

Analysis of Quality Control for Furniture Production using Pareto Diagram and Fishbone Diagram at PT. SKM Jati

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Abstract

This research aims to describe Quality Control in Improving the Production Efficiency of Tables and Chairs Using Pareto and Fishbone Diagrams at PK. SKM JATI. The type of research used is qualitative descriptive with secondary and primary data, which is intended to collect data and information about a problem and facts related to the object and the research site as they are during the study. This research was conducted in Madiun Regency by interviewing the owner of PK. SKM Jati. Data collection techniques used in this study include in-depth interviews, observations, and documentation techniques to obtain accurate data for creating Pareto and fishbone diagrams. The research results show that PK. SKM Jati still faces obstacles that hinder production efficiency, with defects such as holes in the wood, moist wood, and varnish failures. The highest production failure rate is varnish failure, followed by holes in the wood, and lastly, moist wood. Through fishbone diagram analysis, four main problems are identified: people, materials, machines, and methods.

Keywords: Quality Control, Fishbone Diagram, Pareto Diagram

1. Introduction

Situation Analysis. Product quality is a crucial aspect that every company must pay attention to, making quality control essential. To produce high-quality products, it starts with the implementation of all operational standards during the entire process. Several aspects lead to a decline in product quality, such as product damage, requiring efforts to address these issues. In every production process, adherence to established procedures is expected, but in reality, there is often a mismatch between the produced and expected products. For instance, defective products are found in the final production stage, despite following the standards throughout the process, including quality control from raw material inspection to production process monitoring. Therefore, to minimize product failures, every company should have effective quality control. The goal of every company is to achieve optimal and sustainable profits. Quality is directly related to market share and industry growth, making it a crucial aspect for every company. Each product has its own quality standards based on the company's rules and standards. PK. SKM JATI is a furniture company based on Java Island. It was founded in 1991 in Madiun Regency, with its flagship products being Adria tables and chairs since its establishment. PK. SKM Jati has been operating in this field for a considerable time and has managed to generate a turnover of Rp 150,000,000.00 in the last year from 2022 to 2023. By using the Pareto diagram, it will be easier to see the problems that frequently occur or have an impact on PK. SKM Jati, thus identifying the main issues faced by the company. After

identifying the most influential problems in the company, it is necessary to find the root causes. Therefore, the application of the fishbone diagram, which is most suitable for the issues faced by PK. SKM Jati, becomes crucial. The use of Pareto and Fishbone diagrams in this research aims to determine the causes of product defects and make informed decisions to maintain quality, thereby minimizing product defects.

The research objectives of PK. SKM Jati Company: (a) Identifying the priority causes of production defects using the Pareto diagram; (b) Identifying the root causes of quality issues in the production process using the Fishbone diagram; (c) Formulating proposals for improving production quality based on the results of the Fishbone diagram.

2. Literature Reviews

2.1 Understanding Operational Management

Operational Management is the activity of arranging and coordinating the effective and efficient utilization of resources, including human resources, tools, funds, and materials, to create and achieve improvements in functionality. Utility In order to achieve the desired peak of success, whether it be for a product or service, a company must have a profound understanding of operational management and other relevant aspects. Therefore, it is crucial to implement operational management accurately to achieve optimal results. Operational management is a part of management that is intended to coordinate all activities implemented to tangibly achieve the intended goals. Assauri (2008:17) states that management is an activity or effort conducted with the orientation towards achieving goals through the maximum utilization of resources. Meanwhile, Assauri (2008:17) suggests that management is the activity of transforming inputs to produce outputs through processing. Output. Meanwhile, operational management, according to Prawirosentono (2010:1), involves planning, implementing, and supervising all activities in accordance with their sequence. Set Of Activities to produce goods product from the processing of raw materials used.

