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MINIMIZE WASTE MOTION IN THE PRODUCTION PROCESS LAYOUT

Fenza Gusti Naufal Paleva[1], Eka Bambang Gusminto[2], Ariwan Joko Nusbantoro[3], Fiona Niska Dinda Nadia[4], Rasyidi Faiz Akbar[5]
Faculty of Economic and Business, Jember University[1 2 3]
Postgraduate School, Airlangga University[4]
Faculty of Economic and Business, State University of Surabaya[5]
Email: fenzanaufal@gmail.com[1]; ekabagus825@gmail.com[2]; jk_ariwan@yahoo.com[3]; fiona.niska.dinda-2017@feb.unair.ac.id[4], rasyidifaiz@ymail.com

ABSTRACT

This study aims to determine the factors that cause waste motion and provide a proposed improvement and improvement design to minimize the factors that cause waste motion in the production process of UD Putera Sroedji Jember. UD Putera Sroedji is a medium-scale company in the field of rice production in the Jember area. The problems found at UD Putera Sroedji are the production flow that is not suitable in general and the distance between departments is quite far. These two things are one of the causes of the company's waste motion. The data was obtained by making observations to observe the flow of the production process as well as measuring distance and time. Data analysis used ARC, ARD and Kaizen methods. The results show that the efficiency level given from the two production process lines, namely the proposed layout will be estimated to be able to reduce the production distance of line 1 along 31.25 meters or more efficiently by 30.65% with time savings of 2.828.75 seconds. 2 along 45.4 m or more efficient by 38.07% with a time saving of 3,980.15 seconds.

***Keywords**: ARC, ARD, efficiency, layout, waste motion*

ABSTRAK

Penelitian ini bertujuan untuk mengetahui faktor-faktor yang menyebabkan terjadinya *waste motion* dan memberikan rancangan usulan perbaikan dan penyempurnaan untuk meminimalkan faktor-faktor penyebab *waste motion* pada proses produksi UD Putera Sroedji Jember. UD Putera Sroedji merupakan perusahaan skala menengah dibidang produksi beras di wilayah Jember. Permasalahan yang terdapat pada UD Putera Sroedji adalah alur produksi yang tidak sesuai pada umumnya dan jarak antar departemen yang terbilang jauh. Kedua hal tersebut merupakan salah satu penyebab dari terjadinya waste motion perusahaan tersebut. Data diperoleh dengan melakukan observasi untuk mengamati alur proses produksi serta melakukan pengukuran jarak dan waktu. Analisis data menggunakan metode ARC, ARD dan *Kaizen*. Hasil penelitian menunjukkan tingkat efisiensi yang diberikan dari kedua jalur proses produksi yaitu tata letak usulan yang diberikan akan diperkirakan dapat mengurangi jarak produksi jalur 1 sepanjang 31,25 meter atau lebih efisien sebesar 30,65 % dengan penghematan waktu sebesar sebesar 2.828,75 detik, jalur 2 sepanjang 45,4 m atau lebih efisien sebesar 38,07 % dengan penghematan waktu sebesar 3.980,15 detik.

Kata kunci: ARC, ARD, efisiensi, tata letak, waste motion

INTRODUCTION

The Covid-19 pandemic period started from March 2020, until the beginning of 2022 the Covid-19 pandemic has not been able to be overcome. This certainly has a major impact on various aspects of life, be it education, society, culture, and especially the economy. From this phenomenon, it can be concluded that one of the affected economic sectors, namely trade, is still within the negative GDP limit of -1.23%, so from this data, the trade sector is one of the sectors that need to be addressed or improved, both in terms of GDP or in terms of GDP (Central Agency on Statistics, 2021). from another point of view. One of the causes of this is that there are several policies set by the Government that cannot be separated from the Covid-19 which has an impact on the trade sector, micro, small and medium enterprises (MSMs) industry. On the other hand, the economy is one of the important factors in life. As it is known that a person will be in direct contact with economic needs in carrying out life

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(Hanoatubun, 2020). In the current pandemic conditions, there are still many industries that cannot maintain the viability of their companies.

