Facility Planning of ABC Cafe with SLP Approach

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Abstract

Cafe, as one of the service industries, is important to have a good facility layout to make customers enjoy the food and beverages and also the ambiance provided at the cafe. The object of this research is one of the cafe in Bogor. This study uses the SLP method through analysis of ARC, ARD, and calculating the travel distance to determine the material handling costs incurred. The result of the re-layout shows that the cost of material handling, travel distance, and time for operational standards decreased.

Keywords

Cost of Material Handling, Re-layout, Service Industry, Systematic Layout Planning (SLP), Time standard.

Introduction

Technology development and a highly competitive market in the industry field require businesses to develop their own companies. In order to do that, innovations and improvement need to be done so companies can compete with other businesses and most importantly to improve their service and product quality. Facility layout not only facilitates a company's operational performance, but also has an impact on customer satisfaction and loyalty (Ibrahim et al., 2018). Hence, a well designed facility layout can support companies to give their best quality.

Industrial facility layouts are defined as a process to physically arrange the factors shaping the production system so that they suitably and efficiently fulfill the organization's strategic objectives. The purpose of the layout design is to minimize material handling costs where material handling has an impact of 40% from 80% of all operational costs and optimizes the production process and the relationship between workers, the flow of materials and goods, the flow of information, and the working methods of a company. Therefore a facility layout has a significant impact on a business performance where it affects the efficiency of production systems and their productivity level (Altuntas and Selim 2012; Ku et al. 2011;Navidi et al. 2012).

Facility layouts are needed in any kind of business, including a cafe, where customers come to enjoy food and beverages and also the ambience provided at the cafe. Therefore, it is crucial for a cafe to have a proper facility layout to give the best quality to its customers.

This research is conducted in ABC cafe, a cafe located in Bogor, West Java. It was founded in 2017 and has been serving a variety of coffee drinks, main dishes, and sweet snacks. It has both indoor and outdoor seating areas. ABC is built in an old house building that functions as a boarding house, which was later renovated into a commercial area (cafe).

After observing the production layout, which is the bar area and the kitchen area, we concluded that ABC's efficiency and productivity can be improved through layout planning. Hence, the objective of this paper is to

improve the layout of the production area (kitchen) of a Cafe in Bogor, Indonesia through the application of Systematic Layout Planning (SLP) methodology. This research will analyze the material flow, formulate new alternatives, and then suggest a new and improved layout.

2. Literature review

Systematic Layout Planning

The restructuring of the layout purpose is to optimize the work process, also ensuring the security of the flow of materials, people, and information (Monks 1987). There are several layout planning algorithms that can be used, with their own peculiarities, pros, and cons. This research uses a highly used methodology, the SLP method, especially in small- to mid-size companies, due to its accessibility (Gilbert 2004). This method aims to regulate the procedures for selecting the best layout for the factory facilities and help in the subsequent decision-making by the company (Silva and Moreira 2009).

According to Tortorella and Fogliatto (2008), SLP has three macro steps:
Analysis : This step is about the collection of company data, the process flow, and the activities related to it. To obtain the flow, the "From-to Chart" is used to see the distance traveled by the materials in the layout. Then use "Relationship Map." for obtaining the description of the data from the related activities that need to be physically close to each other to those that are irrelevant or even undesirable (Thompson 2010).
Research : This step is about the design of different layout alternatives. Therefore, a "Relationship Diagram" is used to arrange the various sectors according to their required proximity. **Selection** : This step is about presenting the new layouts and will benefit from the project improvements (Muther and Wheeler 2000).

Performance indicators for food service layout

From the consolidated literature review, one of the main indicators is traveled distances which are directly related to the layout arrangement and will help measure the performance of the proposed changes in the alternative (Ruiz et al. 2014; Malekshahi 2013). In addition, several studies (Huan and Qiang 2011; Ho 2011; Reich 2011) assess financial results by means of operating costs impact, which represent the effect of any change on the organization of the system.

3. Methods

This research was conducted to improve the layout of the facilities of the observed objects, especially in the coffee & beverage bar section and the food-making kitchen. Before starting the research, we conducted a preliminary study by looking for references to previous research journals related to the topic we presented. Then we collected primary data through interviews and direct observation to the location of the research object. The facility used as the object of our research is Third Wave Coffee Co. located in Bogor City, West Java. The cafe has various menus, both from drinks and food. The researcher chose the food menu with the longest production time and the best-selling beverage menu, namely Carbonara Katsudon and Iced Coffee Latte as a research sample. We took the two menus because they were considered to be able to represent all other menus, both in terms of food and drinks.

The next step, the data is processed as our reference in designing new cafe facility layout recommendations. The approach used to design the layout of this cafe facility is to use Systematic Layout Planning (SLP). The SLP method can be used to solve problems related to various kinds of material flow problems in production, transportation, warehousing, supporting, assembly, and office activities. (Nugeroho, 2021). The following are the steps in using the SLP method.

