

Analysis of Material Unavailability in the Beside Table Production Process Using Root Cause Analysis (RCA) and 5S Methods in A Furniture Company

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ABSTRACT

Furniture manufacturing company, producing products such as tenban, beside cabinet, beside table. In carrying out its production, furniture companies often occur conditions of material unavailability when the production process is in progress and there is a difference between the amount of material inventory stock in the information system (computer) and the stock of materials in the warehouse. This research will identify the factors that cause material unavailability during production using the Root cause analysis (RCA) method. Several factors cause material unavailability, namely, errors in inputting material stock data, not doing physical stock-taking regularly, material moving to other parts of the shelf, material storage is not neat because there are few storage shelves and material identity labels are not yet valid, recording stock-taking is still manual, material or spare parts are lost, return material (defects) from users is placed on the same shelf as OK material and narrow warehouse space and limited storage shelves. To overcome these problems, this research provides a sustainable improvement proposal by implementing the lean thinking concept with the 5S principle in the company. It is expected that with the application of the 5S concept in this company so that the material inventory system in the warehouse is controlled optimally so that it can increase the productivity of employee performance in the company and a better change for the company.

Key Words: Lean Manufacturing, Material Unavailability, Root Cause Analysis, 5S principle.

1. INTRODUCTION

Along with the development of industry in Indonesia, there is intense competition between companies. Modern industry in a highly competitive global market adheres to the concept of production, not just as an activity of transforming inputs into outputs, but views the concept of production as a value-added value creation activity. The current production system must have an integral system and clear structural and functional components.

To assess the efficiency of a company, many companies use various benchmarks of actual production results achieved following the stated objectives of the company. Knowing what activities can add value and minimizing and eliminating waste in the production process is one technique to help companies improve work productivity and manage their manufacturing processes efficiently.

Industrial furniture manufacturing company located in Cikarang, where its activities are to produce products such as tenban, bedside cabinets, and bedside tables, usually this furniture can be found in hospitals and offices. This research is more focused on the beside table production process because, in the last few months, it has often experienced material unavailability during the production process, which of course will have an impact on performance productivity and company performance towards customers. Figure 1 is an image of the bedside table product.



Figure 1. Beside Table Product

The number of materials used in the production process of 1 item of bedside table products is 34 types of materials. Materials that often experience unavailability are ball bearings, bolts, nabe, and washers. Because of the unavailability of this material greatly hampers the production process. For this reason, it is necessary to identify in more detail the bedside table material inventory process. The following is a table of materials that are not available during the production process from January to March 2022.

Table 1. Material Availability Data

No	Material Name	Month Unavailability (Pcs)			Order Quantity Received (Unit)	Total Unavailability Material (Pcs)	Total Output Production (Unit)	Percentage Production Shortage
		Jan	Feb	Mar				
1	Bolt M5xPO SWRCH	224	320	288	1880	832	1828	97%
2	Nabe B6x25S	143	156	126	1769	425	1663	94%
3	Ball Bearing	576	504	600	2010	1680	1940	96%
4	Washer 10 chrome3	145	120	215	1684	480	1564	93%
Total		1088	1100	174	7343	3417	6995	

Based on Table 1 in the last 3 months, accounting for 34 items of material that make up the bedside table product, 4 items of material are unavailable from January to March 2022 there is still unavailability of Bolt M5xPO SWRCH, Nabe B6x25S, Ball Bearing, and Washer 10 chrome3 during the production process. So the target of production output cannot be completed 100% on time, in this company, the production process is carried out only according to the number of orders from customers (No stock of finished goods). The unavailability of this material has an impact on the productivity of employee performance which cannot meet customer needs and delays in product delivery to customers. Therefore, it is necessary to identify in more detail the material inventory process, so that improvement proposals are made that can reduce the problem of unavailability and differences in material stock. With a decrease in material unavailability, it can increase performance productivity in the production process.

Based on these problems, this study will look for the causes of the occurrence of cases of material unavailability when the production process is in progress and the discrepancy between the data report and the actual amount of material in the warehouse using the Root Causes Analysis (RCA) method. Root cause analysis, often known as RCA, can be used to conduct a detailed analysis of the identification of non-value-added activities (Jucan, 2005).

