Re-Planning the Layout of Production Facilities Using the Method *Activity Realition Chart* (ARC) At PT. Betts Indonesia

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Abstract
PT. Betts Indonesia is a manufacturing company that produces laminate tubes. In the production process, several materials used in the production process to become finished products. The problems found in this study are the irregularity of the layout of production materials, often the placement of materials that are not in accordance with the material specifiedFor the flow of raw materials, bottlenecks often occur because the existing lines are narrow, so they have to alternate with each other, which causes a decrease in the efficiency of the production process. The method in this study uses the Activity Realition chartto improve the material flow that has been carried out currently with the aim of rearranging the layout of efficient production facilities so as to optimize material handling. From the results of this study it is expected to rearrange the flow of raw materials more efficiently so that the level of the production process can produce the maximum production process from the targets set by the company.

Keywords**:** *Activity Realition Chart, Material Handling, Production Process, Facility Layout.*

Abstrak
PT. Betts Indonesia merupakan perusahaan manufaktur yang memproduksi laminate tube. Dalam proses produksinya, memiliki beberapa material yang dipakai dalam proses produksi hingga menjadi produk jadi. Untuk permasalahan yang terdapat dalam penelitian ini adalah ketidakaturan tata letak material produksi sering kali terjadi penempatan material yang tidak sesuai dengan tempat material yang sudah ditentukan. Untuk jalur aliran material bahan baku sering kali terjadi penghambatan karena jalur yang ada saat ini sempit jadi harus bergantian satu sama lain yang menyebabkan penurunan efisiensi proses produksi. Metode dalam penelitian ini menggunakan Activity Realition chart guna memperbaiki aliran material yang telah dijalankan saat ini bertujuan untuk penataan ulang tata letak fasilitas produksi yang efisien sehingga dapat mengoptimalkan jarak material handling. Dari hasil penelitian ini diharapkan untuk melakukan

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Citation**:** Fransiscus Pradana Chrisanto Putra and Boy Isma Putra. 2023. Re-Planning the Layout of Production Facilities Using the Method *Activity Realition Chart* (ARC) At PT. Betts Indonesia. *Journal of Research and Technology* Vol. 9 No. 2 Desember 2023: Page 145–150.

penataan ulang aliran material bahan baku yang lebih efisien sehingga tingkat proses produksi dapat menghasilkan proses produksi yang maksimal dari target yang telah ditentukan perusahaan.

Kata Kunci: *Activity Realition Chart, Material Handling, Proses Produksi, Tata letak Fasilitas.*

1. Introduction

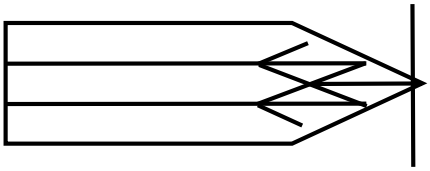
PT. Betts Indonesia is a manufacturing companywho manufactures*laminate tube* for*personal care*. There are 3 parts to the production of the implementation of the laminate tubes production process, the first is the section including machines*printing, Injection Moulding,* and Named production machine*Ice* is the main product producing machine of PT. Betts Indonesia which combines all the raw materials that produceproduct packaging.

Irregularity in the layout of production materials often occurs placement*material* inappropriate production*material* which has been determined. Until, employees such as operators and*packer* to take the material too far and the position of the material is out of place, due to manual filling of the material into the production machine which causes a decrease in the efficiency of the production process by 7% of the average yield*output* machine per 1 shift. This causes a decrease in the production process and distance efficiency due to inhibition of the flow of raw materials. This study aims to determine the efficient distance required in the production process in order to optimize the distance*material handling* more optimal and efficient. You can see the advantages of applying the ARC method (A*ctivity Realition Chart*) using a worksheet of the form*relayout* production layout and ARC adjacency diagram (A*ctivity Realition Chart*).

2. Method

This research uses data processing techniques*metode activity realition chart* (ARC), ie is that technique simple in planning the layout facilities by degree activity relationship.Basically*Activity Relationship Chart* (ARC) almost the same as From to Chart, only here the analysis is more qualitative in nature. If the analysis is based on the weight or volume Pictures on the From to chart and the distance the materials are moved from department to department, this activity relationship replaces these with a letter code indicating the degree of activity quality relationship. and a numeric code that explains the reason for selecting the letter code.

