

Warehouse Relayout Analysis Using Flow Process Chart and Dedicated Storage in CV Master Multi Jaya

Valentino Ibanez* , Agus Hindarto Wibowo

Department of Industrial Engineering, Faculty of science and technology AKPRIND Yogyakarta

**Corresponding author: valentinoibanez16@gmail.com*

ABSTRACT

Based on the observations in CV. Master Multi Jaya, the placement of materials is still not organized or still not neat, so that cause an ineffectiveness of work in the process of materials handling. The problems that exist in CV. Master Multi Jaya is currently an irregular arrangement of materials. This is an obstacle to placing and sending materials. This research aims to gather information of the warehouse activity to be a flow process chart. That is become basic theory of creating re-layout the effective arrangement of materials. Dedicated storage is one of methods can be formulated to re-layout their warehouse to be better layout than before. Data retrieval is carried out using a chart called operation process chart, its function is to submit the time record of the operation. Then it convert to be a flow process chart which is use as consideration of dedicated stoage. The dedicated storage calculate the throughput warehouse capacity with the quantity of material storage tools based on each products. Then, author must be record the time of material handling and sum it up on the excel as the table of input materials time. But this object research just focus on warehouse arrangement which is through by the material handling. Then, the transportation tool is just wear two trolleys. The result of this research is new layout of warehouse or a good workstation of CV. Master Multi Jaya.

Keywords: *Layout, Material handling, Process, Flow Process Chart, Dedicated Storage*

1. INTRODUCTION

One of the important things affected the productivity in all of industry is layout. Layout determines the competitiveness of each enterprise in smoothness of the production process, flexibility of operation, adequacy of production capacity and material handling costs term, as well as for comfort in the process production. The companies those ignored a good layout will certainly get many problems such as production output does not reached.[1]

Those points are found in CV Master Multi Jaya. This research could present the problem solving for their layout. The warehouse of the author's object in company is all of manufacturing summary activity, it consists of production area, finished-goods storage area, raw materials storage area, and package's area. There are many goods has been queued in the line storage. This research aim for one type of product, it is platesoap. It begins from operation process chart which is convert to flow process chart. Flow process chart contains all of activity symbol in one frame. After designing the flow process chart, relayout should be drawn by dedicated storage method. These dedicated storage in this research learn about the qualitative dedicated storage. The material handling of the layout is focused to be an object of observation and it should be consideration of comparatives between before and after warehouse relayout. The layout of the company is messed up such as the picture below

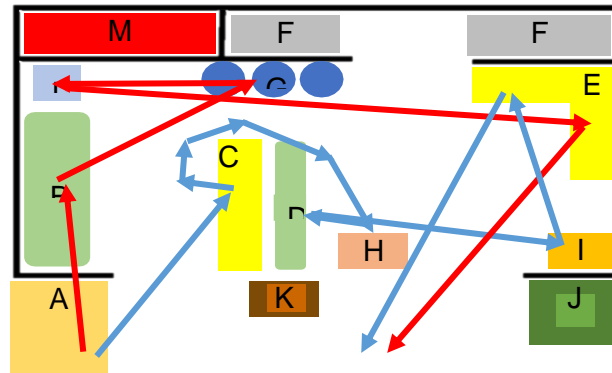


Figure 1. Disordered Material Handling

2. METHODS

1. Layout

Layout is defined as an activity of planning or composing facilities of an industry optimally which includes labor, conveyances, production departments, raw material storage warehouse, finished-goods storage and all supporting facilities which corresponds to the best design of the structure consisting of this facility. Facility design is an activity of evaluating, analyzing, forming concepts and realizing systems for the manufacture of goods and services. In other words, it is the arrangement of the place of resources physical used to make the product. [2]

2. Flow Process Chart

Flow Process Chart is a diagram that show the sequences of operations, inspections, transportations, delay, and storage which is occurred during a process or procedure. It is contained information necessary for analysis such as the time required and the distance of the displacement that occurs. Time is usually expressed in hours or minutes while the displacement distance is usually expressed in meters [3]

3. Dedicated Storage

One of relayout method is dedicated storage. In this research, author used this method just for submit the total area space of warehouse of the company. The methods can be used as the benchmark to redesign the layout. This method just explain about the space area requirement of all storages in a table.