Furthermore, it suggests ways that kaizen, or continuous improvement can be implemented using the 5S technique. It is hoped that this research can help furniture manufacturing companies strengthen the material inventory management system and improve performance productivity.

2. LITERATURE REVIEW

2.1 Lean Manufacturing Concept

Lean is a continuous effort to eliminate waste and increase the value added to products (materials or services) to provide customer value. The goal of lean is to continuously improve the value-to-waste ratio (Gasperz, 2007). Lean explains that reducing waste can use Value Stream Mapping (VSM), 5S, Kanban, Poka-yoke, and Root cause analysis methods.

The implementation of lean manufacturing is carried out continuously to create improvements in processes and innovations in the company so that the company makes continuous improvements to achieve operational excellence and customer intimacy.

2.2 Just In Time Concept

Work Just In Time is a philosophy of continuous problem-solving and supports lean production. The main goal of just-in-time is to increase the productivity of a production system or operation by eliminating all kinds of activities that do not add value (waste) to a product.

To produce the Just In Time (JIT) method, eight principles must be taken into consideration in determining the production strategy system, namely (Jaelani, 2009):

- a) Produce according to master production schedule orders
- b) Small quantity production
- c) Reduce wastage (eliminate wastage)
- d) Continuous product flow improvement
- e) Product quality perfection
- f) Respect for people (respect to people)
- g) Reduce all forms of uncertainty
- h) Long-term attention

2.3 Supplies

In the opinion of Kieso (2001), inventory is an asset item that is held for sale in normal business operations or materials that will be used or consumed in producing materials to be sold. According to Carter (2006), the types of inventory in manufacturing companies are raw materials, materials in process, and finished materials.

2.4 Root Cause Analysis

This Root Cause Analysis is an effective tool for solving problems up to their roots. According to Jucan (2005), Root Cause Analysis is a methodology for identifying and correcting functional causes. Root Cause Analysis (RCA) can be done using various tools, such as the 5 Whys analysis, Fishbone (Ishikawa) diagram, cause-effect diagram, Pareto chart, and so on. Root Cause Analysis (RCA) is a structured approach to identifying influential factors in one or more past events so that they can be used to improve performance (Corcoran, 2004).

The steps in Root Cause Analysis (RCA) are as follows:

- a. Define the non-conformity.
- b. Investigate the root cause of the problem.
- c. Create a proposed action plan.

- d. Implement the action plan (implement proposed action).
- e. Conduct monitoring (verification & monitoring of effectiveness).

3. METHOD

3.1 Type of Research

This research is a type of descriptive research, which is carried out to identify a problem from the company, evaluate the problem, and suggest appropriate solutions or proposals for the company.

3.2 Data Collection Methods

The data collection required in the study is the stock data of material inventory of bedside table assembly products of furniture manufacturing companies, which is done in the following way:

1. Literature Study Library research leads to data collection obtained from research journals that have similarities to the current research and actual data within the scope of furniture manufacturing companies.
2. Field research
 - a. Interview, Conduct interviews by asking questions directly with related parties, to obtain data related to problems and improvements needed to reduce or prevent inefficient material availability.
 - b. Observation, Observations are made by directly observing the location in the work group working on bedside table assembly products to obtain the necessary data and information.

3.3 Data Processing and Analysis Methods

At the data processing stage, to determine data processing is carried out using the Root cause analysis (RCA) method, as well as by applying the 5S tool to furniture manufacturing companies. At this stage, the researcher identifies the factors that cause material unavailability during the beside table production process, which with this research is expected to eliminate unavailability, delays, waste, and differences in stock numbers, the material storage system in the warehouse is more structured and well organized.