Derajat Hubungan (atas)



Alasan Penetapan Derajat Hubungan (bawah)

Source: Sritomo, 2000.

Figure 1. Activity Relationship Chart (ARC)

Reason description *Activity Relationship Chart* (ARC) degree of relationship. Here, letter codes such as A, E, I, etc. indicate how the activities of each department are directly or closely related to one another.

A : Absolute need to be brought closer
E : It's very important to get closer
I : It's important to get closer
O : Enough/ordinary
U : Not important
X : Not wanted nearby

The calculation method used is the efficiency formula, which is a measure of the success of an activity which is assessed based on the amount of resources used to achieve the desired results.Besides that, efficiency is to achieve an optimal goal and as desired, by minimizing the resources expended. Efficiency Calculation formula can be presented as follows:

$$x = \frac{n_1 - n_2}{n_2} \times 100\% \quad (2)$$

3. Result and Discussion

At this stage is the process of data processing that has been done by researchers along with their calculations. As follows:

3.1 Initial Production Layout

As for the initial production layout in each room can be shown as follows:

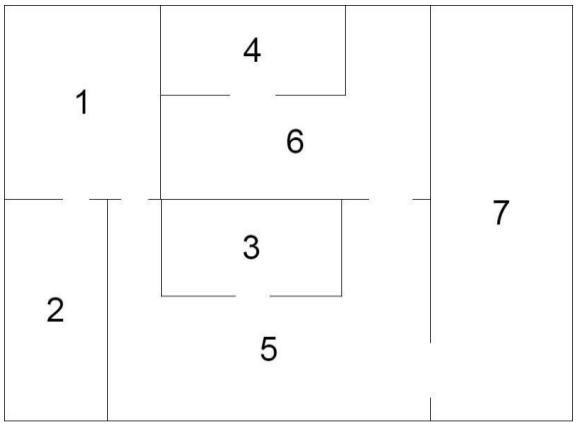


Figure 2. Initial Layout of the Production Room

The layout description above is as follows:

1. Material Warehouse
2. Printing Process Room
3. Injection Process Room 1
4. Injection Process Room 2
5. Tubing Process Room 1
6. Tubing Process Room 2
7. Finished Material Room

In the layout of the production process above, the process mechanism for material flow from raw materials to finished goods can be explained, as follows:

Table 1. Mechanism Mileage in the Production Process From Raw Materials to Finished Goods

No	From Room	Objective	Mileage(m)
1.	Material Warehouse	Printing Room	10
2.	Material Warehouse	Injection Room 1	35
3.	Material Warehouse	Injection Room 2	55
4.	Material Warehouse	Production Room 1	18
5.	Material Warehouse	Production Room 2	50
6.	Production Room 1	Finished Material Room	82
7.	Production Room 2	Finished Material Room	115
	Total		365

In the initial layout table above, a total distance of 365m is obtained.

3.2 Proposed Production Layout

The proposed layout for each room can be shown as follows:

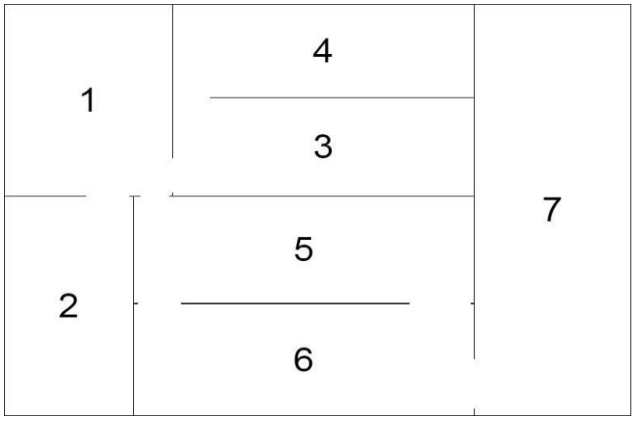


Figure 3. Proposed Production Room Layout

In the layout of the proposed production process above, it can be explained the process mechanism of material flow from raw materials to finished goods, as follows:

Table 2. Mechanism Mileage in the Production Process From Raw Materials to Finished Goods

No	**From Room**	**Objective**	**Mileage(m)**
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3.	Material Warehouse	Injection Room 2	30
4.	Material Warehouse	Production Room 1	30
5.	Material Warehouse	Production Room 2	35
6.	Production Room 1	Finished Material Room	82
7.	Production Room 2	Finished Material Room	58
	Total		265

In the initial layout table above, a total distance of 265m is obtained. By exchanging the position of the injection process room 1 with the tubing process room 2, a total distance of 265m is obtained.From the data above it can be seen that moving and exchanging space in the production process will make mileage faster and more efficient.

