

QUALITY CONTROL ANALYSIS IN PRODUCTION BLOCK PAVING USING THE STATISTICAL METHOD QUALITY CONTROL (SQC) IN PT. DUTA BETON MANDIRI

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Abstract. PT. Duta Beton Mandiri is a company engaged in the concrete-based manufacturing and its development focuses on ready production mix, paving, bishop's hat, caster, hexagonal, brick, precast, uditch, and stone mill. Making a sustainable product is responsibility as a form of quality policy with ISO 90012015 STANDART with certificate number 1377Q. The problem is in company PT. Mandiri Beton Ambassador is one of the causes of product defects and damage to paving blocks. To reduce defects in paving blocks at PT. Mandiri Beton Ambassador in handling quality control issues and based on the background it will be analyzed using the method Statistical Quality Control (SQC). The goals to be achieved in this research is to determine the percentage of product defects and causes of defects

Keywords: Statistical Quality Control (SQC), P-Chart, Peta Kendali, Diagram Tulang.

1. INTRODUCTION

The pace of industrial development is accelerating in this era of globalization. The competition is likewise getting more intense at this level. Businesses are still competing for customers and working to improve the appeal of their products. EveryThe organization places a high value on the caliber of the goods they manufacture.

Businesses that can produce a superior good or service have a better chance of outperforming their rivals. It goes without saying that a company's qualitative analysis is crucial if it wants to compete on the basis of the caliber of the goods or services the market produces and how well it satisfies customer needs.

The only reason for the issues that exist at the business, PT. Duta Mandiri Beton, is that there are product flaws and paving block damage. PT. Independent Concrete Ambassador will use the statistical quality control (SQC) method to examine the data in order to handle quality control concerns and reduce faults in paving blocks.

In order to generate products in the form of goods or services that meet the criteria sought and planned in a company, quality control is carried out. The goals of this study are to quantify the proportion of paving block products with flaws, identify the root causes of those problems, and identify remedies for paving block product faults.

As a manufacturer of concrete-based products, PT. Duta Beton Mandiri concentrates on ready production mix, pavement, bishop's hats, casters, hexagonal bricks, precast buildings, uditch, and stone mills. Making a sustainable product is a responsibility under ISO 90012015 STANDARD with certificate number 1377Q's quality policy.

2. LITERATURE REVIEW

2.1. Paving Blocks

Paving blocks are made of aggregate, water, portland cement, or another hydraulic adhesive; they can also contain other additives that do not affect the strength of the concrete (SNI03-0691-1996).

Paving blocks are made of cement, sand, and water, which gives the substance the properties of mortar. Sand and other fine aggregates are combined with binders, water, and other elements to create mortar, a building material that when hardened takes on the characteristics of rocks. The paving block itself is suitable for heavily trafficked outdoor floors because it won't break or deform.

2.2 Quality control

Quality control is an activity that is carried out to make sure that production activities and operations are carried out in accordance with what was planned and, if there is a variation, then 12 these discrepancies may be fixed so that what is expected can be attained, according to Assauri (2004).

3. RESEARCH METHODS

The information was used to assess the nutmeg syrup's product damage using UD's statistical quality control approach. Mestika consist of both primary and secondary data.

3.1 Primary Data

Primary data is information gathered by direct measurements of space. Regarding the primary data required for study on the PT Duta Beton Mandiri. looks like this:

- a) Noticing. the act of observing a subject's behavior patterns (whether they be human, inanimate objects, or systematic events) without asking them any questions or getting in touch with the people being observed. Specifically by observing the packaging of nutmeg syrup.
- b) Interview. Techniques for gathering data when conducting surveys with spoken questions for study subjects. Interviews can be conducted over the phone or in person.

3.2 Secondary Data

Typically, secondary data takes the shape of facts, memos, or historical accounts that have been assembled in both published and unpublished archives (data documentaries). You can get this information by requesting it directly from the business. Regarding the secondary data required for PT duta Beton Mandiri research. looks like this:

- A) Data on production amount
- B) The number of product defects per day

4. RESULTS AND DISCUSSION

4.2.1 Data Gathering

The data collected during the Paving Block production process was taken between July 1 and July 20, 2022, based on the findings of the observations conducted.

