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Planning The Layout of Production Facilities (Case Study of Diera Mutiara Internasional in Yogyakarta)

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Abstract: The layout of production facilities is one of the important factors in a company because it has an impact on optimizing the efficiency of the production process. The greater the efficiency, the production process time will be faster and the idle time will be less. This research was conducted to find out what production facility layout was applied by Diera Mutiara International. The method used in this research is by analyzing the layout of production facilities applied by Diera in completing the skincare production process and whether it is efficient. The results obtained from this study state that Diera uses a qualitative flow measurement layout where the movement between departments aims to bring locations that have high displacement rates closer. The conclusion of this study shows that Diera Mutiara International have met BPOM standards in designing the layout of their facilities in a very small factory size.

Keywords: Planning, Layout, Facilities, Skincare, Diera.

INTRODUCTION

One of the factors that affect the efficiency of a company is the factory layout of the company. The layout of this factory is important because the owner of the company wants a factory that allows the production process to occur quickly and safely. If the production process occurs quickly, safely, and efficiently, of course, the goods produced by the company and ready to be sold will be abundant. In addition, the right factory size will also save a lot of costs.

The rapid development of the cosmetics industry with increasingly competitive competition causes business people to always have to look at their environmental conditions. Porter's analysis and SWOT analysis are powerful tools for assessing the business environment. PT Diera Mutiara International is a company that was just pioneered in September 2017, engaged in the organic natural cosmetics industry trying to compete in this industry.

As a start-up company, PT Diera should design the right business model. PT Diera selects specific customer segments, with the value provided being a sense of security and comfort, delivered through direct sales channels and reseller networks. To maintain customer loyalty the company provides free consultations and membership discounts, then the main

dominating resource is employees with the main activity being production and sales, and partnerships carried out with suppliers, resellers, and distributors. Then viewed from the financial side, the revenue stream comes from the sale of products and services with the cost structure into fixed and variable costs (Oktriani, 2018). The main production activities require adequate facility layout planning and meeting standards, so this study was conducted to find out how layout planning in this Diera company.

LITERATURE REVIEW

Factory layout requirements

According to Assauri (1978), there are at least 13 factors that must be considered when making factory layouts. These factors are Product type (size and durability); the sequence of production processes; factory area; the area here includes the height of the factory (so as not to be stuffy) and alleys for the traffic of goods and labor; weight and size of the machine; Machine placement for easy repair and replacement capacity balance; minimum movement required for the traffic of goods and labor; material flow from one production line to another; workers' workplaces must also be considered to be safe and comfortable; public facilities such as canteens, cooperatives, bathrooms, and others; Waiting area or place where raw materials are waiting to be produced; Plant climate or air circulation in the plant; Flexibility is the ability of factory layouts to accommodate small changes in the production process so that small changes do not result in large costs.

Factory layout type

In considering the things above, of course, you need business planning documents and business feasibility studies as a place to record data and as evaluation material. 4 types of factory layouts are very dependent on the 13 factors above. The 4 types of factory layouts are:

1. Product layout. In this type, the machine is placed according to the production order that uses the machine. For example, in the process of making clothes, the sewing machine is placed near the fabric warehouse and then the machine is overlocked. The advantage is that supervisors will find it easier to check the production process while the drawback is less flexibility, especially if the company produces many goods with the same raw materials.
2. Process Layout. In this type, factory machines are put together based on their function. For example, a lathe with a lathe, a sewing machine with a sewing machine. The advantage is that such a factory design model is very flexible to produce many products at once. The drawback is that workers have to go back and forth to receive and submit the results of their division's production so production costs are relatively higher.
3. Fixed Position Layout. Factories that have this type are generally used by factories manufacturing very large goods such as aircraft, shipyards, and others. In the production process of this type of factory, raw materials, and production equipment approach the main production site. So do not be surprised if the production process of these items requires very expensive costs.
4. Group Technology Layout. A group technology layout is a factory layout that groups machinery and equipment to process similar products. The advantage of this type of layout is that it utilizes existing machines in full while the advantage is that it needs close supervision so that the production process is effectively established.
    a. Types of goods produced. The type of goods to be produced plays an important role in the design of the plant. Of course, to make a large item, you need to provide a large enough alley so that the goods and labor that

deliver the goods can pass without obstacles. In addition, this aspect of goods will of course also determine raw materials. Different raw materials must necessarily be stored in different warehouse conditions. Knowing the type of goods to be produced also leads you to know how to make these items, what machines are needed, and others.

b. The type of machine required. A factory is a production site filled with various types of machines which are often quite large. Knowing the size of the machine that will be used for production and the amount will help you to know how much area the plant is efficient. The area of this factory is calculated from the area of machines, the number of machines used, and the area of aisles needed for an efficient production process. Of course, the production of a factory will not be efficient if the size of the factory is 25 meters by 25 meters while the size of the machine used is 20 square meters and the number is 25. Because that means the area of the alley that can be used by employees is only about 100 square meters.
c. Create an activity relationship chart. An activity relationship chart is a diagram that shows the relationship between certain production activities so that management can determine which processes should be close together and which should be far apart. This diagram is created after assigning certain codes to each production process.