Step 1: Material Flow
Material flow analysis is a quantitative data analysis for each time a piece of material moves between operational activities or across departments is known as a material flow analysis. The material flow analysis used in this study is the operation process chart and flowchart diagram.
Step 2: Activity Relationship Chart (ARC)
Activity Relationship Chart (ARC) shows how several areas interact with one another in order to encourage the production of the item. The degree of closeness between processes to each other can be evaluated using ARC.
Step 3: Activity Relationship Diagram (ARD)
Diagram of Activity Relationships (ARD) Muther's method involves showing the degree of ARD using a line relationship.
Step 4: Calculation Cost of Material Handling
Cost of Material handling is the cost incurred by the cafe in using material handling. Material handling in this research object is in the form of workers or men. In this research object, material handling is in the form of workers

or man. Based on estimates of the cost of material handling, we chose to alter the arrangement of the bar and kitchen in this instance.
Step 5: Designing Alternative Layout
Develop Layout Alternatives are created using the Activity Relationship Diagram, taking alterations into account and basing them on real-world factors.
Step 6: Improvement
Re-layout to reduce cost of material handling based on the results of alternative layouts that have been made.

4. Data Collection

The data taken primary is divided into two types of data, namely data based on observations and interview data which are described in table 1.

Table 1. Data Collected

Data Collected by Observation	Data Collected by Interview Cafe Owner & Cafe Employee
Cafe Layout Production process Customer service flow	Cafe operating hours Employee salary per month Material flow Production process validation

Based on the data in Table 1, there are three data collected by observation (cafe layout, production process, and customer service flow) and four data collected by interviewing the cafe owner and employees (cafe operating hours, employee salary per month, material flow, and production process validation).

The cafe layout data is used as the first reference for researchers to analyze the layout of the cafe facilities. In the cafe layout, it also shows the flow of incoming material from the arrival location of the material (parking area) to the inventory location (inside the cafe), the flow of employee movements inside the cafe (customer service flow), and the flow of customers from outside the cafe until they determine seats inside the cafe as shown in Figure 1.

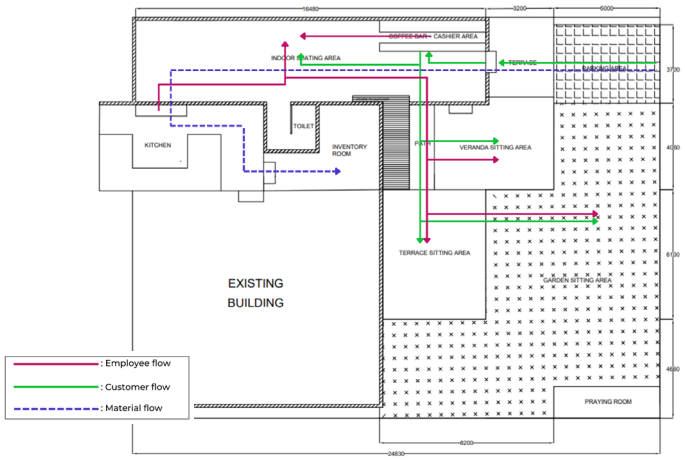
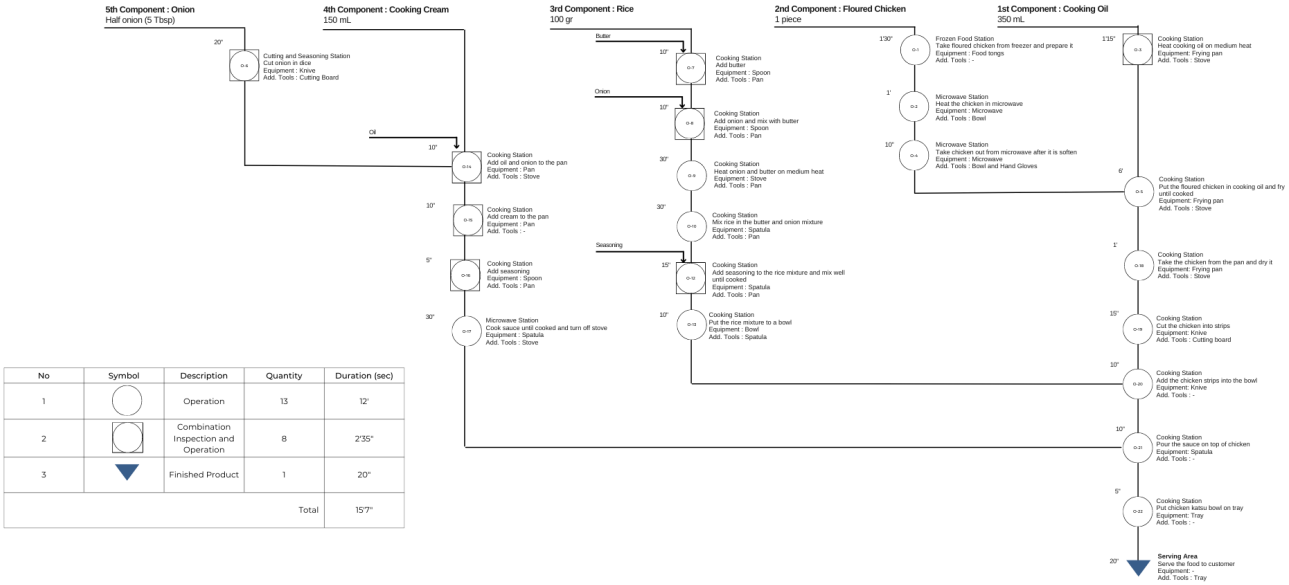


