Volume-2, Issue-7, November-2018: 96-103
International Journal of Recent Innovations in Academic Research ISSN: 2635-3040

Production Layout Reconfiguration for Productivity Improvement at Lucky Jean Garments

Engr. Norxine L. Montalbo, Marc Amiel D. Impoy, Judy Ann L. Luna and Elaiza L. Reaño

Batangas State University JPLPC–Malvar
Corresponding Author E-mail: norxine_montalbo@yahoo.com

Abstract: Lucky Jean Garments is a sewing industry always pride itself on its personnel's strong technical knowledge and expertise in providing competitive design and product quality. It stands for maturity; know how continuity and the ability to assert one's self in the production. This study aimed to propose a production layout design for Lucky Jean Garments in San Pedro II, Malvar,Batangas that will eliminate unnecessary works encountered by the operators, specifically in their unorganized placement of machines which they usually encounter in the present layout. The layout design of the production was developed through specifications and considerations given by the supervisor of the Lucky Jean Garments. The design is composed of storage for raw materials, office, and room for marking area, trimming area, pressing area, revising area, storage area finish products and comfort room. A simulation was made to asses if the design conforms to the objectives and evaluate any improvement on the design. It has been inferred that the design will help the production operators to lessen the long distance travel time inside the production because of the proper location of machines and proper flow of operation in the production. In this study, the researchers used time study to get the time it takes that constitutes to every process, implement productivity improvement in the production process through the proposal of a production layout. Lastly, it aimed to lessen the long distance travel time inside the production to have continuous flow that will be helpful in achieving the output needed in the production. The researchers came up with the observation of present layout and proposed design of production at Lucky Jean Garments. This layout is designed to minimize the unnecesary works and hazards which can be encountered in the production area at Lucky Jean Garments.

Keywords: Production Layout, Time Study, Productivity Improvement, Simulation.

Citation: Engr. Norxine L. Montalbo, Marc Amiel D. Impoy, Judy Ann L. Luna and Elaiza L. Reaño. 2018. Production Layout Reconfiguration for Productivity Improvement at Lucky Jean Garments. International Journal of Recent Innovations in Academic Research, 2(7): 96-103.

1. Introduction

Production improvement is a way of making improvements in the production operation to increase the productivity and for workers and also the tools and equipment used in the production to do the task more precise, effective and efficient. Based from the word itself; "improvement" means making the work quicker, easier, simpler, and safer. These are important factors when producing the goods in a workplace on a day-to-day basis. It is also

important in maximizing the overall effectiveness of the process by eliminating unnecessary works done by the workers and establishing better equipment in reducing waiting time to make the production process faster than the current operation (Sanjay and Nandkumar, 2007). Plant layout planning includes decisions regarding the physical allocation of the economic activity centers in a facility. An economic activity center is any entity occupying space. The objective of plant layout planning is a more effective work flow at the facility, allowing workers and equipment being more productive.

Facilities layout is a systematic and functional arrangement of different departments, machines, equipment and services in a manufacturing industry. It is essential to have a well-developed plant layout for all the available resources in an optimum manner and get the maximum out of the capacity of the facilities. Facility layout techniques apply to the case where several physical means have to be located in a certain area, either industrial processes or services (Rushton *et al.,* 2014). The objective of the paper is not only plant layout but re-layout also. To carry out an appropriate plant layout, it is important to take into account the business strategic and tactical objectives.

Process improvement is the proactive task of identifying, analyzing and improving upon existing business processes within an organization for optimization and to meet new quotas or standards of quality. It often involves a systematic approach which follows a specific methodology but there are different approaches to be considered. Some examples are benchmarking or lean manufacturing, each of which focuses on different areas of improvement and uses different methods to achieve the best results. Processes can either be modified or complemented with sub-processes or even eliminated for the ultimate goal of improvement. In the present world of competitive manufacturing industry, process improvement and optimization of a cycle time is not an easy task. Always in practice when one problem is solved, there comes other new or may be old problems will reoccur with the passage of time (Appian, 2018).

Time study is concerned with the determination of the amount of time required to perform a unit of work. It consists of the process of observing and recording the time required to perform each element of an operation so as to determine the reasonable time in which the work should be completed. The researchers used this tool to identify the causes for the process of production to slowdown (Money Matters: All Management Articles, 2018).

The Lucky Jeans Garments Company is lack of workers that causes slow operations and some of them need an overtime to fulfill the required target in a day. Less supervision is observed in the Lucky Jeans Garments Company causing the workers to perform their job more randomly. The researchers also observed that they rush the jobs which sometimes cause the rejection of the product. The researcher proposed to have a sufficient supervision for the Lucky Jeans Garments workers in order to maintain a continuous flow of production. By doing this, workers will be observed and they are more likely to do the job better with no rushing. Doing this could also eliminate unnecessary action in the workplace and will help maintain productive work hours for the entire process.