This is caused by various factors that greatly affect the activities and performance of the company, which causes the cessation of operational activities for a very long period. In this new normal era, the Government provides flexibility for economic sector activities to run while still paying attention to the Covid-19 health protocol. Social and physical distancing will continue to be enforced to reduce the spread of the virus. The impact on industry or trading businesses that can be seen is the re-layout of several public facilities and also the layout of the production facilities of a factory. With the principle of maintaining a minimum distance of 2 meters or more by the rules that have been applied. This shows that layout planning is very important to do because it is directly related to operational and production activities. The need for attention to the layout of the production facilities of an industry or trading business will certainly have an impact on the efficiency of increasing production volume. This is done to keep the production process running smoothly, resulting in high production rates, minimum labor costs, working hours, machines, and shortening processing time over short distances between machines or between operations. A good layout can provide consistent flexibility to work activities, and use the place efficiently and effectively to generate optimal benefits. The advantages referred to are time assistance from each place of operation to the next operation site, utilization used economically, and not forgetting the operator or user's safety and comfort (Muther and Halles, 2015)

The layout strategy goals is to build an economical layout that meet the competitive needs of design companies the layout must consider the achievement of the following conditions (Heizer & Reinder, 2012). 1) Utilization of space, equipment and people higher. 2) The flow of information, goods, or people better. 3) Better employee morale, also a safe work environment. 4) Interaction with better customers. 5) Flexibility. As stated by James M. Apple, the overall goal of facility design iscarry inputs (ingredients) through eachfacilities in the shortest possible time (Apple 1990:2) . Values showing the degree of relationship is recorded at once with the underlying reasons on a mapactivity relationship chart has been developed by Muther (1973) in Wignjosoebroto (2000: 199).

UD. Putera Sroedji is a trading business that processes rice into rice in Kedawung Village, Mumbulsari District, Jember. The trading business has several production processes in it such as weighing, drying, stripping, milling and packaging. Every trading business engaged in rice processing, especially UD. Putera Sroedji needs to evaluate the layout of the production process to improve efficiency in terms of cost, energy, and time, optimal use of the equipment, and minimize accidents. This of course aims to lead to a more organized scheduling process, to increase the number of products produced. With the high quantity of products produced, it is expected to increase the company's profit. This study uses the Activity Relationship Chart and Diagram (ARC and ARD) methods, as well as the improvement solution using the kaizen method. This method will help in providing good planning for structuring the components of the production process and solving problems that take into account the layout and efficiency in terms of the use of costs, energy, and time.

One of the problems found in UD. Putera of Sroedji lies in a layout that does not pay attention to the flow of the production process. Therefore, the placement and arrangement of the room is irregular and not in accordance with the flow of the process, resulting in an unorganized flow of the production process in and out. Of course, it will also have an impact on being less efficient in terms of energy, cost, time and various other aspects. Like the weighing work station, which is quite far from the next work station, namely the drying section which will take a little time to move. Another thing is also seen from the grain warehouse storage which has to go around far, to go to the milling section work station through the drying station first.

The parking area is too close and is in between the drying process to the grain warehouse. This of course will disrupt the production activities of the two work stations because there are traffic or in and out of employees from the parking lot to the UD production area. Putera Sroedji Jember and the location of the bathroom in general, the warehouse should not be too close to the bathroom because the toilet is identical to dirty and crowded. This is of course to avoid production results or raw materials to avoid matters related to quality and of course avoid crowds so that there are no human errors and result defect of item in the warehouse

Research using the Activity Relationship Chart (ARC) and the kaizen method has been widely studied, such as research on the layout of the room at the Batik Rolla Jember House which was researched by Syah (2016). The conclusion of the research conducted is that from the evaluation results at Rumah Batik Rolla Jember regarding the application of the plant layout, there are several problems. The main problem with the current plant layout at Rumah Batik Rola is that the production flow is quite long, so it takes longer.

