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Planning Of Production Facilities Layouts In Home Industry With The Systematic Layout Planning Method

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Abstract

UD HS Pabuaran is a Home Industry company engaged in making tofu. One of the problems faced by UD HS Pabuaran is that the layout is not by the criteria, where the laying of work stations has not yet paid attention to the level of interrelationships between work stations. The method used to solve this problem is the Systematic Layout Planning (SLP) method. The analysis is done by comparing the total distance of material transfer between the initial layout with the proposed design, which then impacts changes in material handling costs. The total length of material transfer fell to 9,270 meters from 14,350 meters or 35%. The reduction in the length of material movement causes a decrease of 55% in the cost of handling material, from Rp. 794,75 to Rp. 361.25, -

Keywords: facility layout, SLP, material handling.

1. Introduction

In the industrial, a company must consider things that must be regarded to achieve its goals, namely with a good plan. One of the projects that must be considered by the company is the planning of the layout of factory facilities, where this is one of the factors that play an essential role in increasing the productivity of a company. Design is a significant foundation in the industrial world where the layout can be interpreted as a procedure for setting up factory facilities used in material handling and determining the production process equipment used to support the smooth production process.

In general, a well-planned factory layout will determine efficiency and, in some cases, will also maintain the smooth running of an existing production process. One of the goals of designing the layout of factory facilities is the more effective use of space. The use of space will be effective if the machines of other plant supporting facilities are arranged or arranged in such a way as to take into account the minimum distance between machines or production facilities and the flow of material movement.

A good layout of production facilities plays a significant role in the production process activities, can improve the quality of the products produced, and provide comfort and freedom of movement to working operators. The optimal factory layout arrangement will also provide convenience in supervision and in facing future plant expansion plans. (Wignjosoebroto, 2009). UD HS Pabuaran is a Home Industry engaged in the manufacture of yellow tofu in the Cianjur Regency area, which has been established since 1993. UD HS Pabuaran is required to provide customer satisfaction in the form of providing the highest quality products and in the process of fulfilling demands.

To fulfill this demand, of course, an improvement in the production process is needed. One of the factors that influence the smoothness of the production process is the layout of the facilities. UD HS Pabuaran has obstacles in the production process caused by the design that is not following the good layout criteria, where the placement of work stations has not paid attention to the level of relationship between work stations and the utilization of floor area that has not been maximized. Looks like picture 1 below:

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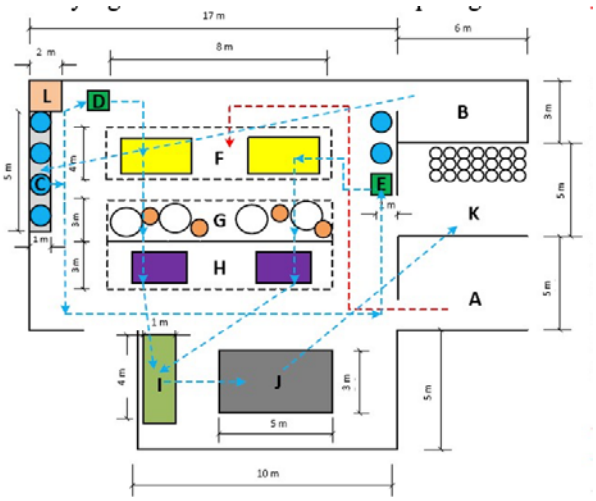


Figure 1 Initial Layout of UD HS Pabuaran

Based on the background description, it is necessary to conduct research to design the layout of the re-facilities in the production line in order to increase work efficiency and effectiveness.

2. Literature Review

The layout is a significant foundation in the industrial world. According to Wignjosoebroto (2009), a plant layout or facility layout can be defined as a procedure for setting up factory facilities to support the smooth production process. This arrangement will be useful for the placement of machines or other production support facilities, the smooth movement of material movement, temporary and permanent material storage, worker personnel, and so on. Two things are arranged in the facility layout, namely machine settings and factory departmental settings. The facility layout is defined as planning the arrangement of production facilities, both existing and new.

In general, a well-planned factory layout will determine efficiency and, in some cases, will also maintain the survival or work success of an industry. The tools and equipment of a good facility will be meaningless as a result of careless layout planning. An enterprise's production activity is demanded to last a long time with a layout that does not always change, so any mistakes made in this layout plan will cause significant losses.

3. OBJECTIVE OF THE RESEARCH

Referring to the background that has been described, the objectives of this research are:
1. To produce minimum mileage and fare on the production line.
2. To design the proposed layout in the production line.