4.2.2 Processing Data

Making a P control chart is the first step in the data processing procedure in order to determine the values of CL, UCL, and LCL. The final step is to apply the Statistical Method Quality Control (SQC) based on the computation of the data collected by comprehensive means. Next, design a map chart control P.

The P-Chart method, which is used in this report, was selected because it is suited for the problem because it controls the average model based on sample. The analysis's subsequent steps are as follows:

The P-Chart approach for quality control analysis determines the proportion or average damage (P).

$$CL = \bar{p} = \frac{\sum np}{\sum n}$$

$$\bar{p} = \frac{\sum np}{\sum n}$$

$$\bar{p} = \frac{1165}{23621}$$

$$\bar{p} = 0,0493$$

The average damage is calculated by processing the data and is equal to 0.0493 percent. The upper control limit (UCL) or upper control limit is as follows:

$$UCL = \bar{p} + 3 \sqrt{\frac{\bar{p}(1-\bar{p})}{n}}$$

$$UCL = \bar{p} + 3 \sqrt{\frac{\bar{p}(1-\bar{p})}{n}}$$

$$= 0,0493 + 3 \sqrt{\frac{0,0493 (1-0,0493)}{23621}}$$

$$= 0,0493 + 3 \sqrt{\frac{0,0468}{23621}}$$

$$= 0,0493 + 3 (0,0014)$$

$$= 0,0493 + 0,0042$$

$$= 0,0535$$

Lower Control Limit (LCL), often known as the lower control limit:

$$LCL = \bar{p} - 3 \sqrt{\frac{\bar{p}(1-\bar{p})}{n}}$$

$$=0,0493 - 3 \sqrt{\frac{0,0493(1-0,0493)}{23621}}$$

$$=0,0493 - 3 \sqrt{\frac{0,0468}{23621}}$$

$$= 0,0493 - 3 (0,0014)$$

$$= 0,0493 - 0,0042$$

$$=0,0451$$

0.0535 is the result of data processing exceeding the Upper Control Line (UCL) or control above limitations. Lower Control Limit (LCL), often known as lower control limit, is currently 0.0451. Additionally, the control chart graphic will describe the aforementioned facts.

The P-Chart diagram, which is used to depict a process, demonstrates when a process is out of control (or "Out of controls"). The procedure will then be looked into to determine what caused the situation to spiral out of hand. which will be followed by the implementation of a solution-seeking, problem-solving, and problem-fixing action.