Research conducted by Syah (2016) on the research object of Rumah Batik Rolla which uses the Activity Relationship Chart (ARC) method and the kaizen method provides conclusions with the results of research on alternative designs for the layout of the Rolla Batik House more efficiently, this is because the flow The previously long production process can be shortened. So it can be concluded that in the production flow it can be cut 13 m, this can speed up and facilitate the flow of communication and production at Rumah Batik Rolla Jember. The distance cut is 28.88% or 29% for the distance of the production line in the production of stamped batik.

Research also conducted by Hartono (2017) with Kaizen and Lean Manufacturing methods on the object of research on the Ground Coffee Leather Production process concluded that the lead time before repair was 485.46 minutes to 327.7 minutes after repair. % to 58% after improvement. By looking at the previous research, the researcher wants to conduct a similar study using the Activity Relationship Chart (ARC) method and the Kaizen method. It is hoped that this research can be used as a reference to provide recommendations, in an effort to minimize the motion waste contained in UD. Putera Sroedji Jember with the aim of increasing efficiency in the production process of each work station. In the scientific field, especially for academics and further researchers as a reference reference and information that can be used for further research regarding the layout to improve and develop further research so as to be able to contribute to the development of science.

METHOD

This research was conducted at the UD. Putera Sroedji Jember. The research period was carried out for 2 weeks, which was carried out from October, 11th until October, 23th 2021.

Method

The quantitative data of this research is the calculation of the distance of production activities, time production, and quantity data related to production. But the qualitative data are as follows: company profile,production stage, facility layout, and company production conditions. The data were collected within in October 2021. Basically this research uses a mix-method, namely quantitative research and qualitative research. Qualitative research emphasizes inductive analysis, not deductive analysis (Prastowo, 2012). The data collected is not intended to support or reject the hypotheses that have been compiled before the research begins, but abstractions are compiled as specifics that have been collected and grouped together through careful data collection.

While the data in the form of numbers and qualitative data used as numbers. The quantitative data used in this study are the distance of production activities, production time and quantity data related to production At the data analysis stage, it will then be processed according to stages such as measuring the degree of closeness of the relationship between production facilities using the Activity Relationship Chart (ARC) method, Create Work Sheet The results of the ARC analysis are then used to determine the location of each department which is arranged in a more systematic way in the worksheet , Create Block Templates Data that has been processed in the worksheet then entered in the Activity Template, after the Activity Template Block Diagram (ATBD) is created, proceed by compiling ARD. Then calculate the optimization of the proposed layout on UD. Putera of Sroedji, and the last as a solution in its improvement using kaizen method. The reason for using the kaizen method as a refinement of the previous methods is because 5S or Kaizen is very important as a foundation in making a process as short as possible, reducing costs production, quality output and reduce the incidence of accidents by the existence of better conditions (Imai, 2001)

RESULTS AND DISCUSSION

UD. Putera Sroedji is a medium-sized individual company that produces and sells packaged rice located on Jalan Mumbulsari Dusun Krajan RT.02 RW.05 Karang Kedawung Village, Mumbulsari District, Jember Regency. This trading business was established in April 2017

In terms of marketing, until now UD. Putera Sroedji focuses on selling rice to other rice mill partners. Packaging is done at UD. Putera Sroedji already uses his own brand, only in the form of rice rafts measuring 2.5 kg, 5 kg, 10 kg to 25 kg. So that the rice sent by UD. Putera Sroedji still has to be further processed and packaged with certain labels at partner rice factories to reach the final consumers.