Figure 1. Third Wave Cafe Co. Layout

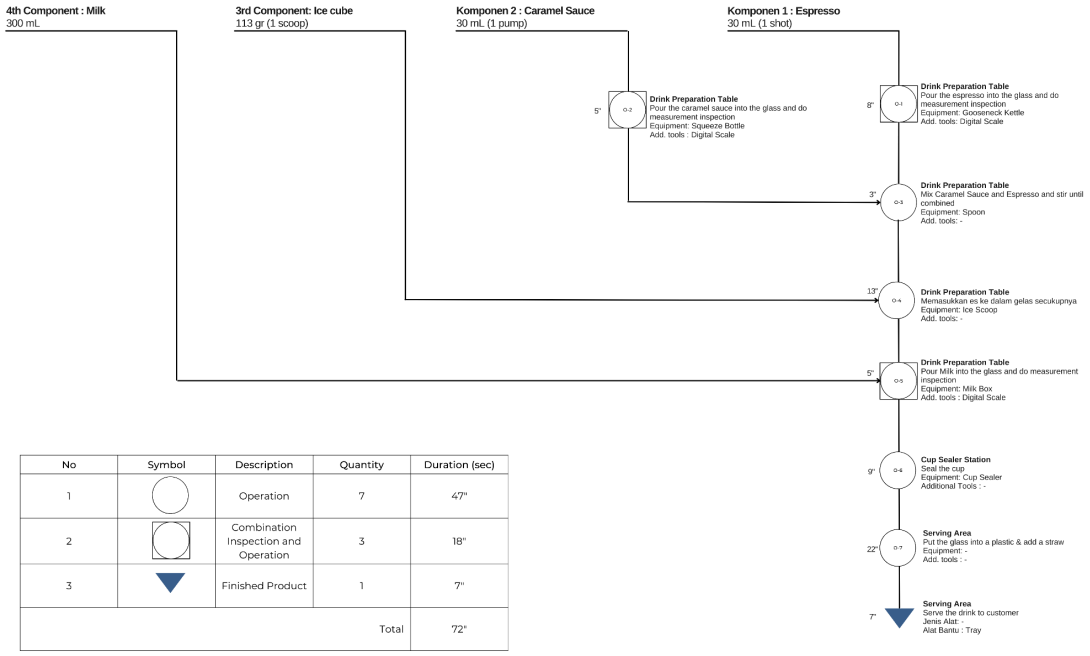
Then, the production process of the selected menus are translated by researchers as an operation process chart (OPC). The selected menu is based on the best-seller items in each category (food and drink) which are Chicken Katsu Carbonara and Iced Coffee Latte. The process charts between food and drink are shown separately.

Figure 2 shows the process of making Chicken Katsu Carbonara. In total, there are 13 operations with a total duration of 12 minutes. Then, there are 8 combinations of inspection and operation with a total time of two minutes and thirty-three seconds. Last, the finished product is served for about 20 seconds. Therefore, the total of making Chicken Katsu Carbonara is needed in 15 minutes and 7 seconds.



No	Symbol	Description	Quantity	Duration (sec)
1	○	Operation	13	12'
2	□	Combination Inspection and Operation	8	2'35"
3	▽	Finished Product	1	20"
			Total	15'7"

Figure 2. Operation Process Chart of Chicken Katsu Carbonara



No	Symbol	Description	Quantity	Duration (sec)
1	○	Operation	7	47"
2	□	Combination Inspection and Operation	3	18"
3	▽	Finished Product	1	7"
			Total	72"

Figure 3. Operation Process Chart of Iced Coffee Latte

Figure 3 shows the process of making Iced Coffee Latte which is made from a total of 11 operations in 1 minute 2 seconds. Process is divided into three, namely operation, combination of inspection and operation, and finished product. In making Iced Coffee Latte there are a total of 7 operations with a total duration of 47 seconds, 3 combinations of inspection and operations with a total duration of 18 seconds, and the finished products are served with a total duration of 9 seconds.

In this study, researchers focused on re-layouting of the facilities in the kitchen and cafe bar section. Researchers choose these two locations because most of the work process in making products are done by employees in these two locations. The layout of the kitchen and bar facilities can be seen in the figure 4 and 5.

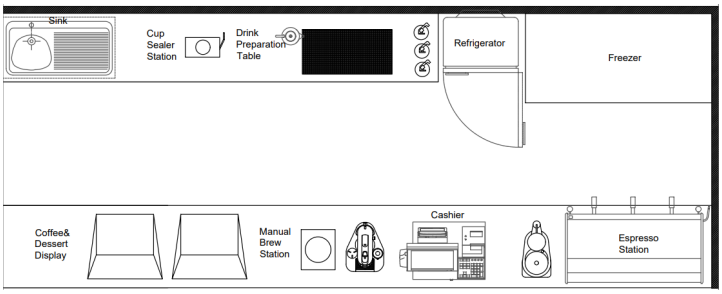


Figure 4. Bar Layout

Figure 4 shows the layout of Third Wave Cafe's Bar. Most of the processes taken in the bar are taken by the employee for receipt orders and making drinks. All orders, both food and drink orders, are received at the cashier. Then, food orders will be sent to the kitchen. Meanwhile, drink orders will be immediately made in the bar. Non-coffee drinks will take place in the back, but the coffee drink will take place in front of the bar.