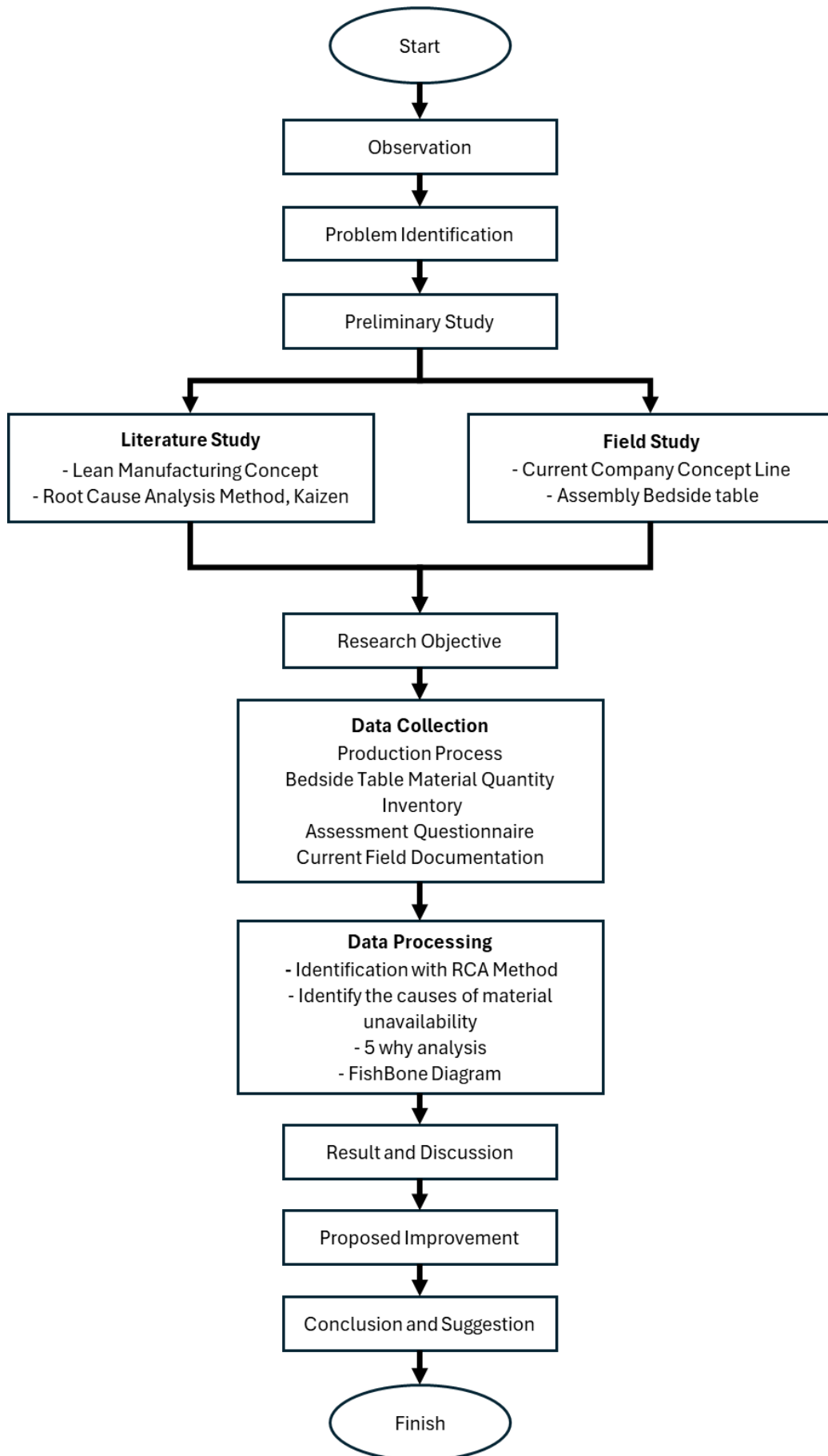


Figure 2. Research steps

4. RESULT AND DISCUSSION

This result and discussion will explain the problems from the results of field observations about the factors that cause material unavailability besides table production. The improvement plan is made using Root cause analysis of the factors that cause material unavailability.