The main production activities at UD. Putera Sroedji includes rice drying and milling, while other supporting production activities include material transportation, weighing, and packaging. Raw materials entering the factory range from 1.5 to 2 tons/day, while sales range from 1 to 2.5 tons/day. The raw materials that have just arrived are weighed directly with the vehicle using a digital scale. After weighing, the raw materials will be unloaded from the vehicle and go directly to the drying department. Drying at UD. Putera Sroedji uses manual drying using direct sunlight. The dry raw materials will then be stored in the raw material warehouse, for further processing in the milling machine. The raw material can be ground if the water content has reached 12%. The milling machine used at UD. Putera Sroedji is a milling machine with two processes that functions to separate the husks of the grain from the rice, and to polish the rice to make it whiter with a machine capacity of 2 tons. Rice scales at UD. Putera Sroedji uses a conventional scale which is placed under the milling machine. The rice will be stored in the rice warehouse before being sold.

The advantage of this research compared to previous research is that in general, previous research on re-layout will only find problems that occur and provide solutions, but it is different from this study which adds aspects of refinement with the kaizen method as a reference for regular maintenance. Of course, another advantage is that the method used is still quite rarely used, in contrast to re-layout methods such as Systematic Layout Planning (SLP), Area Allocation Diagram (AAD), and BlocPlan which are of the references that are often used in Layout.

Description of UD's Layout and Production Process Putera of Sroedji

In Figure 1 (see Appendix) is a the production process that became the beginning of production at UD. Putera Sroedji is the weighing department. After being weighed, the raw grain material will be transported to the next process, namely the drying department. In this stage the drying process is carried out in two ways, namely using solar heat and an oven. The dried grain raw material will then be stored and allowed to stand for a certain period of time in the temporary storage of the grain warehouse, for further processing in the stripping and milling machine.

Activity Relationship Chart (ARC) Analysis

After knowing the initial layout of the entire production process of UD Putera Sroedji Jember, an Activity Relationship Chart (ARC) analysis was conducted based on the degree of closeness and the degree of reasoning in the analysis process. Based on the results of the analysis in Figure 2 (see Appendix), there are several components such as the degree of closeness between departments with the symbols I, E, O, U, X. Each symbol has the following meaning, which means that Code I in the ARC analysis describes the relationship between the initial department and the department. it is important to approach the goal. Code E in the ARC analysis illustrates that the relationship between the initial department and the destination department is very important to be closer. Code O in the ARC analysis illustrates that the relationship between the initial department and the destination department is normal or sufficient, the closeness between the two facilities does not really affect the smoothness of the production process. Code U in the ARC analysis illustrates that the relationship between the initial department and the destination department is unnecessary. Meanwhile, Code X in the ARC illustrates that the relationship between the initial department and the destination department is not desirable to be close together.

Worksheets

The previous results are then summarized into a worksheet with the aim of making it easier for the next analysis. Based on Table 1 (see Appendix) is a work sheet obtained from the analysis of the Activity Relationship Chart (ARC). Then the work sheet grouping table is made from the Activity Relationship Chart (ARC) diagram which is shown belowthen used to create an Activity Template Block Diagram (ATBD). Preparation of Activity Template Block Diagram (ATBD) and will serve as a guide for rearranging the layout of departments and factory facilities by shortening and moving facilities whose placement is not in accordance with the degree of closeness of relations between departments or factory facilities.

This approach will be carried out by bringing the department or factory facility closer to the priority code contained in the diagram, worksheet, or Activity Template Block Diagram (ATBD). Priority codes E and I, which means their proximity affects the smoothness of the production process and distances departments or factory facilities with code X because they are considered inappropriate and interfere with the smooth production process when brought closer, while codes O and U are considered normal according to company conditions. The results of the Activity Template Block Diagram (ATBD) will then be used as a reference in making the Activity Relationship Diagram (ARD).