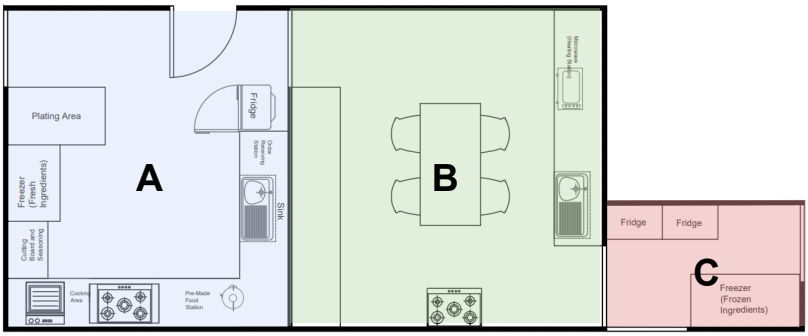


Figure 5. Kitchen Layout

Figure 5 shows the layout of Third Wave Cafe's Kitchen. The main kitchen for making orders takes place on the left side as shown in figure 5. From the layout, it can be seen that some equipment is located apart from the main kitchen. Main kitchen is shown in blue area (area A on figure 5). The green area (area B on figure 5) will only be visited when the microwave is in use. The red area is inventory location. When orders are received at the Order Receiving Station, the orders will be made immediately at the kitchen.

Results and Discussion

Numerical Results

Cost of Material Handling (Iced Coffee Latte)

Below are the calculations of material cost handling based on the human resource (worker). The calculations are done using the standard minimum wage of the region and with the assumption that there are approximately 100 portions sold within a day.

Worker Salary = Rp 144.341,65 / day
Working Time = 8 hours / day
Worker Salary/hour = Rp 18.042,71 / hour
Cost of Material Handling = Worker Salary (per hour) / Distance (per hour)
= Rp 18.042,71/13,14
= Rp 1.373,11

Table 2. Cost of Material Handling of making Iced Coffee Latte

From	To	Material Handling	Distance (m)	Cost of Material Handling	Frequency (total coffees made)	Total Cost of Material Handling
C	D	Man	0,186	Rp1.373,11	12	Rp3.064,78

D	G	Man	0,216	Rp1.373,11	12	Rp3.559,10
G	E	Man	0,210	Rp1.373,11	12	Rp3.460,24
E	G	Man	0,210	Rp1.373,11	12	Rp3.460,24
G	H	Man	0,117	Rp1.373,11	12	Rp1.927,85
H	C	Man	0,156	Rp1.373,11	12	Rp2.570,46
Total			**1,095**	**Total**		**Rp18.042,67**

From the calculation based on table 2, it is known that the total cost of material handling for making Iced Coffee Latte in an hour is Rp18.042,67 with a total distance of 1,095 m. This distance is measured inside the bar area.

Cost of Material Handling (Chicken Katsu Carbonara)

Below are the calculations of material cost handling based on the human resource (worker). The calculations are done using the standard minimum wage of the region and with the assumption that there are approximately 50 portions sold within a day.

- Worker Salary = Rp 144.341,65 / day
- Working Time = 8 hours / day
- Worker Salary/hour = Rp 18.042,71 / hour
- Cost of Material Handling = Worker Salary (per hour) / Distance (per hour)
  = Rp 18.042,71/366 meter
  = Rp49,30

Table 3. Cost of Material Handling of Chicken Katsu Carbonara

From	To	Material Handling	Distance (m)	Cost of Material Handling	Frequency (Total portions made)	Total Cost of Material Handling
J	M	Man	2,254	Rp49,30	6	Rp666,69
M	P	Man	7,780	Rp49,30	6	Rp2.301,18
P	K	Man	8,440	Rp49,30	6	Rp2.496,40
K	P	Man	8,440	Rp49,30	6	Rp2.496,40
P	K	Man	8,440	Rp49,30	6	Rp2.496,40
K	L	Man	0,622	Rp49,30	6	Rp183,98
L	O	Man	1,300	Rp49,30	6	Rp384,52
O	K	Man	1,665	Rp49,30	6	Rp492,48
K	L	Man	0,622	Rp49,30	6	Rp183,98
L	K	Man	0,622	Rp49,30	6	Rp183,98
K	Q	Man	1,360	Rp49,30	6	Rp402,26
Q	K	Man	1,360	Rp49,30	6	Rp402,26
K	L	Man	0,622	Rp49,30	6	Rp183,98
L	K	Man	0,622	Rp49,30	6	Rp183,98
K	Q	Man	1,360	Rp49,30	6	Rp402,26
Q	K	Man	1,360	Rp49,30	6	Rp402,26
K	L	Man	1,007	Rp49,30	6	Rp297,85
L	K	Man	1,007	Rp49,30	6	Rp297,85
K	N	Man	2,793	Rp49,30	6	Rp826,12

N	K	Man	2,793	Rp49,30	6	Rp826,12
K	L	Man	0,622	Rp49,30	6	Rp183,98
L	K	Man	0,622	Rp49,30	6	Rp183,98
K	L	Man	0,622	Rp49,30	6	Rp183,98
L	O	Man	1,300	Rp49,30	6	Rp384,52
O	K	Man	1,665	Rp49,30	6	Rp492,48
K	O	Man	1,665	Rp49,30	6	Rp492,48
Total			**60,965**	**Total**		**Rp18.032,36**

From the calculation based on table 3, it is known that the total cost of material handling for making Chicken Katsu Carbonara in an hour is Rp18.032,36 with a total distance of 60,965 m. This distance is measured inside the kitchen area.