4. Weighted Distance

The second method of warehouse relayout is weighted distance. Total length of material handling is needed based on FPC data. Then, the length of material handling which before relayout was measured from start to finish. Weighted distance should be analyzed from center of the objects

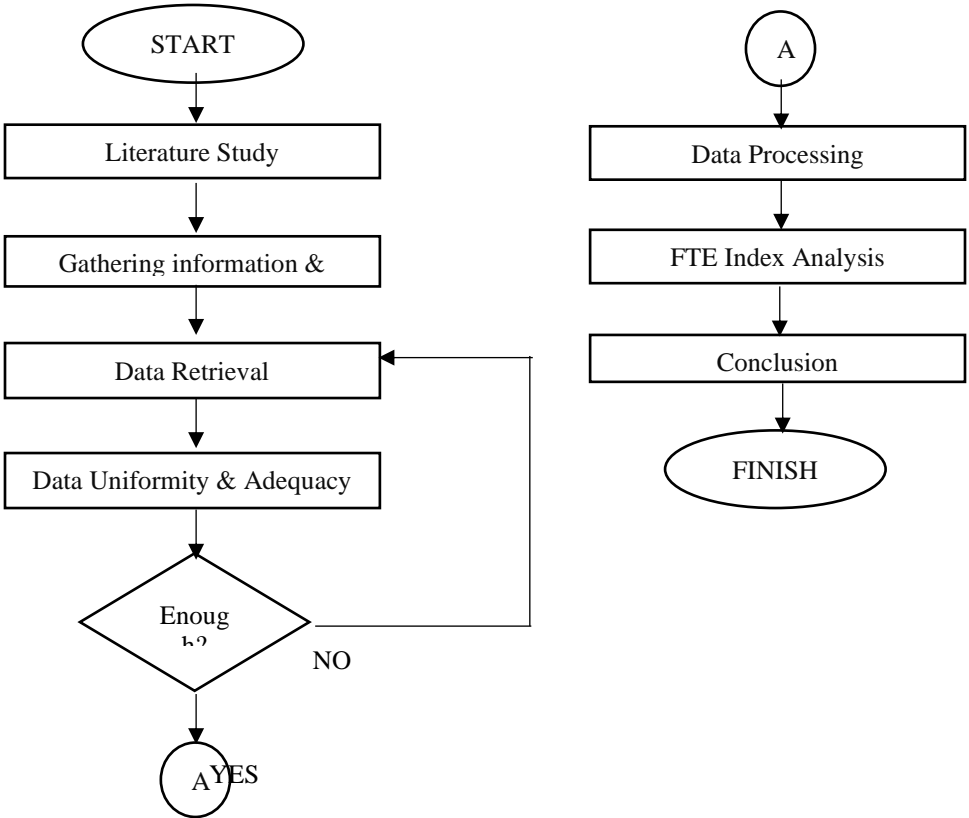


Figure 2. Research of Flow Chart

3. RESULTS AND DISCUSSIONS

1. Data Retrieval

The authors has observed the activity of the production. It begins from draw the operation process chart which include; operations, inspections, and storages. The object of the research is taken from one of product, that is handsoap product.

a. Flow Process Chart (FPC) Analysis

The Flow Process Chart is the next step from operation process chart to submit the production process. It contains five symbol based on American Symbol Mechanical Engineering (ASME). It can be present as showed on the table 1 below:

Table 1. Flow Process Chart of Platesoap

FLOW PROCESS CHART							
NOTES				PRODUCE : <i>PLATESOAP</i>			
ACTIVITY	NOW		EVALUATIO N		DIFFERENT		No. Map
	SUM	TIME	SUM	TIME	SUM	TIME	
○ : OPERATION	26	283,5					: 01
: INSPECTION	4	11					Author : Now : √
⇒ : TRANSPORTATION	10	11					Materials : √
D : DELAY	11	532,5					Evaluation :
: STORAGE	1						Mapped by : V. Ibanez
TOTAL SUMMARY	52						Mapped Date : June,14th 2022
TOTAL TIME		838					

Name of Activity	Symbols	Distance (m)	Time (minute)
Raw Material Storage	■ — ■ — ■	5	5
Water Filling	■ — ■	0	15
Stirring	■ — ■	0	10
A-type Sulfate Weighing	■ — ■	1	1
B-type Sulfate Weighing	■ — ■	0	1
Mixing I (Sulfate A + Sulfate B)	■ — ■ — ■	0	1
Mixing II	■ — ■	1	15
Amphytol Measurement	■ — ■	3	1
Mixing III	■ — ■	3	3
Active ingredients Measurement	■ — ■	3	1
Mixing IV	■ — ■	3	2,5
Preservative Measurement	■ — ■	3	1
Mixing V	■ — ■	3	80
Sodium Sulfate Weighing	■ — ■	1	2
Mixing VI	■ — ■	1	35
Dye Measurement	■ — ■	3	1
Mixing VII	■ — ■	3	5
Parfume Measurement	■ — ■	3	1
Mixing VIII	■ — ■	3	3
Delaying (WIP)	■ — ■ — ■	0	360
Packages Inspection	■ — ■ — ■	8	5
Product Filling	■ — ■	0	50
Cap washing	■ — ■	2,5	5
Capping	■ — ■	2,5	15
Labelling	■ — ■	0,6	10
Product Wrapping	■ — ■	10	15
Product Boxing	■ — ■	1	15
Product Storage	■ — ■ — ■	8	-