To give solutions to these constraints, such principles aim to eliminate unnecessary work, reduce transportation, motion, waiting time, improve the workplace and enhance of the employees. As observed in the current Lucky Jeans Garments making process, the factor contributing to the large travel distances consumed for the whole process is scattered arrangement of machines, marking, sewing, trimming, revising, pressing, and packing

processes. The marking and trimming set ups is located at the upper right of the Lucky Jeans Garments area which is far from the location of revising, pressing, and packing area, located at the lower section of the workplace which cause slow process.

The goal of the study is to eliminate unnecessary work by rearranging production layout at the company. Furthermore, the acquired results after completing the study would benefit the company, the customer, and the researchers. This study is specifically intended to design and improve the existing production Layout of Lucky Jean Garments at San Pedro II, Malvar, Batangas. The study is important to the company for the maximization of continuous production flow and effective usage of the space throughout their production processing. The proposed design of the production layout will be adapted by the company and will be implemented. The proposed designs will benefit all the personnel who were responsible in handling the materials. The study is important to provide an efficient production operation with respect to the company. This can also improve the company's system of inventory since the specification of the tools will be more emphasized in the storage room.

Objectives of the Study

The researchers studied the entire production area of Lucky Jean Garments to understand the present situation in the area. This study aimed to eliminate unnecessary work and improve a workplace by proposing a production layout for the company and to assure the good quality of the products while the employees are in good condition.

This study sought to answer the following questions:
1. What is the status of the current production layout at Lucky Jean Garments in terms of:
1.1 Dimension;
1.2 Machine Configuration?
2. How does the existing layout design affects the operation in terms of:
2.1 Process Flow;
2.2 Process Time;
2.3 Total Distance Traveled;
2.4 Productivity?
3. What alternative layout design could be proposed by the researcher to improve the operation at Lucky Jean Garments?
4. What design should be implemented using the following evaluation techniques:
4.1 Maximin;
4.2 Analytical Hierarchy Process;
4.3 Imprecise Ranking Table;
4.4 Trade-Off Analysis?
5. What are the impact of the proposed layout design in terms of:
5.1 Process Flow;
5.2 Process Time;
5.3 Total Distance Travelled;
5.4 Productivity?

3. Materials and Methods

3.1 Research Design

The design of the study "Production Layout for Productivity Improvement at Lucky Jean Garments" is one type of descriptive research design. It is conclusive in nature, as opposed to exploratory. This means that descriptive research gathers quantifiable information that can be used for statistical inference on your target audience through data analysis. However, using

properly, it can help an organization better define and measure the significance of something about the productivity improvement in Lucky Jean Garments–San Pedro II.

The collected data came from the supervisor and production operators. Essential historical records needed to analyse the existing process and condition were requested from the production supervisor under the production area. A series of questions necessary for the data collection were asked to the supervisor and employees. This study conducted by the researchers will make use of this design and development type of research to be able to predict a design and improvement of the current layout of production of Lucky Jean Garments at San Pedro II, Malvar, Batangas. The researchers gathered data to use as foundation in conceptualizing the design.

Considering the existing layout of production, the researchers assessed its condition and found out that the layout needs to be improved The most essential data they were gathered from the production process is scattered arrangement of machines and long travel distance in every process through observations and series of questions to the random employees. Likewise, the proponents gathered information from the internet, books, and preceding researches which were used as reference.

3.2 Subject of the Study

The subject of this study are the Lucky Jean Garments and their respondents. The respondents include the employees, clients and the management of Lucky Jean Garments wherein the researchers will identify the needs and requirements of the corporation for the improvement of the production layout, and they will gather data from the observations and interviews obtained.

3.3 Data Gathering Instrument

Quality control operation and safety concepts were considered for data gathering of the study. In order to provide reliable information to the study, the researchers of the study conducted a measurement of the whole production, including the dimension of the rooms for raw materials and other storage area for finish products using a measuring meter. Series of informal interviews were conducted with the supervisor as well as the employees to acquire information concerning their working experience in the existing production layout. Observation in the production is also used as a base of gathering information.

The researchers also looked for other references from the internet and the library researched including undergraduate research, and book related to productivity improvement to attain other related studies which can sustain the study's reliability and significance. The researchers will also use time study in order to determine the improvement in the production layout and from the survey that will be pursued for this study. Through research, observation, and time study, the researchers came up with this design.