1.1. Graphical Results

1.1.1. Coffee Bar

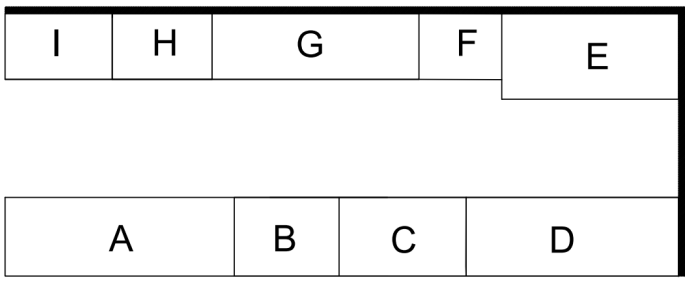


Figure 6. Simplified Coffee Bar Layout

Researchers divided the bar area into several workstations which are shown in Figure 6. Then, each of the workstations are assigned a code listed below in table 4.

Table 4. Coffee Bar Area Codes

Department	Code
Coffee & Dessert Display	A
Manual Brew Station	B
Cashier	C
Espresso Station	D
Freezer	E
Refrigerator	F
Drink Preparation Table	G
Cup Sealer Station	H
Sink	I

Based on table 4, the coffee bar area has a total of 9 workstations. Each station relation is then identified through an Activity Relationship Chart. Activity Relationship Chart is made to know the level of correlation between two

workstations, considering work order, worker movement, material flow, equipment used, and the hygiene of the material. Those considering factors are used as the reason for determining the importance of the two workstations to be placed. The importance level codes (Table 5) and reasons for importance (Table 6) are shown on the table below.

Table 5. Codes of Importance Level

Code	Definition	Color
A	Absolutely necessary	Red
E	Especially Important	Orange
I	Important	Green
O	Ordinary Importance	Blue
U	Unimportant	Yellow
X	Closeness Undesirable	Grey

Table 6. Reason of Importance

Code	Reason
1	Adjacent Work Order
2	Speed of worker movement
3	Material flow between two workstations
4	Use the same equipment
5	Hygiene of materials or equipments used

Activity Relationship Chart.of the coffee bar area is shown in figure 7.

No	Department
A	Coffee & Dessert Display
B	Manual Brew Station
C	Cashier
D	Espresso Station
E	Freezer
F	Refrigerator
G	Drink Preparation Table
H	Cup Sealer Station
I	Sink

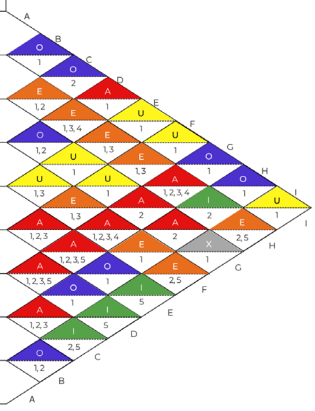


Figure 7. Activity Relationship Chart (ARC) of Coffee Bar

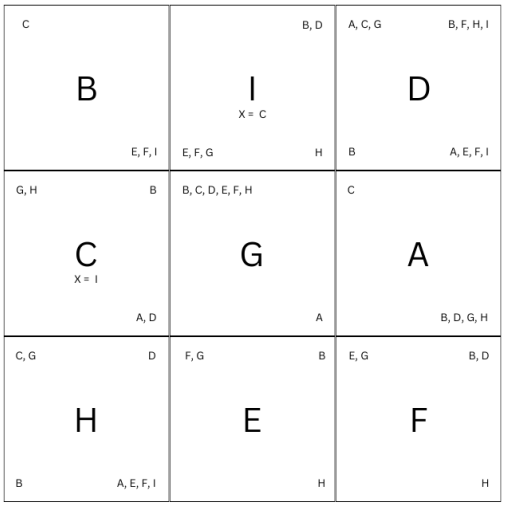


Figure 8. Activity Relationship Diagram (ARD) of Coffee Bar

Based on the figure 7 which shown the ARC of Coffee Bar, there are several workstations in accordance with the activities based on the reasons in Table 6, among others:

a. Manual Brew Station (B) and Espresso station (D) is absolutely necessary because of the adjacent work order.
b. Manual Brew Station (B) and Drink Preparation Table (G) is absolutely necessary because of the adjacent work order, speed of worker movement, material flow between those workstations, and use of the same equipment.
c. Freezer (E) and Refrigerator (F) is absolutely necessary because of the adjacent work order, speed of worker movement, and material flow between those workstations.
d. Cashier (C) and Drink Preparation Table (G) and Cup Sealer Station (H) are absolutely necessary because of the speed of worker movement.
e. Between Freezer (E) and Refrigerator (F) with Drink Preparation Table (G) are absolutely necessary because of the adjacent work order, speed of worker movement, material flow between those workstations, and hygiene of materials used.
f. Drink Preparation Table (G) and Cup Sealer Station (H) is absolutely necessary because of adjacent work order, speed of worker movement, and material flow between those workstations.

Based on ARC results, then the researcher can determine the possible improvement for Bar Layout. Workstations that are absolutely necessary will be the highest priority to be located imminently. The proposed improvement location of proximity between workstations on the bar is shown in Figure 8.

