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Reducing Waste by Implementing Just in Time Method at PT. Uwe Molino Luwuk

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ABSTRACT

The manufacturing industry is one of the important sectors in the Indonesian economy. PT. Uwe Molino Luwuk is one of the manufacturing companies that offers bottled drinking water (AMDK) products. This company still has several problems related to waste in its production process. This situation is also reflected in the loss of time during the production process. This waste can cause great losses for the company. This study aims to optimize production to reduce waste can be done by applying the Just In Time (JIT) method through the Value Stream Mapping (VSM) data analysis technique. The results of the study showed that the dominant waste in the top order was waiting. Developing improvements from the current to the future state, the lead time value of the material on the production floor was faster, in the VSM before 510 minutes while the lead time of the VSM after was 310 minutes. So there is a reduction in time of around 60.7%.

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INTRODUCTION

The manufacturing industry is one of the important sectors in the Indonesian economy. This sector produces various products needed by the community, such as food, beverages, textiles, electronics, and automotive. The manufacturing industry in Indonesia has bright prospects in the future. Stable economic growth, a large population and government policies that support the manufacturing sector are important factors in creating opportunities for this industry. In the future, the manufacturing industry in Indonesia is expected to continue to grow and increase its contribution to the country's economy. Manufacturing companies in Indonesia have the opportunity to utilize abundant human resources and improve the quality of the workforce through training and development programs[1].

The manufacturing industry is also often faced with the problem of waste, namely resources that are wasted and do not provide added value to the production process[2]. Waste can be in the form of raw materials, time, labor, and space[3]. Waste can cause companies to experience financial losses and reduce efficiency and have a negative impact on the environment[4]. Thus, addressing the many challenges that arise in a manufacturing industry into operational decisions has shifted the focus of academic research from efficiency to a more holistic view of manufacturing including sustainable production systems[5].

PT.Uwe Molino Luwuk is a manufacturing company that offers bottled drinking water (AMDK) products. This company is located in Koyoan Village, Nambo District, Banggai Regency, Central Sulawesi. This company still has several problems related to waste in its production process. This situation is also reflected in the loss of time during the production process. This waste can cause major losses for the company. Optimizing production to reduce waste can be done by implementing the Just In Time (JIT)[6]. Method The Just In Time implementation has the principle of "only what is needed, when it is needed, and in the amount needed"[7].

JIT is a philosophy that encourages a company to increase the effectiveness of its production process by eliminating waste[8]. The implementation of JIT can be done by summarizing the system using waste elimination, including choosing everything that does not affect the value of the product, eliminating unnecessary things (non-valueadded activities) and things that increase added value (value added activities)[9]. In a JIT production system, each subsequent process pulls the parts it needs from the previous process as needed, and the first process provides the pulled parts to the subsequent process. By implementing JIT, companies can minimize the inventory of raw materials and finished products, thereby reducing waste[10].

Based on the problems above, the just in time method can overcome and be a way out of the problems of PT. UWE MOLINO LUWUK. After conducting observations and making careful considerations, the researcher is interested in conducting research for the final assignment entitled "Reducing waste by implementing the just in time method at PT. UWE MOLINO LUWUK"

RESEARCH METHODS

Value Stream Mapping (VSM) is a method used for the method used to visualize the flow of materials and information in a production process. The main purpose of VSM is to identify and reduce waste in the process, so as to increase efficiency and productivity. Value Stream Mapping (VSM) is a method used to visualize the flow of materials and information in a production process. The main purpose of VSM is to identify and reduce waste in the process, so as to increase efficiency and productivity.

The benefits of data analysis techniques using VSM are:

1. Improve understanding of the process: VSM helps teams to see the big picture of the process and understand how each step relates to each other.
2. Identifying waste: VSM helps identify non-value-adding activities (waste) in the process, such as waiting time, unnecessary movement, and defective products.
3. Improve communication: VSM can be used to facilitate communication between different teams within an organization

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4. Designing solutions: VSM can be used to design solutions to reduce waste and improve process efficiency.
5. Tracking progress: VSM can be used to track progress in waste reduction and efficiency improvement efforts.