2.2 Definition of Quality

The essence of quality is a term that has often been heard by the general public and has become a keyword. keyword for the industrial world. There are various companies that produce similar products or services, making it important for each company to have its own characteristics while still considering the quality provided to consumers. This is not separate from the crucial role of quality as a determinant of competition. As explained by American Society for Quality is the overall features and characteristics of a product or service that can provide satisfaction to consumers, either implicitly or explicitly. Therefore, efforts to maintain product quality are continuously carried out by companies, with the goal of providing satisfaction to consumers (Heizer and Render, 2011).

2.3 Definition of Pareto Diagram

According to Heizer et al. (2014;244), they explain that Alfredo Pareto was the pioneer in introducing the Pareto diagram for the first time, and Joseph Juran was the first person to use it. The Pareto diagram is a bar graph and line graph that provides an overview of the comparison

of all types of data comprehensively. Through its use, it allows the identification of dominant problems, enabling the determination of priority for resolution.

2.4 Definition of Fishbone Diagram

The Fishbone diagram is a technique developed in the 1960s by Professor Kaoru Ishikawa, who is also a pioneer in the development of the quality management field (Desai, Desai, and Ojede. 2015). According to Mustofa (2014), the fishbone diagram serves to illustrate various main factors that influence quality and result in the problems being studied. We can also identify various factors in detail with significant impacts, and the consequences created for the main factors can be known through the fishbone-shaped arrows in the diagram. The use of the diagram is intended to visually present the causes of problems or understand the cause-and-effect relationships of issues, such as the factors causing product defects.

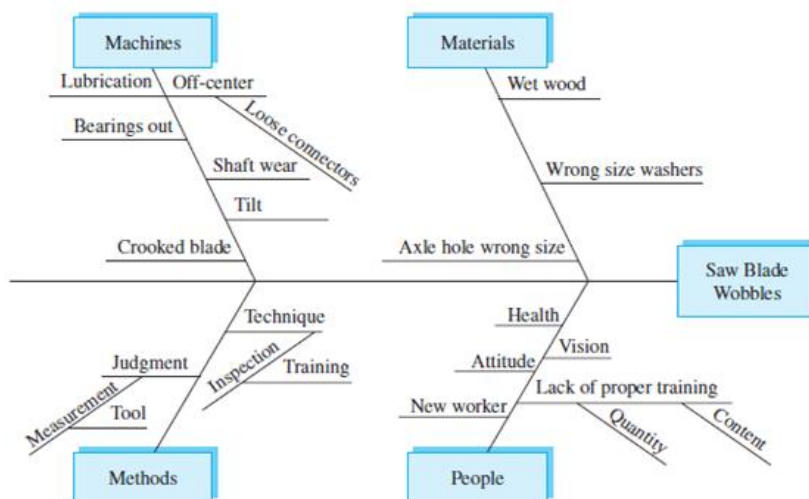


Image 1. Fishbone Diagram on the wobbling wood cutter

Reference: Book "Managing Quality" (2016)

3. Research Method

This type of research is qualitative descriptive research. All the required data will be collected through the use of the following methods:

- Observation - Observation is the direct observation or visitation by the researcher at the research site or in the environment of the research object, aimed at obtaining all the necessary data, especially regarding raw material inventory and production quantities.
- Interview - Interview is a data collection technique involving direct question-and-answer interactions between the interviewer and the respondent. Its purpose is to gather all relevant data related to the research topic, including production systems and inventory control methods employed by the company. To obtain accurate results, the author conducted

interviews with Mr. Sukemi, the business owner, and Mrs. Rohini, the financial manager at PK. SKM Jati.

- c) Documentation - Documentation is a data collection technique performed by the researcher through direct observation of all documents or archives in the company that are relevant to the research topic.



Image 2. Sanding Documentation
Reference: Researcher



Image 3. Production Documentation
Reference: Researcher

4. Finding and Discussion

During the production process, PK. SKM Jati experienced several issues, including holes in the wood, incorrect sizes, moist wood, varnish failure, and machine damage. Based on the data obtained by the author, the following are some classifications related to these product failures.