b. Dedicated Storage (Space Requirements)

After creating the FPC table, the authors can define the data requirements of space area needed for every warehouse tools. Before showing the space requirements table, the author should present the list of warehouse tools. Those tables showed as following:

Table 2. List of storage tools

Tools	Quantity	Code	Contains
Raw material 1	1	RM1	Parfume, dye, amphytol, active ingredients, preservatives
Raw material 2	1	RM2	Sodium Sulfate, Sulfate A, Sulfate B
Drums (assembled with stirring machine)	3	D	Production tool (WS1)
Tables	2	T	Production tool (WS2)
Washing area	1	W	Buckets
Storage area 1	1	S1	Raw material of WS2
Storage area 2	1	S2	Finished-goods
Storage area 3	1	S3	Jerry cans & bottles packages
Handsanitizer area	1	H	Production area for handsanitizer
Admin	1	A	Whiteboard & books

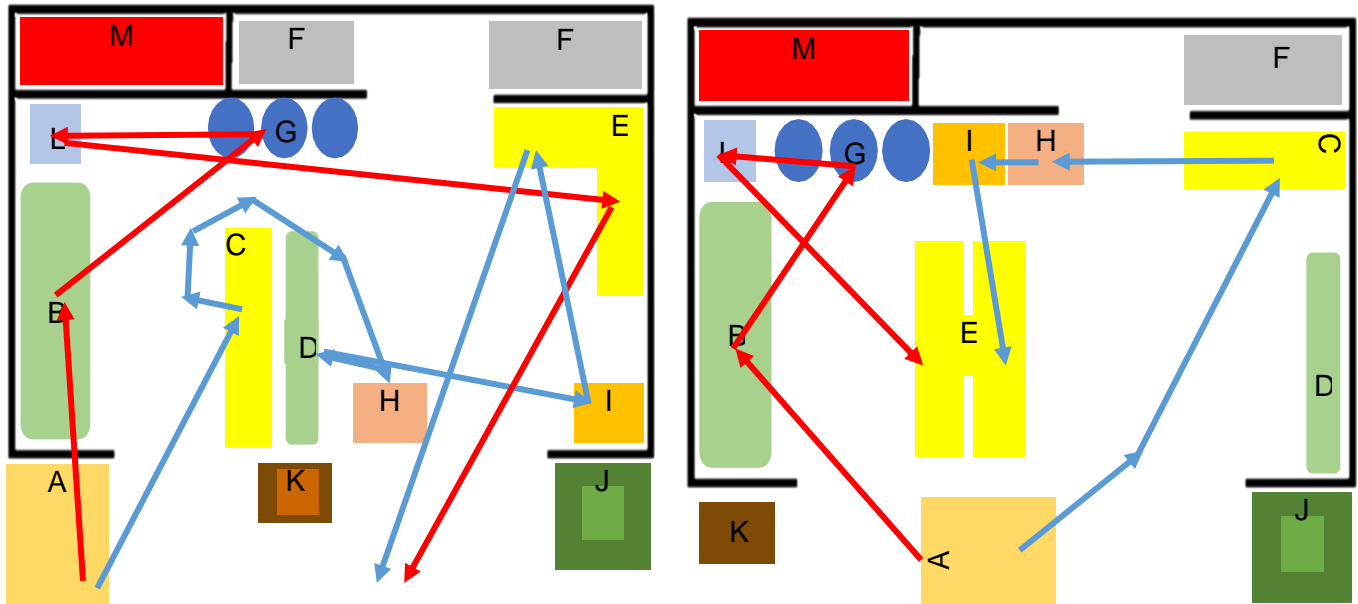
Table 3. Space Requirement

Code	Length (cm)	Width (cm)	Space Req (cm2)
RM1	500	50	25.000
RM2	500	50	25.000
D	250	40	10.000
T	160	50	8.000
W	200	150	30.000
S1	600	50	30.000
S2	700	40	28.000
S3	400	200	80.000
H	400	200	80.000
A	300	150	45.000
Total Space Req			361.000

c. **Weighted Distance**

This method obtain a comparative between before relayout and after relayout. It drawn at the center point of the warehouse tools. Each of them has a center area as a weighted point, then it connected by the line named material handling. For the concern of our research is about the material handling of workstation 1 which one of the product is platesoap. It can be showed as figure 1 below:

Figure 2. Differences Layout of Material handling



The picture above is delivered many differences before rerelayout (left side) and after rerelayout (right side). There are many codes used a capitalized letter. It can be explain the meaning of them on this following:

Table 4. Codes of Warehouse Tools

Tools	Code	Letter Code	Contains
Raw material 1	RM1	B	Parfume, dye, amphytol, active ingredients, preservatives
Raw material 2	RM2	I	Sodium Sulfate, Sulfate A, Sulfate B
Drums (assembled with stirring machine)	D	G	Production tool (WS1)
Tables	T	H	Production tool (WS2)
Washing area	W	L	Buckets
Storage area 1	S1	D	Raw material of WS2
Storage area 2	S2	C	Finished-goods
Storage area 3	S3	A&F	Jerry cans & bottles packages
Handsanitizer area	H	J	Production area for handsanitizer
Admin	A	K	Whiteboard & books

After show the information of the tool's codes, then it can be delivered by an evaluated flow process chart as comparison before relayout and after relayout. The comparison things are looking for the production time and the distance of material handling.

Table 5. Evaluation of Flow Process Chart

FLOW PROCESS CHART									
NOTES							PRODUCE : <i>PLATESOA</i> <i>P</i>		
ACTIVITY	NOW		EVALUATIO		DIFFERENT		No. Map		
	SUM	TIME	SUM	TIME	SUM	TIME			
○ : OPERATION	26	283,5	26	112	0	171,15	Author	:	
: INSPECTION	4	11	4	8	0	3	Now	:	√
⇒ : TRANSPORTATION	10	11	10	6	0	5	Materials	:	√
D : DELAY	11	532,5	11	532,5	0	0	Evaluation	:	
: STORAGE	1		1		0		Mapped by	:	V. Ibanez
TOTAL SUMMARY	52		52			179,15	Mapped Date	:	June,14th 2022
TOTAL TIME		838		658,5					

Name of Activity	Symbols	Distance (m)	Time (minute)
Raw Material Storage	■ — ■ — ■	4	3
Water Filling	■ — ■	0	15
Stirring	■ — ■	0	10
A-type Sulfate Weighing	■ — ■	1	1
B-type Sulfate Weighing	■ — ■	0	1
Mixing I (Sulfate A + Sulfate B)	■ — ■ — ■	0	1
Mixing II	■ — ■	1	15
Amphytol Measurement	■ — ■	2	0,5
Mixing III	■ — ■	2	3
Active ingredients Measurement	■ — ■	2	0,5
Mixing IV	■ — ■	2	2,5
Preservative Measurement	■ — ■	2	0,5
Mixing V	■ — ■	2	80
Sodium Sulfate Weighing	■ — ■	1	0,5
Mixing VI	■ — ■	1	35
Dye Measurement	■ — ■	2	0,5
Mixing VII	■ — ■	2	5
Parfume Measurement	■ — ■	2	0,5
Mixing VIII	■ — ■	2	3
Delaying (WIP)	■ — ■ — ■	0	360
Packages Inspection	■ — ■ — ■	5	3
Product Filling	■ — ■	0	50
Cap washing	■ — ■	1	2
Capping	■ — ■	1	15
Labelling	■ — ■	0,5	10
Product Wrapping	■ — ■	5	15
Product Boxing	■ — ■	1	15
Product Storage	■ — ■ — ■	6	-

4. CONCLUSION

This research can be concluded that the warehouse layout can be cut the production process time. It can be showed by the evaluation flow process chart before and after layout. Before layout, the total production time can reach 838 minutes which the operation time is 238,5 minutes. Meanwhile, after layout, total production time just 658 minutes which the operation time is 112 minutes. It means the research should be the benchmark of the company to layout their warehouse used the same methods of the author given in this research.

The material handling get synchronized by the space requirement of each warehouse tools. Before layout, the distance of material handling is about 71,6 meters. However, after the layout, total distance of material handling is 47,5 meters. Total area of warehouse is about 120 m², but based on the data processing above, there just 36,1 m². In other words, these output of our research can be recommended suggestion for the company to improve their productivity of manufacturing in warehouse.

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