The steps in creating a VSM include:

1. Define the value stream
   Select the product or service to map and define the value stream boundaries
2. Collecting data
   Collect data about processes, such as lead times, cycle times and defect rates
3. Create a VSM diagram
   Create a diagram that shows each step in the process, along with relevant information
4. Analyze the diagram
   Analysis of the diagram to identify waste and improvement opportunities and calculate takt time (calculation of production time available for each component to meet customer demand). The following is the takt time calculation formula
   $$\text{Takt Time} = \frac{available\ production\ time}{Production\ units\ required} \quad \ldots\ldots(1)$$
5. Designing solutions
   Design solutions to reduce waste and increase process efficiency
6. Updating the VSM diagram
   Update the VSM diagram periodically to reflect changes in the process and calculate the overall Lead Time, using the following formula:
   $$\text{Lead Time} = \frac{Lead\ Time\ VSM\ After\ x\ 100\%}{Lead\ Time\ VSM\ before} \quad \ldots\ldots(2)$$
7. Implement the solution
   Implement the designed solution and monitor the results.

RESULTS AND DISCUSSION

Data processing is the next step taken to process research data by implementing Value Stream Mapping at PT. Uwe Molino Luwuk. In the application of the Value Stream Mapping method, several steps are used, including identifying product families, developing VSM for actual conditions, determining the ideal mapping for the future (future state) and determining the ideal mapping for the future (future state). is an in-depth analysis in an effort to improve and eliminate activities that do not have added value along the flow of goods and information flow. The flow configuration in the form of Value Stream Mapping is an ongoing production process that is described in actual terms including the flow of materials and information flow in the company. The Current State Map is used as a reference to identify waste along the value stream and grouping activities that include Value Added (VA), Non Value Added (NVA) and Necessary Non-Value Added (NNVA) [11].

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The following is the AMDK Production Process Flow at PT. Uwe Molino Luwuk, namely:

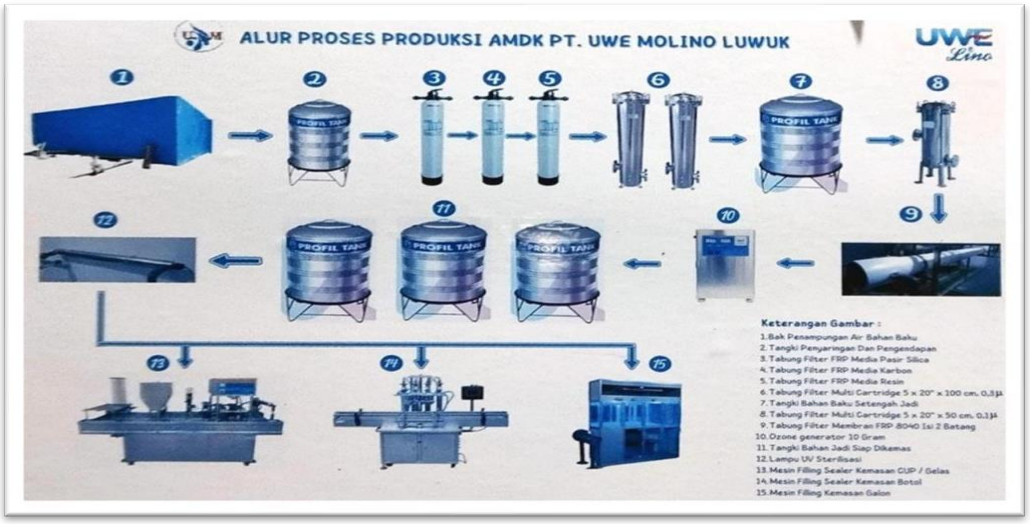

Fig 1. AMDK Process Flow at PT. Uwe Molino Luwuk

The steps for implementing Value Stream Mapping include:

1. Identify Product Family.
   In an interview with the head of production at PT. Uwe Molino Luwuk, Uwe Lino's bottled drinking water is produced as much as 1000 to 1200 cartons per day. The AMDK production activity takes place every Monday to Saturday, with an operational working time of 8 hours per day

Table 1. Product Family Grouping

Product Family	Products produced
Raw material section	Preparing raw materials
Production section	Processing raw materials into AMDK
Packing	Packing products
Finished product section	Store products and ready to distribute

Source: Processed Data, 2024

2. Develop VSM For Actual Conditions
   According to [12] creating current state mapping or mapping of information flow with the current state, which makes it easier to use VSM to understand the initial to final conditions. Current state mapping is used as a reference to identify waste along the value stream and grouping activities that include value added (VA) and non value added (NVA)[13]. Provides convenience to identify and analyze the optimization of the right work process, as well as knowing the location of waste that occurs[14]. The following is the current state mapping that is in accordance with the condition of AMDK at PT. Uwe Molino Luwuk.