X= Holes in the wood; **Y**= Moist wood; **Z**= Varnish failure

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Table 1. List of Inspection Failures for Table and Chair Production December 2022 to August 2023

NO	Month	Types of Damage			Number of Damages	Total Production
		X	Y	Z		
1	5 December 2022	2	1	-	3	10
2	19 December 2022	-	-	4	4	6
3	22 January 2023	3	-	-	3	9
4	8 February 2023	-	1	1	2	20
5	17 February 2023	1	-	-	1	5
6	20 February 2023	-	-	2	1	12
7	2 March 2023	5	-	-	5	15
8	13 March 2023	-	2	4	6	24
9	15 March 2023	1	1	2	4	10
11	15 May 2023	-	-	1	1	14

NO	Month	Types of Damage			Number of Damages	Total Production
		X	Y	Z		
12	12 July 2023	2	-	-	2	8
13	10 August 2023	-	1	-	1	8
14	30 August 2023	1	-	3	4	9
	TOTAL	15	6	17	38	150

Reference: PK. SKM Jati

a) Pareto Diagram of PK. SKM Jati

Based on these three things, the author processed them using the Pareto diagram formula as follows to find the percentage of damage.

$$\text{Percentage of damage} = \frac{(\text{Number of Damage in Each Type})}{(\text{Total Number of Damages})} \times 100\%$$

Based on the provided data, it can be processed as follows by inputting it into the existing formulas as follows:

1. Holes in the wood

$$\frac{15}{38} \times 100\% = 39,47\% \dots \dots \dots (1)$$

2. Moist Wood

$$\frac{6}{38} \times 100\% = 15,79\% \dots \dots \dots (2)$$

3. Varnish failure

$$\frac{17}{38} \times 100\% = 44,74\% \dots \dots \dots (3)$$

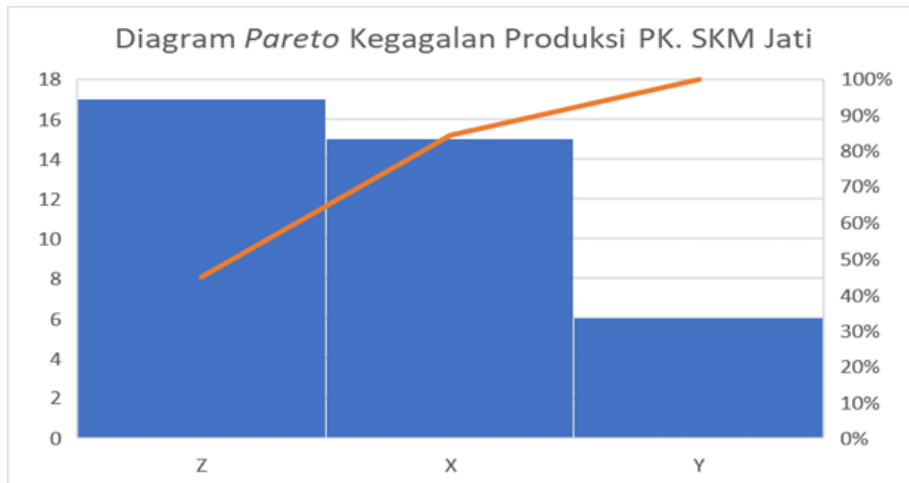


Image 4. Pareto Diagram of PK. SKM Jati

Reference: PK. SKM Jati

b) Fishbone Diagram of PK. SKM Jati

The Fishbone Diagram, also known as a cause-and-effect diagram, is so named because it illustrates the causes related to product failure. Here is the fishbone diagram related to PK. SKM Jati.