Activity Template Block Diagram (ATBD)

The next step is the creation of ATBD, as the first step in making the initial analysis blocks of ARD. Based on the analysis of Figure 3 (see Appendix), this is a further analysis step after making the worksheet, basically all letter codes contained in the worksheet are of course included in the Activity Template Block Diagram (ATBD) but with the exception of the letter U (Unimportant) code, because it is considered that the proximity of the placement is not too taken into account. or which means that it does not have a significant effect on the company's production process activities. As stated in the worksheet, the numerical code explains the reasons for choosing the degree of relationship between departments and production facilities. The next step is cutting to arrange the block diagram template in accordance with the order of the degree of activity that is considered important and necessary.

Table 2 (see Appendix) shows that using the initial layout the total overall time required by UD. Putera Sroedji Jember transfers raw materials for 9,660.45 seconds with an average arrival of raw materials per day 1760 kg. The frequency of transferring raw materials from weighing to external drying is 19 times, the calculation is obtained by dividing the total average arrival of raw materials per day by 43.1% which will become raw materials to be dried (outside drying) per day, which is 760 kg with the weight of raw materials / sacks of 40 kg. The transfer of raw materials from external drying to the raw material warehouse is carried out with a frequency of 19 (rounded up from 18.24) times, the calculation is obtained by dividing the average capacity of raw materials that have been dried (outside drying) which was initially 760 kg and then experienced shrinkage as much as 4% to 729.6 kg with a weight of 40 kg of raw materials / sacks. The frequency of moving materials from the raw material warehouse to stripping is 43 (rounded up from 42.24) times, obtained by dividing the average ready-to-process raw materials per day (combined with raw materials dried in the drying machine) of 1,689, 6 kg with a weight of 40 kg of raw materials / sacks.

The next transportation frequency is 28 times (rounded up from 27.4), obtained from the results between the average capacity of raw materials to the stripping machine per day, which is 1,689.6 kg, there is a shrinkage that occurs around 35% and the results that will be continued to the next process are only about 65%, which is 1,098.24 kg, then divided by the weight of the raw material/sack of 40 kg. The frequency of transportation from the milling department to the rice warehouse is 27 times (rounded up from 26.08), obtained from the results between the average raw materials to the milling machine per day (there has been shrinkage) which is 1,098.24 kg there is a shrinkage that occurs in the process milling is about 5%, which is 1,043.3 kg, then divided by the weight of raw materials / sacks of 40 kg. From all the series of raw material transfer processes carried out in each department using an average of 2 people.

Table 3 (see Appendix) shows that using the initial layout the total travel time required by UD. Putera Sroedji Jember transfers raw materials for 11,295.5 seconds with an average arrival of raw materials per day 1760 kg. The frequency of transferring raw materials from weighing to drying is 25 times, the calculation is obtained by dividing the total average arrival of raw materials per day by 56.9% which will become raw materials to be dried (drying machine) per day, which is 1000 kg with weight of raw material / sack of 40 kg. The transfer of raw materials from the drying machine to the raw material warehouse is carried out with a frequency of 24 times,

The calculation is obtained by dividing the average capacity of dried raw materials (drying machine) which was initially 1000 kg and then experienced a shrinkage of 4% to 960 kg with a weight of 40 kg of raw materials/sack. The frequency of moving materials from the raw material warehouse to stripping is 43 (rounded up from 42.24) times, obtained by dividing the average ready-to-process raw materials per day (combined with raw materials dried in the drying machine) of 1,689.6 kg with the weight of raw materials / sacks of 40 kg. The next transportation frequency is 28 times (rounded up from 27.4), obtained from the results between the average capacity of raw materials to the stripping machine per day which is 1,689.6 kg there are

The shrinkage that occurs is about 35% and the results that will be continued to the next process are only about 65%, which is 1,098.24 kg, then divided by the weight of raw materials / sacks of 40 kg. The frequency of transportation from the milling department to the rice warehouse is 27 times (rounded up from 26.08), obtained from the results between the average raw materials to the milling machine per day (there has been shrinkage) which is 1,098.24 kg there is a shrinkage that occurs in the process milling is about 5%, which is 1,043.3 kg, then divided by the weight of raw materials / sacks of 40 kg.