4. RESEARCH METHODOLOGY

The approach uses a Systematic Layout Planning (SLP), a systematic and organized factory layout plan by Richard Muther (1973). SLP consists of step by step procedures for planning the layout of facilities suitable for analyzing and designing work or information flows on industrial facilities and others. SLP is widely applied to various problems, including production, transportation, warehousing, supporting services, and activities found in offices (office layout).

1. Flow of material analysis

Material flow analysis deals with quantitative measurements for each material transfer from one unit to another.

2. Activity relationship

Perform material flow analysis in the form of a process map called an Activity Relation Chart (ARC) to find activity relationships between work units. The benchmark here is minimal total material handling.

3. From-to Chart analysis

Quantitative analysis of material flow will be measured based on the quantity of material moved, such as weight, volume, number of units, and other quantitative companies. The map that is commonly used to perform the quantitative analysis is from the chart. This technique is advantageous for conditions where many items flow through an area. The numbers on a

from to chart will show the load's total weight to be moved, the distance to move materials, the volume, or any combination of these factors.

4. The need for an area

Done by analyzing and calculating the area requirement for the placement of production facilities.

5. Extensive area available

Adjustments were made to the Company's condition, from the size of the production area currently owned.

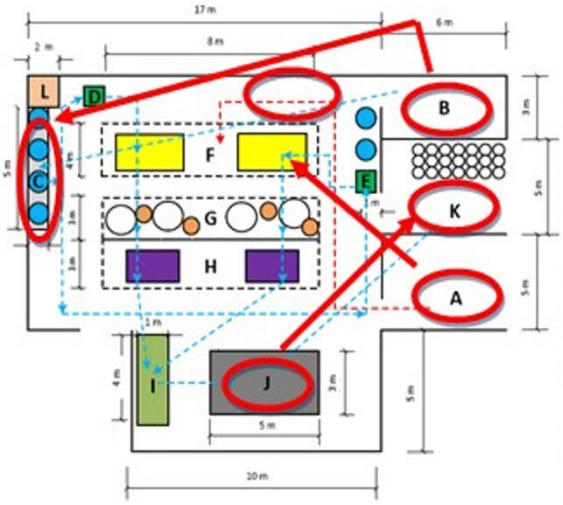
6. Planning for alternative layout & evaluation

Making decisions on the proposed layout design that should be selected or applied. Evaluating the layout chosen alternatives to provide confidence that the decisions taken have provided an optimal alternative layout.

5. RESULT AND DISCUSSION

Analysis of Initial Facility Layout

In the conditions of the initial facility layout, UD HS Pabuaran had not paid attention to the degree of proximity between work stati ger.



Information:
- A. Fuel Warehouse
- B. Raw Material Warehouse
- C. Washing Place
- D. Mill 1
- E. Mill 2
- F. Boiling place
- G. Screening and Nurseries
- H. Printing Place
- I. Tofu Place That Has Been Printed
- J. Cutting and Coloring
- K. Finished Product Warehouse
- L. Water Resources

Symbol Description:

Flow of Firewood
Production Flow

Figure 2 Initial Facility Layout

We can see in Figure 2 that the level of the relationship between stations is of little concern, for example, a fuel warehouse with a boiling place, a cutting & coloring place with a finished product warehouse, or a raw material warehouse with a washing place, even though the degree of proximity between these stations is important and must be close due to flow their sequential processes.

