 0.374. Thus the second hypothesis which states the control of the quality of the production machine has an effect on the operational performance of the company declared acceptable. Based on these results It is said that the better the quality of the production machine, the product produced is according to the set target because there is no production machine that has a problem and the product quality will be good because the production machine functions according to its use.

## CONCLUSION

Based on the results of data analysis that has been carried out on all data obtained, then conclusions can be taken as follows:

Product quality control affects the company's operational performance. This is known from the regression coefficient of 0.917. Every increase in one product quality control unit will increase the company's operational performance by 0.917.

Control of the quality of the production machine has an effect on the Company's Operational performance. This is known from the regression coefficient of 0.374. Each increase in one production machine quality control unit will increase the operational performance of the company by 0.374.

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