Of all the series of raw material transfer processes carried out in each department using an average of 2 people. Tables 2 and 3 show that both UD raw material transfer paths. Putera of Sroedji Jember only uses human labor in completing production activities. The time required for human labor to move materials from one department to another which ranges from 2.91 seconds/meter to 3 seconds/meter, Then human labor is used to transport raw materials that weigh around 40 kg. If the raw materials entering the company's factory range from 1-2 tons/day, then the drying machine can accommodate all raw materials with the production flow according to line 2, while outside drying (line 1) with a capacity of 3.5 - 4 tons is used if the raw materials are incoming raw material exceeds the capacity of the drying machine.

Table 4 (see Appendix) shows that applying the proposed layout can reduce the overall time of route 1 by 6,831.75 seconds. The change in distance is an optimal number that is adjusted to the conditions of the company's production area while still paying attention to procedures, one of which is between departments having a minimum distance of 3 meters to dampen engine vibration between departments. From the proposed layout that has been analyzed, there are several significant changes, such as the raw material warehouse section to the stripping department which was initially 42.6 meters away to 31.5 meters. Because in the initial layout, the two departments had to go far past the drying machine department and the milling department first. Meanwhile, in the proposed layout of the two departments, there is no need to rotate further because the production flow process is carried out following the sequence of the production process procedures in general.

Table 5 (see Appendix) shows that applying the proposed layout can reduce the travel time for route 2 by 7,315.35 seconds. The use of frequency and transportation time on line 2 is adjusted to the initial layout. Changes only occur in the distance traveled from one department to another. The change in distance is an optimal number that is adjusted to the conditions of the company's production area while still paying attention to procedures, one of which is between departments having a minimum ofa distance of 3 meters to dampen engine vibrations between departments. From the proposed layout that has been analyzed, there is a significant change in the weighing section towards the drying machine which was initially at a distance of 28.25 meters to 13 meters. In the initial layout between the two departments, they must first rotate through the office. While in the proposed layout of the two departments, there is no need to rotate further because the production flow process is carried out following the sequence of the production process procedures in general by moving the less strategic part of the office itothe middle of the company's production area. Tables 4 and 5 show the total time required by UD. Putera Sroedji Jember by applying the proposed layout. There is a reduction in the time of the two lines, so the application of the proposed layout needs to be considered to improve production efficiency which can affect the quality and quantity of the output produced.

Kaizen Method

The Kaizen method in this study was used to improve and support the implementation of the Activity Relationship Chart (ARC) and Activity Relationship Diagram (ARD)methods. In the Kaizen method, several problems were found with the solution as follows. Table 6 (see Appendix) shows that the layout evaluation with Kaizen was carried out at UD. Putera Sroedji Jember supports ARC and ARD methods. The ARC method is used as the main method, meaning that this method is used to determine the relationship between one part and another. The ARC method can also be used as a consideration in making decisions to move rooms/sections with to shorten flow of the ongoing production process. After that, it was continued with ARD as an analysis in making the layout of the proposal. Then the last one is the Kaizen method as a complement to the previous methods and of course also used to support the implementation of the ARC and ARD methods, with the implementation of the Kaizen method it is hoped that it can foster good habits in the implementation of production in order to facilitation process.

Activity Relationship Diagram (ARD)

After analyzing through the worksheet, Activity Template Block Diagram (ATBD) and Time Table for the Transfer of Raw Material Production Process Proposed Paths 1 and 2 in the previous process. The next step is the creation of the final ARD. Figure 4 (see Appendix) is the result of the Activity Relationship Diagram (ARD) analysis obtained from the Activity Template Block Diagram (ATBD). Information or results from the Activity Template Block Diagram (ATBD) are analyzed to determine the location of the factory facility layout, which is based on the degree of closeness of the relationship and sorted according to the flow of the production process.