1. Holes in the Wood

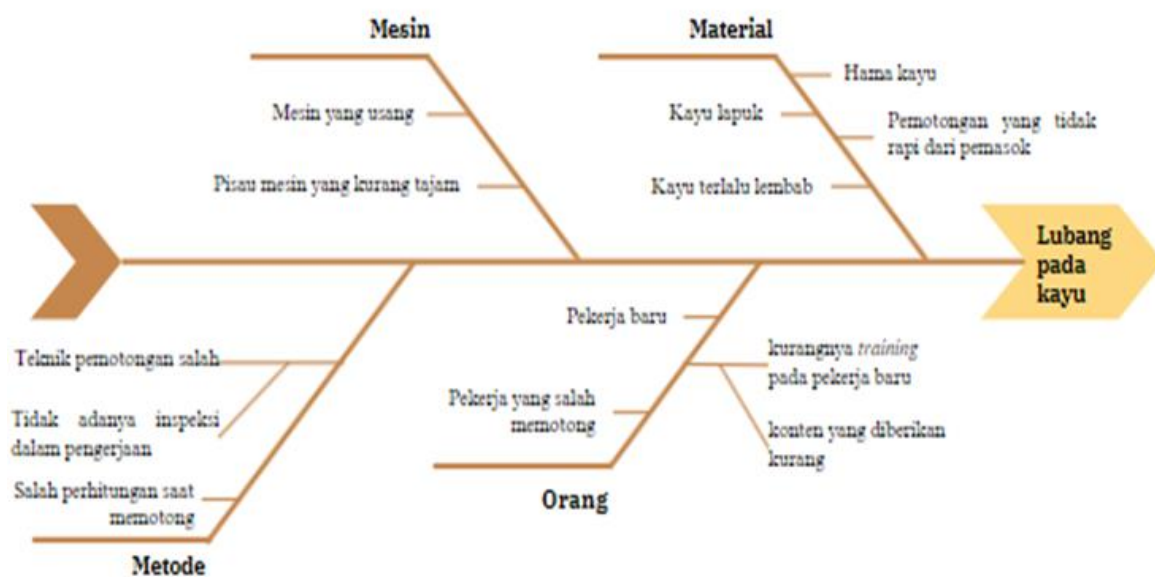


Image 5. Fishbone Diagram for Holes in the Wood

Source: PK. SKM Jati

Table 2. Plan for Addressing Quality Issues Holes in the Wood at PK. SKM Jati

Observed Factors	Issues that Occurred	Mitigation Plan
a) Person	1) New workers	Implementing a contract system to prevent too frequent turnover of workers.
	2) Lack of training for new employees	Improving employee knowledge through training and guidance from superiors, providing rewards and punishments to motivate employees to work optimally.
	3) The worker made the wrong cut	Control is carried out on workers who are currently performing the cutting to identify the location of the worker's mistakes and rectify them.
b) Material	1) Wood pests	Conducting checks by the manager to assess the quality of the wood.
	2) Weathered wood	Requesting a discount when it turns out there is a wood with holes in the cutting process.

Observed Factors	Issues that Occurred	Mitigation Plan
	3) Sloppy cutting from supplier	Collaborate with a trusted wood cutting company
	4) The wood is too damp	Creating a contract with suppliers to ensure that the wood to be delivered has undergone a moisture checking process.
c) Machine	1) Obsolete machine	Investing in new machinery.
	2) The machine knife is not sharp enough	Checking each blade before starting the cutting process.
d) Methods	1) Wrong cutting technique	Supervising the workers during the cutting process.
	2) Miscalculation when cutting	Make a blue print before cutting

