

APPLYING VALUE STREAM MAPPING (VSM) TO IMPROVE THE GROCERY

SHOPPING PROCESS

BY

GRISHMA KOIRALA

VIVEKANANDA GOSWAMI

OF

IM605

PRESENTED TO

DR. ESTEBAN SOTO VERA

SOUTHEAST MISSOURI STATE UNIVERSITY

Introduction Of VSM

VSM is a lean management tool introduced by Toyota in the 1940s. The goal of VSM is to identify and eliminate waste, reduce lead time, and improve the overall efficiency of the process. The VSM process involves creating a map of the current process, including all the steps involved, from the start of the process to the end. This map can include information such as cycle time, lead time, and inventory levels. The map also shows the flow of materials and information between each step in the process. Once the current process has been mapped out, the next step is to identify areas of waste and inefficiency. This can include waiting times, excess inventory, unnecessary processing steps, and other areas where time or resources are being wasted. After identifying areas for improvement, the next step is to develop a plan to eliminate waste and improve the process. This can involve rearranging the layout of the process, reducing waiting times, improving product quality, or other improvements to increase efficiency. Overall, VSM is a powerful tool that can be used to analyze and improve a wide range of processes, from manufacturing to service industries like grocery shopping. By identifying areas of waste and inefficiency and developing a plan for improvement, VSM can lead to significant improvements in efficiency, quality, and customer satisfaction.

The grocery shopping process can be a tedious and frustrating experience for customers. Long checkout lines, crowded stores, and difficulty in finding items can all contribute to a negative shopping experience. By applying VSM methodology to the grocery shopping process, the project aims to identify areas for improvement and streamline the process to make it more efficient and customer friendly. The project will analyze the current grocery shopping process from the customers' perspective, identify areas of waste and inefficiency, and develop a plan for improvement. This can involve reorganizing the layout of the store, improving product findings,

and reducing wait times at checkout. The goal is to provide a more pleasant and enjoyable shopping experience for customers.

By applying VSM methodology to the grocery shopping process, the project aims to enhance the overall shopping experience for customers and increase satisfaction with the store. This can lead to increased customer loyalty and improved business performance for the store.

Literature Review

(De Steur, Wesana, Dora, & Pearce, 2018) conducted a systematic review of studies that applied VSM to reduce food losses and waste in supply chains. They found that VSM is an effective tool for identifying and reducing waste in the food supply chain. The study suggests that VSM can be applied to identify and reduce waste in grocery stores, leading to a more efficient and sustainable grocery shopping process. Similarly, (Fry, 2013) used VSM to identify waste in the manufacturing of automotive components. The study showed that VSM can be used to identify areas of waste and inefficiency and develop solutions to improve the process. This approach can also be applied to the grocery shopping process to reduce waste and improve efficiency.

(Marques, Jorge, & Reis, 2021) applied Lean methodology to improve operational performance in a retail store and e-commerce service. They found that Lean principles, such as value stream mapping, can be used to identify areas of waste and inefficiency and develop solutions to improve the process. The study suggests that Lean principles can be applied to the grocery shopping process to improve the shopping experience for customers.

VSM Project

Introduction:

The project aims to use Value Stream Mapping (VSM) methodology to improve the grocery shopping process and make it more efficient and customer friendly. The current shopping process can be time-consuming, stressful, and frustrating for customers, which can lead to a negative shopping experience. By applying VSM, we can analyze the current process and identify areas for improvement. The project will focus on reducing waiting time, improving product availability, and providing better customer service to enhance the overall shopping experience. Ultimately, the goal is to make grocery shopping a more pleasant and enjoyable experience for everyone involved. The project will involve creating a process chart, routing sheet, and working station layout chart to document the current state of the grocery shopping process. The team will then conduct a Current State Mapping analysis to identify areas of waste, such as waiting time, product findings, and poor layout of the store. Based on the results of the analysis, a Future State Mapping plan will be developed that outlines the improvements to be made to the shopping process. An Action Plan will then be developed to implement the improvements identified in the Future State Mapping plan.

The goal of the project is to make grocery shopping a more efficient and customer-friendly experience, reducing the time and effort required for customers to complete their shopping and enhancing their overall satisfaction.