Here's an example of an activity relationship chart:

1. Make a general overview of factory design. The general description here only includes your details about the factory design you want. In this general description, you can pour where public facilities such as prayer rooms, canteens, and toilets are located.
2. Create layouts in the design application. Currently, you and the architect you hire can use a design application such as Sketchup to simplify the process of designing your factory layout. Because, by using this application, you can directly see an overview of the factory both from the front of the building, back, and top.

Plant Layout Planning Principles

Plant Layout Principles – Plant Layout is an optimal arrangement and placement of Factory Facilities including Manpower, production equipment, storage rooms, material handling equipment, and all other supporting services with the best structural design to accommodate all these facilities (Praminingtyas, 2012). The main goal in optimizing the layout of factory facilities or Plant Layout is of course to maximize profits for the company. With an optimal layout or layout, the costs of transporting and handling materials in the manufacturing process can be reduced to a minimum so that the company's profits can be increased. The movement of labor in work can also be minimized so that work productivity can be increased and contribute positively to company profits.

The following are some of the benefits that can be obtained through optimizing the Factory Facility Layout.

1. Facilitate the flow of materials (raw materials and supporting materials) to be used by Production.
2. Facilitate the manufacturing process.
3. Minimize the handling and transportation of materials and the costs associated with them.
4. More effective in utilizing people, equipment, and space
5. Increase flexibility and anticipate changes that will occur in future data.
6. Provide comfort, convenience, security, and safety of workers.

7. Minimize Investment in Production Equipment and Machinery.
8. Reduce the amount of production time

Principles that must be considered when planning Plant Layout (Arif, 2017).

1. Principle of Integration, A good layout is to integrate people, materials, machines, and other supporting services to get optimal utilization of the resources they have.
2. Principle of minimum distance, This principle relates to the movement or movement of people and materials. The layout should be set as close as possible to minimize travel and movement. Keep in mind that long distances can increase the use of working time which will also increase operational costs.
3. Principle of Space Utilisation, A good layout is to utilize the entire space both Horizontal space and Vertical space. Optimal utilization is not only on the floor of the room but also includes the height of the room (three-dimensional utilization).
4. Principle of Flow, a good layout is a layout that can facilitate the flow of material movement to the completion stage.
5. Principle of Maximum Flexibility, A good layout is a layout that does not cost a lot and takes a long time when changes occur. Future needs should be taken into consideration in designing the layout or layout of factory facilities.
6. Principle of Safety, Security, and Satisfaction, A good layout is a layout that considers safety, security, comfort, and satisfaction of labor and facility security such as avoiding fire and theft.
7. Principle of minimum handling, a good layout is a layout that can minimize material handling.

METHOD

This research method is to describe all activities carried out at UMKM Diera Mutiara Internasional which is located at Jalan Bumijo Lor JT I / 1233 Yogyakarta. Data collection was conducted using interview techniques and direct field review. Interviews are conducted with the CEO, pharmacist in charge, and management who can provide information both orally and in writing about the company profile, production capacity, land area, and production process.

RESULTS AND DISCUSSION

Company Profile

In September 2017, PT Diera Mutiara International was established which aims to produce natural care cosmetics that are safe and efficacious to maintain the natural beauty of Indonesian women. The resulting products are in the form of facial, body, and hair care. Diera products have a pH that is formulated according to the pH of the body so that it is easily absorbed by the skin perfectly and practical to use. PT Diera Mutiara International markets its cosmetic care products with the Diera brand and its slogan "Wild Beauty Skincare". Diera has the tagline " Wild Beauty Skincare " which means to restore, youth, and rejuvenate the natural beauty of Indonesian women. More deeply, Diera products are formulated to rejuvenate the natural beauty of Indonesian women. In addition, Diera products can restore or improve skin problems; and Diera is formulated to delay the signs of aging in women.