Kitchen Area

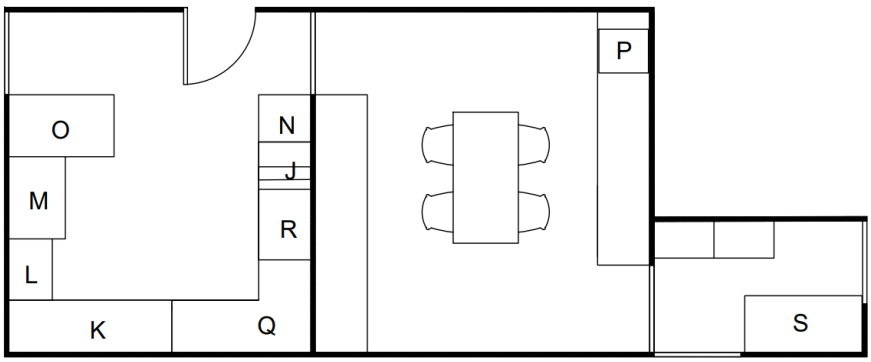


Figure 9. Simplified Kitchen Layout

Researchers divided the kitchen area into several workstations which are shown in Figure 9. Then, each of the workstations are assigned a code listed below in table 7.

Table 7. Kitchen Area Codes

Department	Code
Order Receiving Station	J
Cooking Area (Stove & Deep Fryer)	K
Cutting Board & Seasoning Station	L
Freezer (Fresh Ingredient)	M
Refrigerator (Fresh Ingredient)	N
Plating Area	O
Microwave (Heating Station)	P
Pre-made Food Station	Q
Sink (Dishwashing Station)	R
Inventory (Frozen Ingredient)	S

Based on table 7, the kitchen area has a total of 10 workstations including from the stations outside of the main kitchen area. Each station relationship is then identified through the activity relationship chart on figure 10.

Figure 10 is the Activity Relationship Chart in the kitchen, identified to determine which activities should be adjacent and far apart in the area. The importance level codes (Table 5) and reasons for importance (Table 6) are shown on the table above.

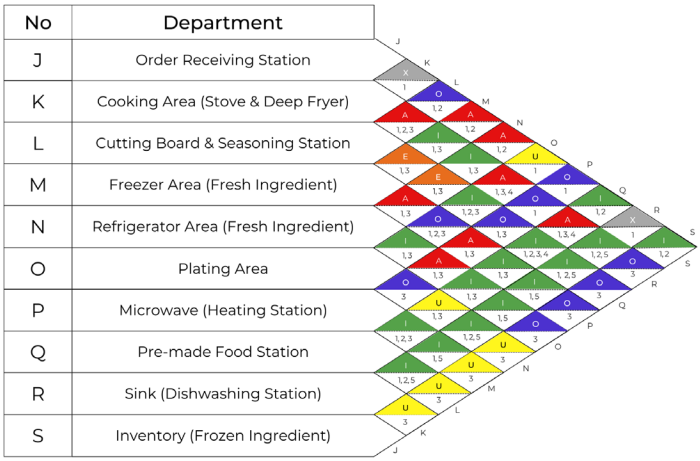


Figure 10. Activity Relationship Chart (ARC) of Kitchen

Based on the figure 10 which shown the ARC of Kitchen, there are several workstations in accordance with the activities based on the reasons in Table 6, among others:

a. Order Receiving Station (J), Freezer Area (M) and Refrigerator (N) is absolutely necessary because of the adjacent work order.
b. Cooking Area (K), Cutting Board & Seasoning Station (L), Plating Area (O), and Pre-made Food Station (Q) is absolutely necessary because of the material flow between those workstations
c. Order Receiving Station (J), Freezer Area (M) and Refrigerator (N), and Microwave (P) is absolutely necessary because of the adjacent work order, speed of worker movement, and material flow between those workstations.
d. Plating Area (O) and Cooking Area (K) is absolutely necessary because of the adjacent work order, speed of worker movement, and material flow between those workstations.
e. Pre-made Food Station (Q) and Cooking Area (K) is absolutely necessary because of the adjacent work order, speed of worker movement, and material flow between those workstations.

f. Cooking Area (K) and Cutting Board & Seasoning Station (L) is absolutely necessary because of the adjacent work order and speed of worker movement
g. Freezer Area (M) and Refrigerator (N), and Microwave (P) is absolutely necessary because of the adjacent work order, speed of worker movement, and material flow between those workstations.

Based on ARC results, the possible improvement for Kitchen Layout can be determined. Workstations that are absolutely necessary will be the highest priority to be located imminently. The proposed improvement location of proximity between workstations on the bar is shown in Figure 11.

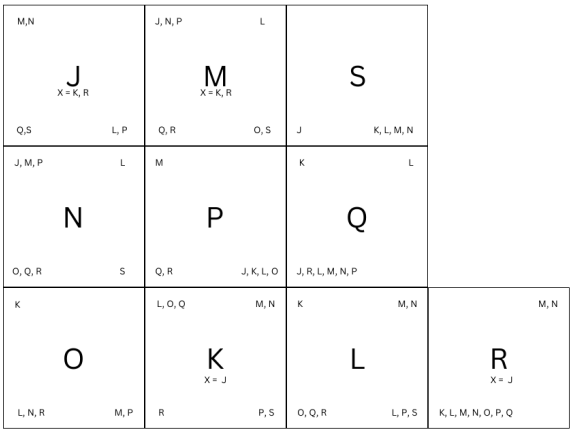


Figure 11. Activity Relationship Diagram (ARD) of Kitchen

Proposed Improvements

Travel Distancing (Coffee)

Below is the travel distance for making a coffee. The improved layout reduces travel distance from 1,095 m to 0,901 m shown in Table 6. The improved layout is obtained by making changes in several stations' positions.

The process of making coffee at the thirdwave cafe before improvements can be seen in figure 12 which shows the material flow.