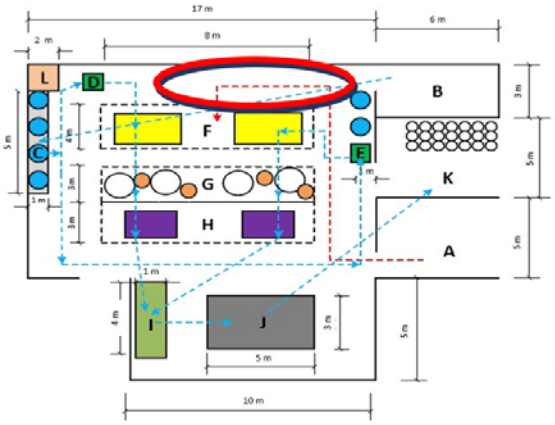


Figure 3 The utilization of floors is not optimal

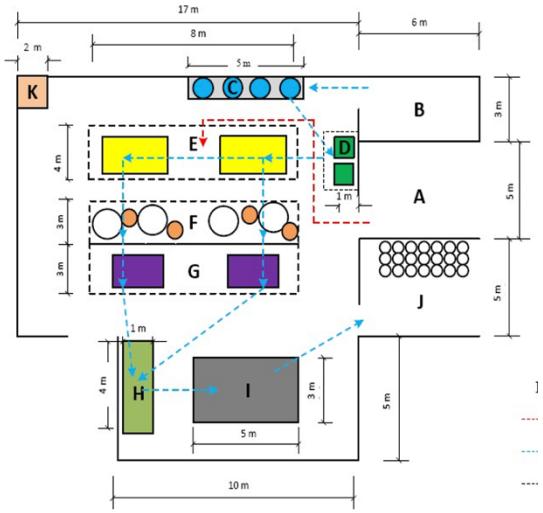
Information:
- A. Fuel Warehouse
- B. Raw Material Warehouse
- C. Washing Place
- D. Mill 1
- E. Mill 2
- F. Boiling place
- G. Screening and Nurseries
- H. Printing Place
- I. Tofu Place That Has Been Printed
- J. Cutting and Coloring
- K. Finished Product Warehouse
- L. Water Resources

Symbol Description:

Flow of Firewood
Production Flow
StationAreaBoundary

The production floor at UD HS Pabuaran has not been fully utilized; it can be seen in Figure 3 that there are still areas that have not been used. This area can be used as a washing work station so that the production process of making yellow tofu at UD HS Pabuaran can run effectively and efficiently.

Analysis of Proposed Facility Layout



Information:
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K. Finished Product Warehouse
L. Water Resources

Symbol Description:
Flow of Firewood
Production Flow
StationAreaBoundary

Figure 4 Proposed Facility Layout

The proposed facility layout shows changes in material flow that are more regular and close together. These changes will affect the distance of material transfer and the cost of material handling, which is less so that the optimal production process will be obtained.

Comparison between Initial and Proposed Facility Layouts

Analysis Based on Material Mileage

Table 1 compares the material flow mileage between the initial facility layout and the proposed facility layout.

Table 1 Comparison of Material Mileage

Mileage (m)		Difference (m)	Percentage of Decrease
Before	After		
14,350	9,270	5,080	35%

Based on the table above, it can be explained that the mileage on the proposed facility layout is smaller than the initial facility layout, with a decreasing percentage of 35%.

Analysis Based on Material Handling Costs

After comparing the material mileage, then the next step is to compare the total material handling costs between the initial facility layout and the proposed facility layout, which can be seen in table 2

Table 2 Comparison of Material Handling Costs

OMH		Savings
Before	After	
Rp 794.75	Rp 361.25	Rp 433.50

We can see in Table 2 that the cost of material handling is reduced due to the reduced material transfer distance. Within 1 cycle of making yellow tofu can be reduced by Rp. 433.50, -

We can calculate the savings made by UD HS Pabuaran for 1 year are as follows:

Table 3 Total Savings per Year

Production/Day (kg)	Production / Month (kg)	Savings / Cycles	Total Savings / Yr
1,000	30,000	Rp 433.50	Rp 7,803,000

From table 3, it can be seen that the total savings/year of Rp. 7,803,000 - Wherein one cycle of making tofu, it is as much as 20 kg; in other words, there are 18,000 cycles/year

6. CONCLUSION

Conclusion

Based on the discussion conducted, there are several conclusions obtained, namely:

1. Based on the results of the analysis, the proposed facility layout resulted in a decrease in material mileage from 14,350 meters to 9,270 meters or a decrease of 35%. The Material Handling fee for the initial facility layout is Rp. 794.75, - and the proposed facility layout of Rp. 361.25 - or a decrease of 55%.
2. Based on the analysis of the proposed layout determination, it was found that there were several changes between the initial layout and the proposed layout. These changes include moving the fuel warehouse to the finished product warehouse, which results in a decrease in the mileage between the fuel warehouse and the boiling place, which previously had a distance of 15 meters to now 8 meters, and a reduction in the distance between the cutting & dyeing location and the finished product warehouse initially. 10 meters is now 4 meters. Then there was the boiling place transfer so that it was close to the raw material warehouse, which was initially 18 meters away now to 3 meters, and changes to the mills that were initially separate are now combined in one place.

Suggestion

The following are suggestions that the author would like to convey regarding the research conducted at the UD HS Pabuaran Production Line:

Moving material will be more efficient if it is necessary to replace material handling tools with a larger capacity and use tools such as a true to make the material moving process more effective.

7. ACKNOWLEDGMENT

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