4.1 Identification Stages

Table 2. 5-Why Analysis Identification

The 5-Why Problem	Because
	Material clutter
	Defective and OK materials mixed
	Sloppy material placement
	The layout of the material rack is messy
	Insufficient shelves in the warehouse, narrow
	The difference between the amount of material data (computer) and the actual amount
	No Checking, or actual calculation of physical materials
	Lack of sense of responsibility towards work
	Operators are negligent and undisciplined
	No reprimands and sanctions from superiors
	Material miscalculation
	Defective and OK materials are mixed on one shelf
	Operators do not know material names by heart
	No naming label or material identity
	Employees do not apply the concept of 5S

Based on the 5 why analysis, it can be seen that the factor causing the unavailability of materials during the production process and the difference between the stock of materials in the information system (computer) and the actual stock in the warehouse is the lack of regular physical checking of materials or stock-taking.

4.2 Proposed Improvement and Implementation

Based on the factors identifying the causes of the problem of material unavailability during the production process in this study, to reduce this, the researcher provides a proposal for improvement using the Root cause analysis (RCA) method, namely using the 5S principle at work.

- a. Proposed Improvements Based on Needs

The design of improvements is based on the demands of the needs that have been identified. The following are proposed improvements that can be presented in the table below.



Table 3. Proposed Improvements



No.	Requirements List	Proposal	Object
1	Shelf Addition (Seiri, Concise)	Increase the number of shelf levels in the warehouse, for materials that are rarely used are placed on the top shelf, and vice versa.	Warehouse
2	Identity Labels (Seiton, Neat)	Label identity will be very helpful in picking up materials, which previously only had Japanese writing (factory default) on the material carton.	Shelf Material
3	Stock Card Inventory (Seiketsu, Rawat)	Stock cards function during inventory so that periodic checks are carried out actually with the actual	Each Box Material
4	Create SOP and Manual Log Book (Seiketsu, Rawat)	The existence of SOPs in (In, Out) Material and log books in the warehouse area, to record the entry and exit of materials.	Warehouse
5	Making Warehouse Picket List (Seiso, Resik)	With a regular picket list in the warehouse, the warehouse area will be maintained and clean and well maintained.	Employees
6	Training or socialization (Shitsuke, Diligence)	For operators to know that implementing 5S is very important for the company.	Employees

b. Comparison of Warehouse Condition with 5S Tools

Improvement of warehouse conditions is proposed using the 5S Tools, namely Sort, Store, Shine, Standardise, and Sustain.

Table 4. Comparison of Warehouse Conditions with 5S Tools

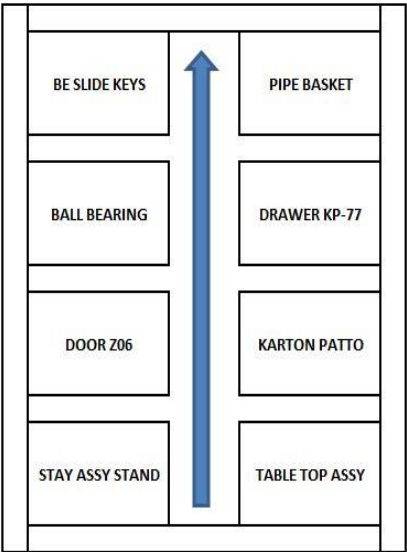
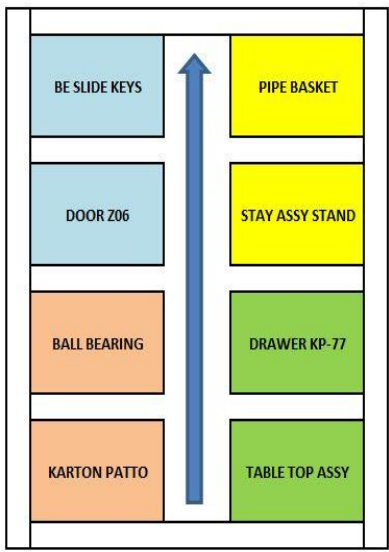
Existing	Proposed Improvements
<p>Materials are placed on the floor</p> 	<p>Materials are tidied up and named.</p> 
<p>Materials are not organized</p>	<p>Stacked on shelves (according to material type)</p>