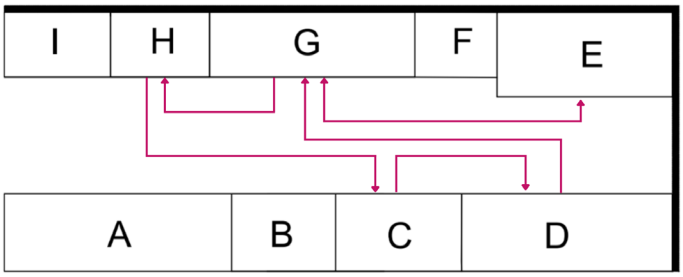


Figure 12. Coffee Bar Material Flow Before Improvement

In Figure 13 it can be seen that after improvement, the process of making coffee by the thirdwave cafe is simpler.

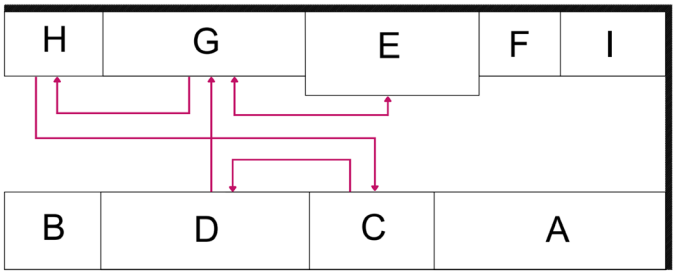


Figure 13. Coffee Bar Material Flow After Improvement

Table 8. Improvement of Travel Distance (Coffee Bar)

From	To	Material Handling	Distance Before (m)	Distance After (m)
C	D	Man	0,186	0,130
D	G	Man	0,216	0,090
G	E	Man	0,210	0,146
E	G	Man	0,210	0,147
G	H	Man	0,117	0,118
H	C	Man	0,156	0,270
Total			**1,095**	**0,901**

From the table above, we can see the calculations of the travel distance before and after the layout improvement. The total distance is improved from 1,095 m to 0,901 m. With the difference of 0,194 m, the layout improvement proved to be significant.

Travel Distancing (Chicken Katsu Carbonara))

Below is the travel distance for making Chicken Katsu Carbonara. The improved layout is done by repositioning several stations, particularly for Station P since it is initially placed in a separate room.

The process of making Chicken Katsu at the thirdwave cafe before improvements can be seen in figure 14.

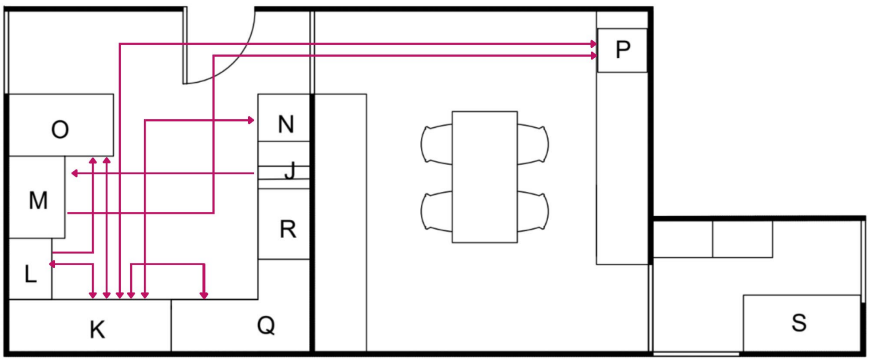


Figure 14. Kitchen Material Flow Before Improvement

In Figure 15 it can be seen that after improvement, the process of making Chicken Katsu can be done in one area so that is more efficient.

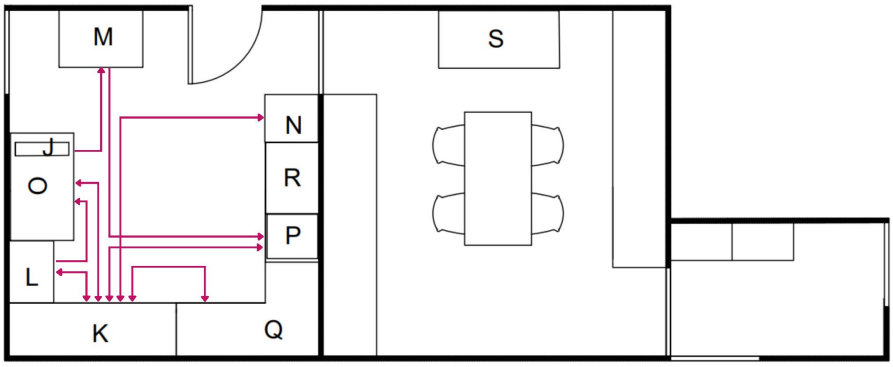


Figure 15. Kitchen Material Flow After Improvement

Table 9. Improvement of Travel Distance (Kitchen)

From	To	Distance before (m)	Distance after (m)
J	M	2,254	0,986
M	P	7,780	2,666
P	K	8,440	2,024
K	P	8,440	2,024
P	K	8,440	2,024
K	L	0,622	0,622
L	O	1,300	0,971
O	K	1,665	1,389
K	L	0,622	0,622
L	K	0,622	0,622
K	Q	1,360	1,360
Q	K	1,360	1,360
K	L	0,622	0,622
L	K	0,622	0,622
K	Q	1,360	1,360
Q	K	1,360	1,360
K	L	1,007	0,622
L	K	1,007	0,622
K	N	2,793	2,793
N	K	2,793	2,793
K	L	0,622	0,622

L	K	0,622	0,622
K	L	0,622	0,622
L	O	1,300	0,971
O	K	1,665	1,389
K	O	1,665	1,389
Total		**60,965**	**33,079**

The re-layout of the kitchen has shown a significant improvement of the travel distance to make the Carbonara Katsudon (Table 9). The most significant changes can be seen from the distance to walk to Station P such as the travel distance from station K to P where the initial distance was 8,440 m and now reduces to 2,024 m. Overall, the improvement reduces travel distance from 60,965 m to 33,079 m.