3.4 Data Gathering Procedure

After conceptualizing the topic of the study, the researchers gathered some of the data needed from the production department. This includes the layout of the Scattered Workplace, data regarding wastes of the said line, their standard production, and data related to past entries and results passed for the current production. The researchers used these data to measure the effectiveness of the productivity improvement in the selected area. The following procedures were done by the researchers in order to have results in the study. The researchers visited the production of Lucky Jean Garments at Malvar, Batangas for the approval of some

documentations needed in the study. Also, the researchers conducted an interview with the supervisor of Lucky Jean Garments as well as the employees. The researchers personally administered the proposed production layout and explain it to the respondents to ensure that the design they wanted were considered. With the use of the data that had been gathered, researchers were able to identify the situation of the current production. Due to the demand of the respondents, the researchers came up with the design requirements needed in the development.

Time study was also done by the researchers to measure the comparison between the existing production and the proposed design.The researchers constructed a Gantt chart to illustrate the start and finish dates of the terminal elements and summary elements of this study. It is a chart in which a series of horizontal lines shows the amount of work done or production completed in certain period of time in relation to the amount planned for those periods.

After analyzing these data, the researchers conducted further observations and research to gather more accurate data that can be helpful to the study.

3.5 Design Stage

The design stage focuses mainly on information gathering process done through the observation of the existing production layout. Data from the interviews and actual measurement of the area were considered. Lucky Jean Garments sees that their existing production has a problem in terms of lessening a lot of travel distance for the whole process.

In response to the problem stated above, the researchers considered the ideas of the supervisor for improving and organizing the production. He stated his plan that led to the researchers to come up to a design. Researchers also provided an alternative design. After all, the researchers use the gathered data from the survey and do the time study to come up the effectiveness of design.

4. Result and Discussion

4.1 Current status of the Production Layout

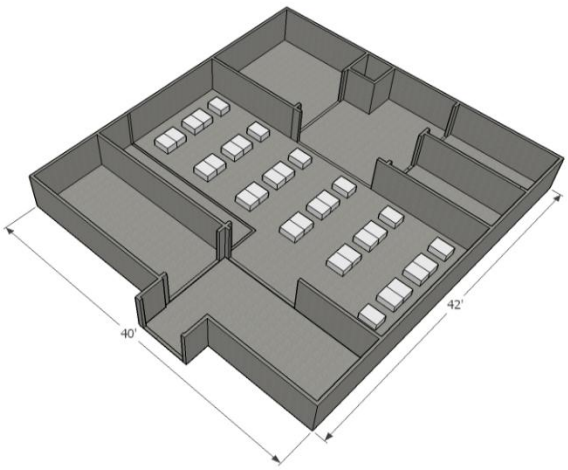

Figure 1. Existing Production Layout

Figure 1 shows the existing production layout of Lucky Jeans Garments. It has an area of 40 x 42 meters or a total of 1680 meter square. It consists of many unsettled rooms. The equipment and materials are unorganized. The bulky and small materials are all mixed up

with waste and inappropriate materials that makes it unsafe for the workers when taking out the materials they actually need. The pile of the materials are stock-up incorrectly which makes it hard for the dressmakers to find the right materials they are requesting. Some of the rooms are not fully built of cement.

4.2 Alternative Layout designs for Lucky Jean Garments

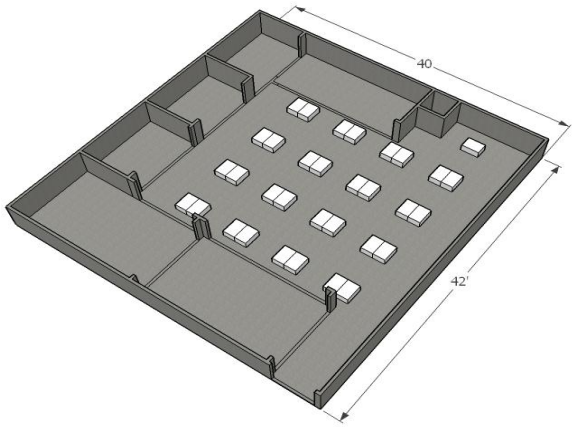

Figure 2. Design 1

Figure 2 shows the layout design 1 of the proposed production of Lucky Jean Garments. In this study, sensitivity analysis should be performed to determine the effect of the proposed layout design. Other tools such as computer simulation should be done to determine other performance measures that are also important to the company such as utilization of idle times when evaluating the proposed layout.

This design was based on the suggested plan of the Lucky Jean's supervisor wherein the office was separated into the production and located beside the comfort room at the back of the area. Also, the storage room for cloth and raw materials is now a single room with a cabinet to the wall. The marking area was also moved and located after the storage for raw materials. The scattered machines are arranged in best location based on how to improve production process. After in sewing machines, next is trimming of the finished clothes, behind this process is revising area which is close to trimming section, and also pressing and packaging area for it to eliminate the wasted time in traveling to the next process. And lastly, the storage area of the finish products of Lucky Jean Garments was closed to the entrance and exit of the factory for them to be easily transported by the truck.