Layout Efficiency Calculation

1. Line Distance Efficiency 1 = $\frac{101{,}85-70{,}70}{101{,}85}\ X\ 100\ \% = 30{,}65\ \%$
2. Line Distance Efficiency 2 = $\frac{119{,}35-73{,}95}{119{,}35}\ X\ 100\ \% = 38{,}07\ \%$

The efficiency calculation above shows that by rearranging the departments and production facilities according to the proposed layout, it is estimated that the production distance of line 1 is 31.25 m or more efficient by 30.65% with a time saving of 2.828.75 seconds. 2 along 45.4 m or more efficient by 38.07% with a time saving of 3,980.15 seconds compared to the initial layout applied by the previous company.

Figure 5 (see Appendix) shows that relocating the office (which is in the middle of the production area) will facilitate human movement and will reduce waste motion that occurs in production process activities, while the relocation of several departments that need to be closer to other departments cannot be done because their placement is permanent. Where as forparking lots and bathrooms have an undesirable degree of proximity to the production department because they can interfere with the smooth running of production. Therefore the two facilities were placed or moved close to the office. In the ARC analysis, the office has a "normalproximity which means it can be close to any department or facility. It can be a barrier between the production facility and the production departmentThe following is a proposed production process flow based on the analysis results of Activity Rethe lationship Chart (ARC) and Activity Relationship Diagram (ARD) which can be applied to UD. Putera of Sroedji Jember

CONCLUSION

Production layout design using the Activity Relationship Chart (ARC) method is generally strongly influenced by level of inter-departmental workflow order (Kolo et al., 2021) . After analyzing the factors that cause activities related to waste motion in the rice production process, it can be known through Activity Relationship Chart (ARC) analysis. The results of the analysis of the Activity Relationship Chart (ARC) method show that the layout of the UD. Putera Sroedji Jember is not optimal, this can be proven or the factors that cause waste motion through the placement of production facilities that are not in accordance with the order of the production process and the distance of several departments is far enough that causes waste motion and will result in the level of time efficiency in the activity process The company's production is strengthened by the degree of closeness and the level of reasoning in the attribute analysis of the Activity Relationship Chart (ARC). Therefore, rearrangement of production facilities needs to be done to shorten the distance of the production process flow, shorten the time of the production process, and of course facilitate the activities of the production process. The proposed layout with a workplace that is absolutely necessary is approached on the grounds of the same sequence of work flow and execution of work (Kolo et al., 2021)

Then the results are continued to the next analysis, namely the Activity Relationship Diagram (ARD) to provide a proposed improvement and improvement design to minimize the factors that cause waste motion in the rice production process, which can be interpreted in rearranging the layout of production facilities at UD. Putera Sroedji Jember will be more optimal by relocating several production facilities whose placement process is not permanent according to the degree of reason and closeness of the relationship. Based on the calculation of the layout efficiency, it shows that by rearranging the production facilities according to the proposed layout, it is estimated that the production distance of line 1 is 31.25 m or more efficient by 30.65% with a time saving of 2.828.75 seconds, line 2 along 45.4 m or more efficient by 38.07% with a time saving of 3,980.15 seconds compared to using the initial layout.

After going through the proposed improvement design, the next improvement is in minimizing motion waste, one of which is using the Kaizen method. The Kaizen method is basically an approach that has several elements such as seiri, seiton, seiso, seiketsu and shitsuke by knowing the meaning and doing it correctly and followed by periodic evaluations such as briefings, meetings and internal audits will produce tremendous benefits for the company but not in a short time will gradually see the difference that will be felt by the company. This way of thinking and managing resources affects all the production chain and even crosses organizational boundaries with the consequence of affecting the supply chain management and logistics. In order to keep chasing the highest standards, companies need to implement the so-called Kaizen concept this means that business activities must continuously improve all departmental units by involving employees from senior management to operators (Simeoni, 2020)

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