Reference: Researcher

2. Moist Wood

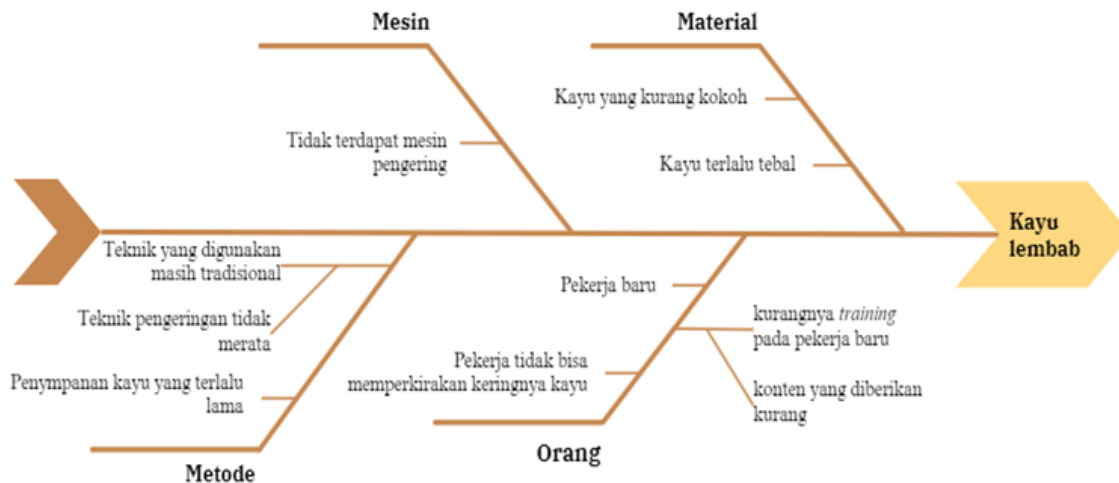


Image 6. Fishbone Diagram for Moist Wood at PK. SKM Jati

Source: PK. SKM Jati

Table 3. Plan for Addressing Quality Issues Moist Wood at PK. SKM Jati

Observed factors	Problems that occur	Countermeasure plan
a) Person	1) New workers	Implementing a contract system to prevent too frequent turnover of workers.
	2) Lack of training for new workers	Increasing workforce knowledge through training and guidance from superiors, providing rewards and punishments to motivate workers and employees to work optimally.

Observed factors	Problems that occur	Countermeasure plan
	3) Workers who cannot estimate the dryness of the wood.	Control is carried out on workers who are currently in the drying process to identify the location of the worker's mistakes and rectify them.
b) Material	1) Less sturdy wood	Creating a contract with suppliers to ensure that the wood to be delivered has undergone a wood sturdiness checking process.
	2) Wood is too thick	Thickness checking is done before the drying process, and there is supervision by the manager.
c) Machine	1) There is no drying machine	Investing in new machines.
d) Methods	1) The technique used is still traditional	Conduct workshops to find out about the latest techniques in wood drying.

Observed factors	Problems that occur	Countermeasure plan
	2) Storing wood for too long	implementing a LIFO (last in first out) system to prevent buildup of raw materials.