3.3 Evaluation

After obtaining data from the comparison distance between the initial layout and the proposed layout, calculations can be carried out to find out how much efficiency is obtained after moving production facilities. The Efficiency Calculation Formula can be presented as follows:

$$\text{Efficiency}=\frac{\text{Starting Distance-Final Distance}}{\text{Starting Distance}}\text{x}100\% \quad (3)$$

By entering data, as follows:

$$\text{Efficiency}=\frac{365-265}{365}\text{x}100\%=27{,}39\% \quad (4)$$

3.4 Activity Realitionship Chart

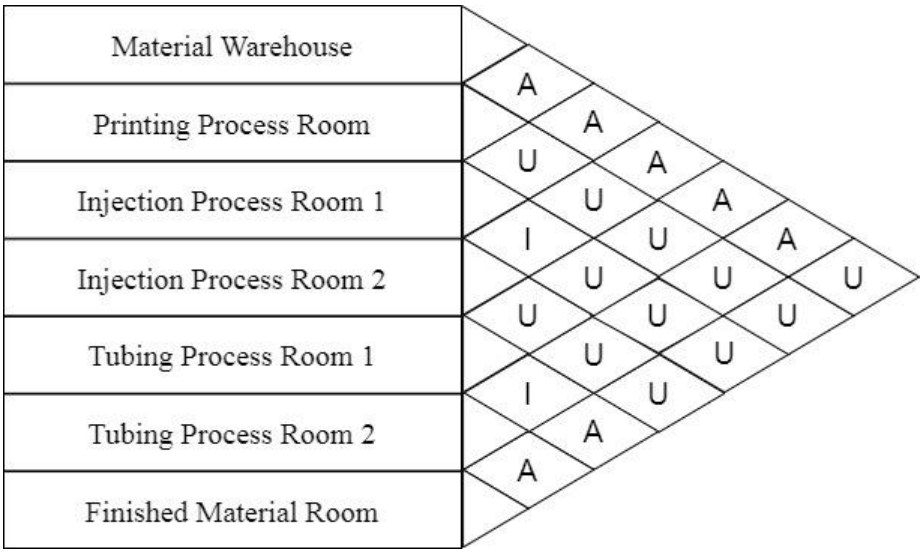

Figure 4. Production Layout Activity Realitionship Chart Diagram

3.5 Comparison Calculations *Layout* Early and *Layout* Proposal

Tabel 2. Data Comparison of Preliminary Layout and Proposed Layout

No	Factors Analyzed	Initial Layouts (m)	Proposed Layouts (m)	Efficiency
1.	Distance	365	265	27,39%

Based on the comparison table data above, the result is that the process of material flow in the production process can be carried out more quickly and efficiently with the proposed layout because the distance traveled is shorter than the initial layout of PT. Betts Indonesia. Calculation of efficiency obtained at a distance of 25.31%.

4. Conclusion

From the calculation results, the most efficient total mileage is the total distance produced by the proposed layout with a result of 265 meters. Compared with the total mileage of the initial layout which amounted to 365 meters, with the proposed layout, an efficiency of 27.39% was obtained. By using the Activity Relationship Chart method, researchers can know for sure the relationship that influences each other between one production process place and another in the implementation of the production material flow process accompanied by the basic reasons. Thus, it is possible to make room transfers that have the most influence on the material flow process to shorten the travel distance, but room transfers must also be adjusted to the availability of existing space.

Appreciation

Alhamdulillah, praise be to Allah SWT who has bestowed His mercy and guidance. The author would like to thank PT. Betts Indonesia and supervisor, Mr. Boy Isma Putra ST., MM., who have helped, supported and gave permission for all the information for this research. So that the writer can complete this research properly and correctly

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