Land

Factory location on Jalan Bumijo Lor JT. I/1233 RT 27 RW 07, Bumijo, Jetis, Yogyakarta City, DIY 55231 with a very narrow land area because it is in the middle of an urban village, but has succeeded in obtaining a BPOM permit with intensive development. The land area is only 100 square meters.

Production Facility Layout Design

Various studies have been conducted to design the layout of facilities that are determined by the type of product made, such as the production of the UD Podotresno tofu factory, Selayar Islands Regency using a gurus layout (line layout) because it is considered easier to move raw materials and more directed in the smooth production process. The placement of production facilities used can streamline time in preparing tofu-making production materials which can increase production results and relatively easier supervision (Handayani, 2018).

PT Focus Cipta Makmur Bersama's Hexabent product (a mixture of fertilizer with bentonite natural stone) has problems with the material distance handling system. (Susanto and Rusidayanto, 2019). Algorithmic methods have been used to determine the function of connections between stations with each other and to minimize the cost of moving materials. Another research using the Craft Algorithm was conducted at CV Graffiti Labelindo engaged in digital printing. The products produced include fashion accessories such as metal buttons, woven labels, leader labels, imitation/Oscar labels, printing labels, plastic labels, various types of stickers, packaging boxes, etc. To improve the layout of facilities using the Craft Algorithm (Computerized Relative Allocation of Facilities Technique) method in several stages of the initial layout identification process, the calculation of material transfer distances and costs and material flow movements using from to chart with 2 stages of work, namely inflow coefficient and outflow coefficient then ended with layout testing using WIN QS software (Oktaviana, et al., 2017)

Bakery products will use different designs to gain production efficiency. A case study at UKM Roti Rizki, Bontang regarding the redesign of the layout of production facilities with the Blocplan method has been carried out (Adidaya et al, 2018). The case at UKM Roti Rizki at this time has not followed a special rule in the placement of equipment. Machines used for the production process do not pay attention to the flow of the production process, as a result of which the space for workers to move is limited, and repetition occurs which wastes time, is inefficient, and reduces productivity.

The production process of Chrome Nickel and Gold Platting coating can be increased in effectiveness with the Systematic Layout Planning (SLP) method to reduce the length of the production process at CV Apindo Brother Sukses Sumbawa. The results of making the proposed layout obtained an improvement in reducing production mileage by 62.5% for nickel chrome and 73.5% for gold (Adiasa et al, 2020). Another research on the use of SLP and Craft methods at CV Daya Mandiri Pontianak, which is a paving press manufacturer factory, has intersecting material handling related to the location of drying and storing products. (Erwin, 2018).

For companies engaged in fashion, the proposal of a systematic layout plan will result in better production. The application of the Activity Relationship Chart (ARC) method is appropriate to apply (Seminar et al., 2020)

The layout planning of Diera facilities in the era of Mutiara Internasional has met the first legality requirement, namely obtaining floor plan approval by BPOM-RI. The time for approval of this floor plan takes quite a long time because there are many revisions. Diera in the era needs a year to approve this floor plan, this illustrates how important facility layout planning is in building a production business.

3 areas need to be prepared, namely, pass box (PB), reject area (AR), and quarantine area (AK) as well as the sample area of residence, besides that, there must be a physical chemistry laboratory. The warehouse area that needs to be prepared is the packaging material warehouse and the raw material warehouse. There is space between goods and there is space between people and goods. The main room of the production site is the mixing and filling room for liquid preparations and viscous preparations. The production flow consists of a weighing room, janitor room, and laundry room and store tools with doors of the same

direction united by corridors. While the secondary packaging room and product warehouse and chemical physics laboratory use doors that are opposite from the direction of the production flow room door. The plant should be equipped with men's, and women's changing rooms and toilets. The floor plan of the room can be seen in Figure 1.