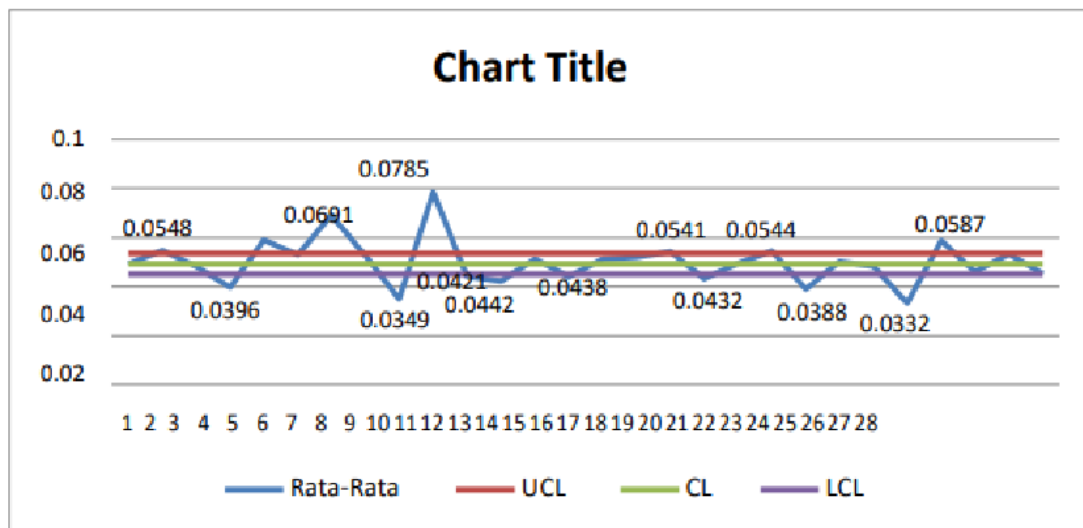


Figure 4.1 P-Chart Graph

The manufacturing of paving blocks exhibits an average data mismatch or is stated to be in an uncontrolled state, as shown by the P-Chart graphic data above. This is because there are 7 points which surpasses the control limit or UCL (0.0535), with the exit points being No. 2 dated July 2, 2022 (0.0548), No. 5, July 5, 2022 (0.0591), No. 7, July 10, 2022 (0.0785), No. 17, July 17, 2021 (0.0541), No. 20, July 20, 2022 (0.0544), and No. 25, July 25, 2022 (0.0587). The exit point for the lower control limit data, or LCL (0.0451), is No. 4 on July 4 (0.0396), No. 9 on July 9, 2022 (0.0349), No. 11 on July 11, 2022 (0.0442), No. 12 on July 12, 2022 (0.0421), No. 14 on July 18, 2022 (0.0432), No. 21 on July 21, 2022 (0.0388), and No. 24 on July 24, 2022 (0.0332). This instability may happen as a result of a process irregularity on that day, frequent machine issues, human

error, a lack of machine maintenance, and inadequate supervision, which causes production to have damage issues that go beyond acceptable control limits.

4.2.3 Diagram of Cause and Effect

Diagrams of cause and effect depict the connection between the issues faced, potential causes, and the variables that affect them. The most crucial thing that needs to be done and tracked is to determine the source of the damage's occurrence. A causal diagram, also known as a fishbone chart, can be used to do this. The following is how causal diagrams are used:

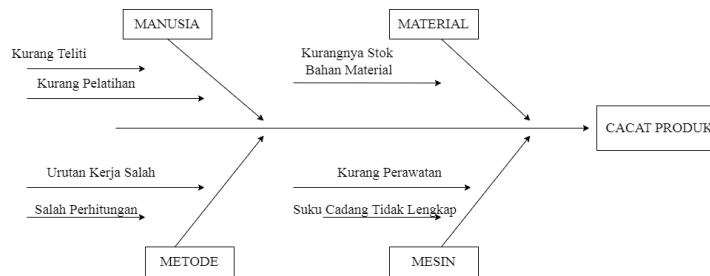


Figure 4.2 Fish Bones

From the fishbone diagram it can be seen that defective products in paving block production are caused by several factors as follows:

1. Human Factors

Is one of the factors causing defects in the product. This is caused by :

- a. Lack of operator focus and accuracy when monitoring machine performance properly.
 - b. Operators are less careful during the production process.
2. Material This stage is not too influential from the production of defects during production. Because the composition of the material or raw materials used is fixed.
3. Operator methods that do not follow the work sequence result materials and machines not running optimally.
4. Machine This stage is the main cause that results in damage in production. This is caused by:
- a. Lack of maintenance of production machines, which results in less than optimal engine performance.
 - b. Ethnic group suggest not complete or in accordance with the instructions resulting in damage to the function of the machine.
 - c. The age of the machine is old, which results in decreased engine performance so that it can cause the engine to stop suddenly

CONCLUSION

From the results of data processing and problem solving analysis, several conclusions are drawn as follows:

1. Based on the results of data processing using the Statistical Quality Control (SQC) method. The results of the analysis of the number of defective products show that the paving block production process at PT. Duta Beton Mandiri was stated to be in an uncontrolled state, this was because there were 7 points that crossed the control limit.
2. From the analysis that has been carried out by researchers, the biggest product damage or defect is the striped color with a total of 638 pieces. And the factors causing the unstable quality of Paving Block production seen from the effect diagram are machine factors, people, work methods, materials. Where the most influential cause is damage to the machine which results in sub-optimal production performance.

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