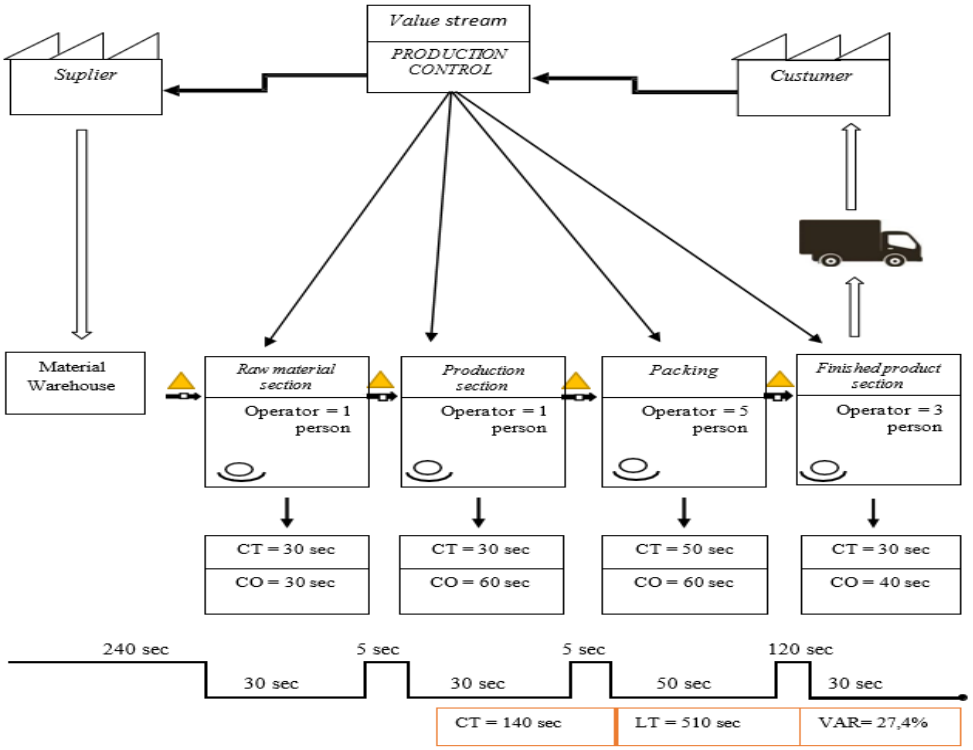

Fig 2. Current State Mapping Uwe Molino Luwuk

Table 2. Grouping of VA and NVA

No	Activity	Time (second)	Category
1	Initial inventory of incoming raw materials and transferred to the material storage area	30	NVA
2	Glass separation to start the packaging process	2,0	VA
3	Filling the volume of water into the glass	8,0	VA
4	Gluing the seal to the glass that has been filled with sterile water	10	VA
5	Cutting the seal according to the shape of the glass	10	VA
6	Packaging that begins with the process of printing the expiration date (coding) by going through a quality control process which is continued with the finished packaging process into cardboard cartons.	50	VA
7	The finished product is transferred to the final product warehouse and is ready for distribution	30	NVA

Source: Processed Data, 2024

Based on Figure 4.3 above, it can be seen that the Value Added Ratio includes the following:

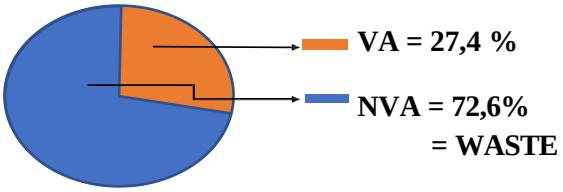

Figure 3. Value Added Ratio

The identification of waste in PT. Uwe Molino Luwuk by conducting interviews with the head of production is as follows**:**

1. Overproduction
   When there is a buildup of products, operational activities will be temporarily stopped while waiting for the storage warehouse to be able to accommodate them again.
2. Defects
   water volume is insufficient and does not meet company standards and Installation of the seal does not adhere perfectly to the glass surface.
3. Inventories
   Requires more storage space.
4. Excess processing
   A failure occurred during the labeling process
5. Transportation
   Manual processes are still carried out when the process of moving goods still involves lifting using human power
6. Waiting
   Sudden power outages cause production activities to stop.
7. Motion
   Re-packaging is good because there was a glass leak in one box

The following is a ranking of types of waste based on direct interviews with the head of production at PT. Uwe Molino Luwuk:

Table 3. Waste Ranking

Type of waste	Rangking
Waiting	1
Defects	2
Excess processing	3
Inventories	4
Overproduction	5
Transportation	6
Motion	7

Source: Processed Data, 2024

Further analysis to identify why events and activities occur that have the risk of causing a bottle neck (work station capacity is smaller than production needs) in the flow of goods and information flow is by describing a configuration in a cause and effect diagram. Fishbone diagram is a detailed description by starting from the question of why processes and activities that do not have added value occur in the process input, namely from labor, raw materials, work methods, environment and work aids[15].