Validation

Improvement Cost of Material Handling (Coffee)

From the previous calculations of material handling cost, it is known that the cost per meter is Rp1373,11. The result of material handling cost after the layout improvement are shown in Table 10.

Table 10. Improvement of Material Handling Cost (Coffee Bar)

From	To	Material Handling	Distance (m)	Cost of Material Handling (Rp)	Frequency (total coffees made)	Total Cost of Material Handling
C	D	Man	0,130	Rp1.373,11	12	Rp2.142,05
D	G	Man	0,090	Rp1.373,11	12	Rp1.482,96
G	E	Man	0,146	Rp1.373,11	12	Rp2.405,69
E	G	Man	0,147	Rp1.373,11	12	Rp2.422,17
G	H	Man	0,118	Rp1.373,11	12	Rp1.944,32
H	C	Man	0,270	Rp1.373,11	12	Rp4.448,88
Total			**0,901**	**Total**		**Rp14.846,07**

After doing the re-layout of the Third Wave Coffee Co bar, Bogor, which was used as a production site for the drinks sold by the cafe, the total distance that workers do when working for 1 hour to make drinks is reduced from 1,095 m to 0,901 also the cost of material handling is reduced from Rp18.042,67 to Rp14.846,07 which was decreased by 18%. In the previous layout, the cafe has an operational standard for making a coffee in 4 minutes which has a travel distance of 1,095 meters. When improvements have been made, it can be reduced to 3,3 minutes with a travel distance of 0,901 meters. So, the efficiency will increase by 18% on travel distance, cost of material handling, and time for making a coffee. (Table 10)

Improvement Cost of Material Handling (Chicken Katsu Carbonara)

From the previous calculations of material handling cost, it is known that the cost per meter is Rp49,30. The result of material handling cost after the layout improvement are as below.

Table 11. Improvement of Material Handling Cost (Kitchen)

From	To	Material Handling	Distance (m)	Cost of Material Handling (Rp)	Frequency (Total portions made)	Total Cost of Material Handling

J	M	Man	0,986	Rp49,30	6	Rp291,64
M	P	Man	2,666	Rp49,30	6	Rp788,56
P	K	Man	2,024	Rp49,30	6	Rp598,66
K	P	Man	2,024	Rp49,30	6	Rp598,66
P	K	Man	2,024	Rp49,30	6	Rp598,66
K	L	Man	0,622	Rp49,30	6	Rp183,98
L	O	Man	0,971	Rp49,30	6	Rp287,20
O	K	Man	1,389	Rp49,30	6	Rp410,84
K	L	Man	0,622	Rp49,30	6	Rp183,98
L	K	Man	0,622	Rp49,30	6	Rp183,98
K	Q	Man	1,360	Rp49,30	6	Rp402,26
Q	K	Man	1,360	Rp49,30	6	Rp402,26
K	L	Man	0,622	Rp49,30	6	Rp183,98
L	K	Man	0,622	Rp49,30	6	Rp183,98
K	Q	Man	1,360	Rp49,30	6	Rp402,26
Q	K	Man	1,360	Rp49,30	6	Rp402,26
K	L	Man	0,622	Rp49,30	6	Rp183,98
L	K	Man	0,622	Rp49,30	6	Rp183,98
K	N	Man	2,793	Rp49,30	6	Rp826,12
N	K	Man	2,793	Rp49,30	6	Rp826,12
K	L	Man	0,622	Rp49,30	6	Rp183,98
L	K	Man	0,622	Rp49,30	6	Rp183,98
K	L	Man	0,622	Rp49,30	6	Rp183,98
L	O	Man	0,971	Rp49,30	6	Rp287,20
O	K	Man	1,389	Rp49,30	6	Rp410,84
K	O	Man	1,389	Rp49,30	6	Rp410,84
Total			**33,079**	**Total**		**Rp9.784,18**

The result of the layout improvement shows a 45,7% improvement where there is a significant decrease in the total distance, from 60,965 m to 33,079 m, which affected the material handling cost from Rp18.032,36 to Rp9.784,18. In the previous layout, the cafe has an operational standard for making a carbonara katsudon in 15 minutes which has a travel distance of 60,965 meters. When improvements have been made, it can be reduced to 8,14 minutes with a travel distance of 33,079 meters. (Table 11)

2. Conclusion

The improvement layout will increase the efficiency of Third Wave Coffee Co, Bogor in making Iced Coffee Latte and Carbonara Katsudon. For making a Iced Coffee Latte, the improvement layout reduces 18% travel distance from 1.095 m to 0.901, cost of material handling from Rp18.042,67 to Rp14.846,07, and duration for making a coffee from 4 minutes to 3.3 minutes. Then, for making Carbonara Katsudon, improvement layout reduces 45,7% travel distance from 60,965 m to 33,079 m, cost of material handling from Rp18.032,36 to Rp9.784,18, and duration for making a Carbonara Katsudon from 15 minutes to 8.14 minutes.

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