																																			
<p>No stock card during inventory</p>  <table border="1" data-bbox="453 685 616 824"> <tr><td>注文番号</td><td>168265-10</td></tr> <tr><td>品目番号</td><td>PT02340</td></tr> <tr><td>名称</td><td>プレート</td></tr> <tr><td>輸出先</td><td>インドネシア</td></tr> <tr><td>梱包数量</td><td>100</td></tr> <tr><td>箱数</td><td>8</td></tr> </table>	注文番号	168265-10	品目番号	PT02340	名称	プレート	輸出先	インドネシア	梱包数量	100	箱数	8	<p>Existence of stock cards during inventory</p>  <table border="1" data-bbox="1091 607 1283 745"> <tr><td colspan="2">INVENTORY</td></tr> <tr><td colspan="2">PT. ABC INDONESIA</td></tr> <tr><td>NAMA PART</td><td>Sepiter Iner</td></tr> <tr><td>JMLAH</td><td>100 Pcs</td></tr> <tr><td>STATUS</td><td>OK</td></tr> <tr><td>PANGGIL CEX</td><td>28-06-2022</td></tr> <tr><td>OPERATOR</td><td>Tri Wahyu</td></tr> </table> <table border="1" data-bbox="1126 752 1283 837"> <tr><td>名称</td><td>プレート</td></tr> <tr><td>輸出先</td><td>インドネシア</td></tr> <tr><td>梱包数量</td><td>100</td></tr> <tr><td>箱数</td><td>8</td></tr> </table>	INVENTORY		PT. ABC INDONESIA		NAMA PART	Sepiter Iner	JMLAH	100 Pcs	STATUS	OK	PANGGIL CEX	28-06-2022	OPERATOR	Tri Wahyu	名称	プレート	輸出先	インドネシア	梱包数量	100	箱数	8
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c. Shelf Layout Redesign

This layout redesign is carried out to facilitate the flow of material movement to be optimal, and precise and the process of preparing production needs to be faster. The results of the layout design can be seen in the table below.

Table 5. Comparison of Shelf Layout

Existing	Proposed Improvements
<p>Current shelf layout condition, the placement of materials is not done with one type of material, but this is mixed with other product materials.</p> 	<p>The proposed layout improvements made are by rearranging the placement of one type of product material and naming the material (label identity).</p> 

The results of the proposed improvements seen from the needs in the field can be seen what is the list of needs and proposals made regarding solving the problem of material unavailability, which proposals are carried out with different objects, namely proposals for HR improvements, on the employees themselves and in the warehouse area.

5. CONCLUSION

After conducting research and discussing the results of research on improving the quality of dry syrup products in the filling and cramping process, the researcher concludes, including (1) several factors cause material unavailability, namely no SOP in material retrieval, errors in inputting material stock data, not conducting periodic physical stock-taking, material moving to other parts of the shelf, material storage is not neat because there are few storage shelves, material identity labels are not yet valid, stock-taking records are still manual, material or spare parts are lost due to moving to other places, and return material (defects) from users is placed on the same shelf as OK material. (2) Implementation of the proposed improvement design related to material unavailability, namely making SOPs regarding material inventory (IN, OUT) materials, providing identity labels/codes for each material, materials placed on shelves and according to the name of the material, tidying up the warehouse area and cleaning the warehouse area (according to picket), the existence of a log book in the warehouse, so that it can be filled in when retrieving materials, improvement of the layout in the shelf area and the addition of shelves, making inventory stock cards, to check and calculate the material at the time of inventory is done with the actual, provide training or socialization activities regarding the 5S concept to employees, so that it can be applied when working and employees can know that the importance of the 5S concept for the company and superiors provide supervision of employees.

Some suggestions that researchers can give from the research results are (1) It is necessary to implement one concept of lean thinking, namely by applying the 5S concept to increase employee performance productivity; (2) Review or review of the 5S method needs to be done regularly, at least once every 6 months to maintain consistency of implementation so that the culture can be sustainable and the desired results will be achieved. (3) This study only identifies the factors that cause material unavailability during the production process and the difference in material

stock data in the information system with warehouse stock using only the Root cause analysis (RCA) method 5 Why's Analysis, so that in future studies it is hoped that researchers can expand the scope of research.

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