Reference: Author

3. Varnish failure

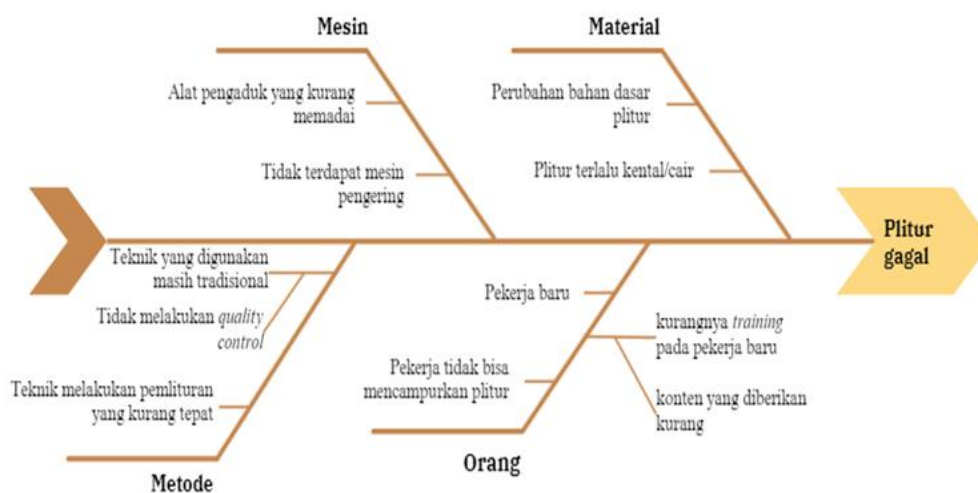


Image 7. Fishbone Diagram for Varnish Failure at PK. SKM Jati

Source: PK. SKM Jati

Table 4. Plan for Addressing Quality Issues Varnish Failure at PK. SKM Jati

Observed Factors	Issues that Occurred	Mitigation Plan
a) Person	1) New Employees	Implement a contract system to prevent frequent worker changes
	2) Lack of training for new employees	Increasing workforce knowledge through training and guidance from superiors, providing rewards and punishments to motivate workers and employees to work optimally.
	3) Workers cannot mix varnish.	Control is carried out on workers who are mixing varnish to find out where the worker's mistakes are and correct them
b) Material	1) Change in varnish base material	Make a contract with the supplier to guarantee that the polish is of the same quality as before when it is delivered

Observed Factors	Issues that Occurred	Mitigation Plan
	2) Polish is too thick or too runny	Carrying out trial and error again when there is a change in the basic ingredients from the manufacturer, so that it still has its own characteristics
c) Mesin	1) Inadequate stirring tool	Investing in a new mixing machine.
	2) No drying equipment available.	Invest in a new dryer.
d) Metode	1) The technique used is still traditional.	Conduct workshops to find out about the latest techniques in wood polishing.
	2) Improper polishing technique	Applying the correct research techniques: When conducting research, it is necessary to pay attention to the correct polishing techniques so that the results are better

5. Conclusion

According to the author's analysis using a Pareto diagram, several main problems have been identified at PK. SKM Jati with the largest product defect being plitur that failed, followed by holes in the wood and the smallest being wet wood. The defect with the specification of holes in the wood reached a percentage of 39.47%, the defect as wet wood reached a percentage of 15.79%, and plitur that failed with a percentage of 44.74%.

According to the Fishbone diagram, each defect has four branches of problems, including material, people, machines, and methods. Out of the four branches, the main cause of the

product failure at PK. SKM Jati is the material sent by the supplier. This includes wet wood and pests in Jati wood, which PK. SKM Jati cannot reject. However, another issue that contributes to the problem is the unprofessional attitude of the workers regarding the cutting of new wood.

Kayu lembab is one of the defects experienced by PK. SKM Jati. The main cause that dominates this issue is the skills of new employees who are less skilled and the methods used by PK. SKM Jati, which are still traditional, relying on sunlight and excessive storage. This is followed by materials that are not supportive for drying, and the minimization of equipment for drying is still done traditionally using solar heat.

Plitur that failed, which caused the final product failure, was caused by the lack of experience of workers who were less experienced in applying plitur, resulting in poor plitur application and not being able to dry.

References

- Assauri, S. (2008). *Manajemen Produksi*, edisi revisi. Fakultas Ekonomi Universitas Indonesia.
- Dorothea, W., & Ariani. (2004). *Pengendalian kualitas statistik : pendekatan kuantitatif dalam manajemen kualitas*. Andi.
- Heizer, J., & Barry, R. (2011). *Manajemen Operasi* (Edisi 9 Buku 2 ed.). Salemba Empat.
- Heri Murnawan, Mustofa, (2014) "Perencanaan produktivitas kerja dari hasil evaluasi produktivitas dengan metode fishbone di perusahaan percetakan kemasan PT.X"
- Haryono, D., & Iwan. (2015). *Pengendalian Kualitas Statistik (Pendekatan Teoritis dan Aplikatif)*. Penerbit Alfabeta.
- Moleong, & Lexy J. (2012). *Metodologi Penelitian Kualitatif*. PT Remaja Rosdakarya.
- Nastiti, & Heni. (2014). Analisis pengendalian kualitas produk dengan metode statistical quality control (Studi Kasus: pada PT "X" Depok)." *Sustainable Competitive Advantage (SCA)*, 4(1).
- Suyadi, Prawirosentono. 2010. *Manajemen Sumber Daya Manusia Kebijakan Kinerja Karyawan*. Yogyakarta: BPFE
- Rangkuti, & Freddy. (2004). *Manajemen Persediaan*. Raja Grafindo Persada.
- S, T. F. (2016). *Managing Quality* (Sixth ed.). Pearson Education, Inc.

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