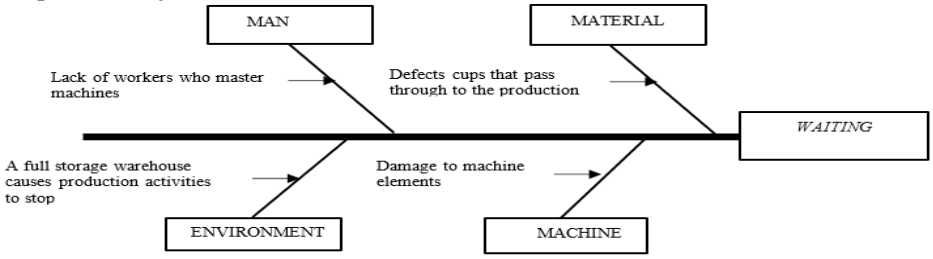

Figure 4. Fishbone Diagram of Dominant Waste Waiting

Takt time calculation is adjusted to the data obtained from PT. Uwe Molino Luwuk, which has an effective production time of 28800 seconds (8 working hours) per day and must produce 1000 boxes of AMDK per day

Takt Time: 28800 /1000 dus = 28,8 detik/dus

From the calculation above, it shows that every 28.8 seconds, 1 box of AMDK must be finished.

3. FMEA

The next stage is to use FMEA (Failure mode & effect analysis). In applying this FMEA method, the RPN (Risk Priority Number) value is obtained which is the result of multiplying severity (S), occurrence (O) and detection (D) which is based on the potential effects of failure and knowing the priority of the causes of defects. Based on the calculation results between the severity of damage, frequency of occurrence, and the possibility of detecting the incident, the highest Risk Potential Number (RPN) calculation value is obtained, which is 168 for environmental influences, RN of 96 occurs due to machines, RN 36 occurs due to materials and RN 16 due to humans. With this RPN value, corrective action needs to be taken to minimize the occurrence of waiting time.

Table 4. Cumulative RPN Percentage

NO	*FAILIRE CAUSE*	RPN	PRESENTASE RPN TOTAL	PRESENTASE RPN KUMULATIF
1	Man	16	5%	5%
2	Material	36	11%	16%
3	Machine	96	30%	47%
4	Environment	168	53%	100%
	Total	316	100%	

Source: Processed Data, 2024

From the results of the analysis above, the improvement plan in creating future state value stream mapping is as follows:

1. Production Capacity: The time to produce AMDK products is in accordance with the standard output capacity based on the machine, so it can be said to be still normal. The anticipation that needs to be done is only improvements to ensure that consumer demand can be met without frequent downtime due to disruptions to the smooth running of production machines that can occur at any time.
2. Time effectiveness: Before the production process begins, machine preparation and material transfer to the AMDK production room are carried out, in this study the previous operator was 1 person. From the results of the author's research, it will take more time, therefore additional operators are needed to make time more efficient and faster. So to reduce the workload, the author proposes to add 2 operators so that the risk of work can be minimized to 180 seconds. After the next preparation, the production process is carried out on the AMDK production line for 30 seconds. After that, the packing section is carried out for 40 seconds. After that, the goods are ready to be placed in the warehouse, which takes 40 seconds. It is necessary to minimize the time for handling packaging by workers, so that it is completed on time in addition to the obstacles that occur in the labor handling process and disruptions to the production machine that cannot be predicted with certainty. The results of the researcher's measurements during the field, the time needed for the packaging process of one box of AMDK products averages around 28.8 seconds.

CONCLUSION

JIT can be an effective solution to overcome the highest waste problem of PT. Uwe Molino Luwuk, namely waiting, where the trigger is a full warehouse and power outages. With careful planning, strict inventory management and increased production efficiency, the company can achieve better customer service levels, reduce production costs and increase competitiveness.

The following are recommendations for improvements to optimize warehouse management:

a. Cooperation with distributors: Establish closer cooperation with distributors to increase delivery frequency and ensure products reach consumers quickly.
b. Capacity evaluation: Conduct an audit of warehouse capacity, identify items that rarely move and consider moving them to another storage warehouse or selling them.
c. FIFO System Implementation: Implement the First In, First Out (FIFO) system to ensure that products that come in first also go out first, thus avoiding expired products.

Here are recommendations for improvements and how to solve problems JIT power outage:

a. Backup generators: Have enough backup generators to run critical production processes during a power outage.
b. Small batch production: With small batch production, the impact of a power outage will be more limited because fewer products will be stopped.
c. Production priorities: Determine high priority products and restart them first after a power outage

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