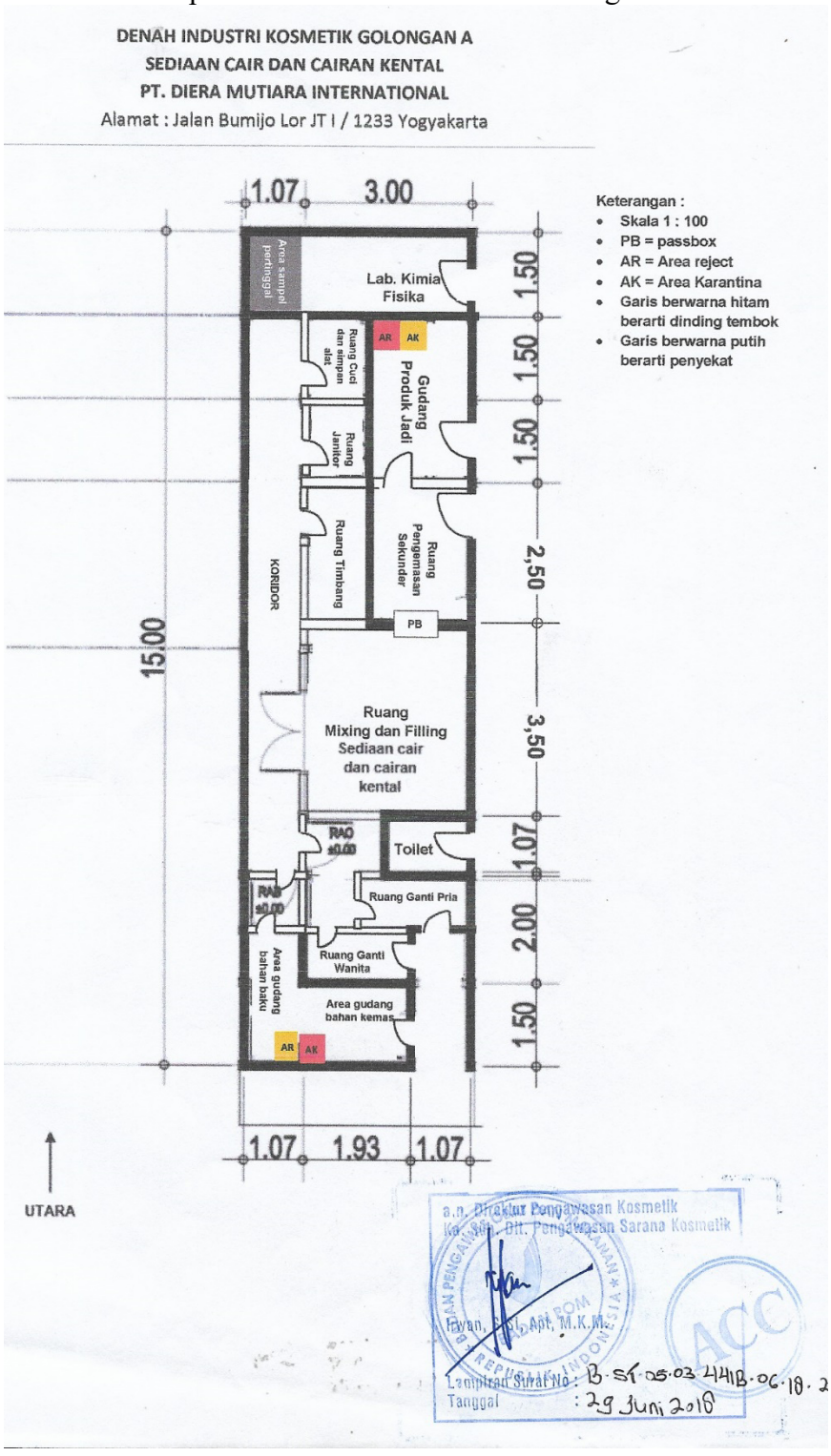

Figure 1. Floor Plan of Cosmetic Industry Group A liquid preparations and viscous liquids in the era of Mutiara International

With a land area of 100 m2 and all space requirements can be met, it shows that Diera Diera can meet the principles of factory layout (Arif, 2017), namely the principle of

integration, the principle of distance proximity, the principle of space utilization, the principle of flow, the principle of maximum flexibility, the principle of work security and safety and the principle of minimal handling. With such a small factory area, of course, the production volume is still very limited. To increase the scale of production, it is necessary to increase the area of the factory, but as a start-up company, it is necessary to start small first.

The advantages that can be obtained through optimizing the Layout of Factory Facilities in Diera in the Era are the smooth flow of materials (raw materials and supporting materials) to be used by production, the existence of manufacturing process facilities, the minimum handling and transportation of materials and the costs associated with them, more effective in utilizing people, equipment and space; increased flexibility and anticipation of future changes; provide comfort, convenience, security, and safety of workers, minimize investment in production equipment and machinery and reduce the amount of production time.

Skincare products produced by Diera currently consist of:

Figure 2. Diera Skin Care Product
Motto: Wild Beauty Skincare

CONCLUSION

The planning of the layout of production facilities in Diera Mutiara Internasional Yogyakarta proves that with a small building area, with planning according to academic rules, it has succeeded in penetrating BPOM-RI permits. This factory plan can be a reference for small entrepreneurs in the field of skincare to be able to build their business space effectively and efficiently and have legality.

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