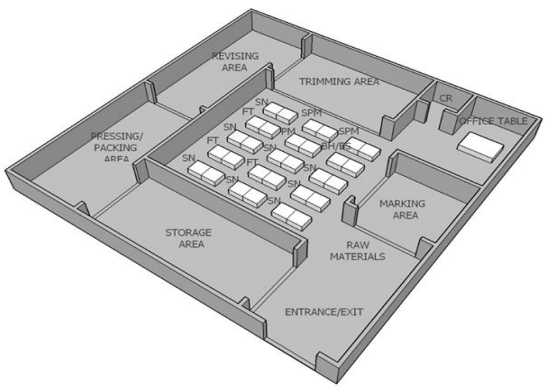

Figure 3. Design 2

Figure 3 shows the second alternative design for Lucky Jean Garments and all units are measured in meters (m). The second design was a renovation of the production. The gate was moved to the center of the production. The production consists of:

The second design was formed to be an alternative. It is similar to the first design but the position was different. Since Lucky Jean has large materials. The room for large equipment is located near the gate, unlike in the first design which is located at the back part of the Lucky Jean. It is to lessen the time for the loading and unloading process of their materials. The first and second design also expanded the allowable space for the storage area, since the supervisor suggested it.

4.3 Evaluation of the Layout design Alternatives using Trade-off Analysis

Table 1. Result of the Four Methods of Trade-off Analysis

Method	Existing Design	Design 1	Design 2
SWS	8.5	15	14.75
Maximin	1.75	3.25	3.25
AHP	41.5	74.7	73.8
IDR	0.42	0.74	0.73

Table 1 shows the product from the percentage and the scores, the researchers get the summation and the average where the existing design is 41.5, Design 1 is 74.7, and Design 2 is 73.8.

The analytical hierarchy process is an effective tool for dealing with complex decision making, and may aid the decision maker to set priorities and make the best decision. After tallying the trade-off analysis using different methods, the researchers came up with their best design. The Design 1 gained the highest average, so in this method the researchers determined that it is the best design.

4.4 Impact of the Proposed Design

The researchers provided a simulation of the flow using Sketch Up 2015 for 3D and Lumion 6 for walkthrough that would be followed in the newly designed production layout. Having a single storage room makes it easier to keep the materials well organized. The researchers conducted a time study of the actual warehouse layout process and the simulated flow process to evaluate the effectiveness of the design. The total standard time of the process flow of the proposed design of Lucky Jean Garments is 105.15 seconds or approximately one (1) minute and 45.15 seconds. It minimized the time consumed in transport of the production.

5. Conclusion

Based on the findings and analysis of the study, the following are the conclusions:

1. After analyzing the existing production layout of Lucky Jean Garments, renovation or improvement on the production should be conducted. Researchers came up with the idea of proposing design for the improvement of their process and also including the office, production area, and storage areas.

2. The proposed layout design will lessen the operating time inside the production because of the proper allocation of machines and proper flow of operation. The risk factor associated in the production was lessened due to the proper storage of raw materials and. Racks are also provided to organize the materials according to its size and uses.

3. Using the different methods of Productivity Improvement, the researchers came up with the layout design of production at Lucky Jean Garments. This layout is designed to minimize the unnecessary works, long distance travel and hazards which can be encountered in the production area.

4. Implementation of proposed layout in the production has great difference in standard time. The implemented proposed layout greatly lessen the operating time inside the production and the standard time achieved was 105.15 seconds. After the time study of proposed layout, it reduced 47.97 seconds. The time study shows that the proposed layout design is suitable for the operation done inside the production.

6. Recommendation

Based on the findings and conclusions of the study, the researchers hereby recommend the following:

a. Further study in the implemented proposed production layout should use for its effectiveness and improvement. To further enhance the production, proper maintenance inside the production areas must be acquired so that it can maintain the correct sort and arrangement of machines and also to remove hazards.
b. The researchers recommend that in order to increase production line efficiency, proposed production layout should be used.
c. In order to increase efficiency, non-value added activities if can't be totally eliminated should be reduced. The non-value added activities result to lengthen the total process cycle time. If in case can be re-layout, production line efficiency and productivity can be expected.

References

1. Money Matters: All Management Articles, 2018 Time Study|Meaning|Objectives| Advantages and Limitations. Account learning.com what is time study.

2. Patil Sanjay and Hukari NandKumar, 2007. Industrial Engineering and Production and Operations Management. Fourth Edition, ElectroTech Publication, Satara, 236 pp.

3. Process Improvement. In apian.com (online) Retrieved November 09, 2016 from:https://www.appiann.com/bpm.process-improvement-organizational-development.

4. Rushton, A., Croucher, P. and Baker, P. 2014. The handbook of logistics and distribution management: Understanding the supply chain. Kogan Page Publishers.