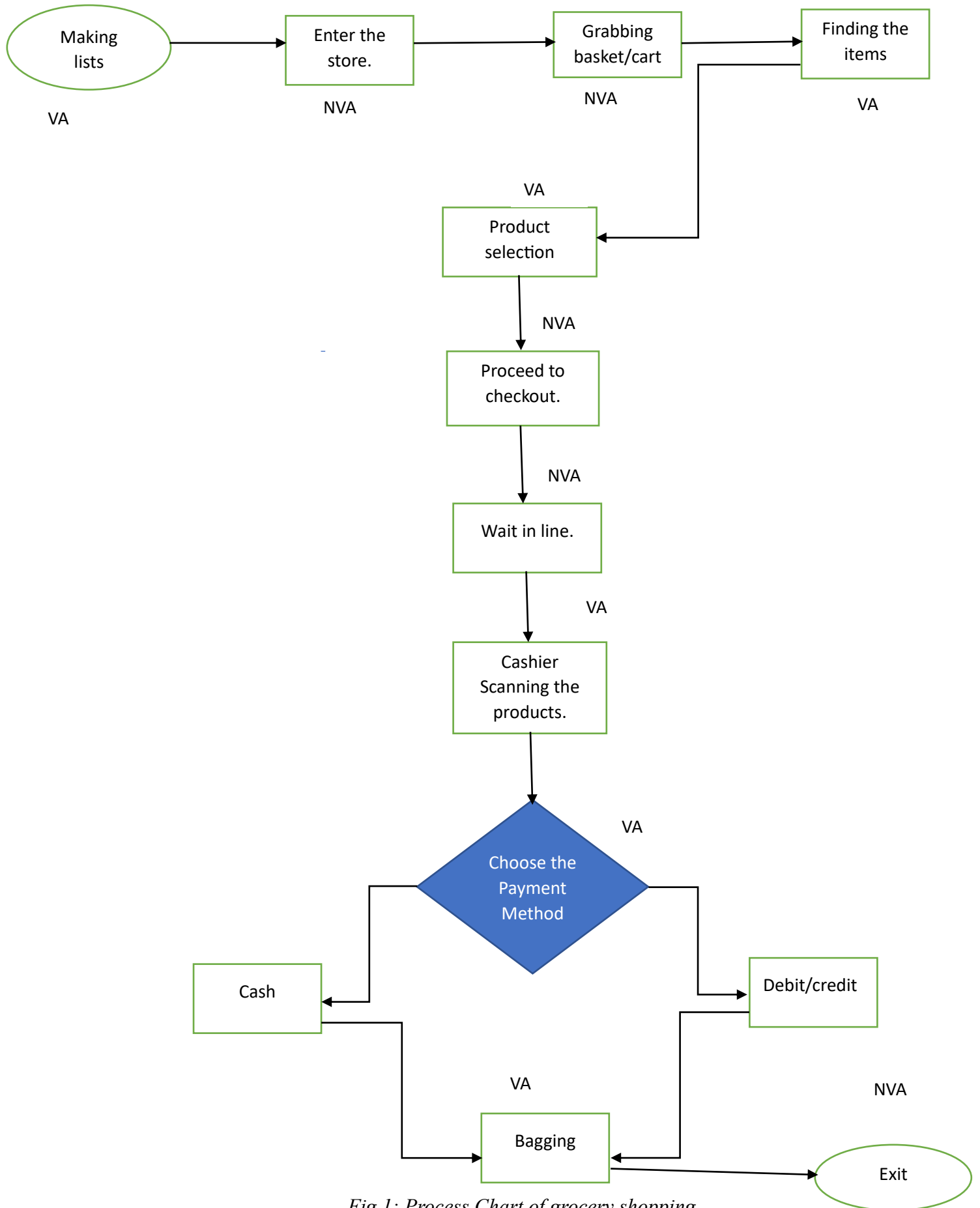


Fig 1: Process Chart of grocery shopping

Task	Location	Responsible Party	Time (minutes)
Make shopping list	Home	Customer	5 minutes
Enter store	Store entrance	Customer	1 minute
Grab a shopping cart/basket	Store entrance	Customer	1 minute
Find items on the shopping list	Aisles	Customer	7 minutes
Product selection	Aisles	Customer	2 minutes
Proceed to checkout	Checkout area	Customer	3 minutes
Wait in line	Checkout area	Customer	10 minutes
Scan the product	Payment area	Cashier	5 minutes
Pay for the products	Payment area	Customer	1 minute
Bag items	Bagging area	Cashier	7 minutes
Exit store	Store exit	Customer	2 minutes

Table 1: Routing sheet

Working Station Layout Chart:

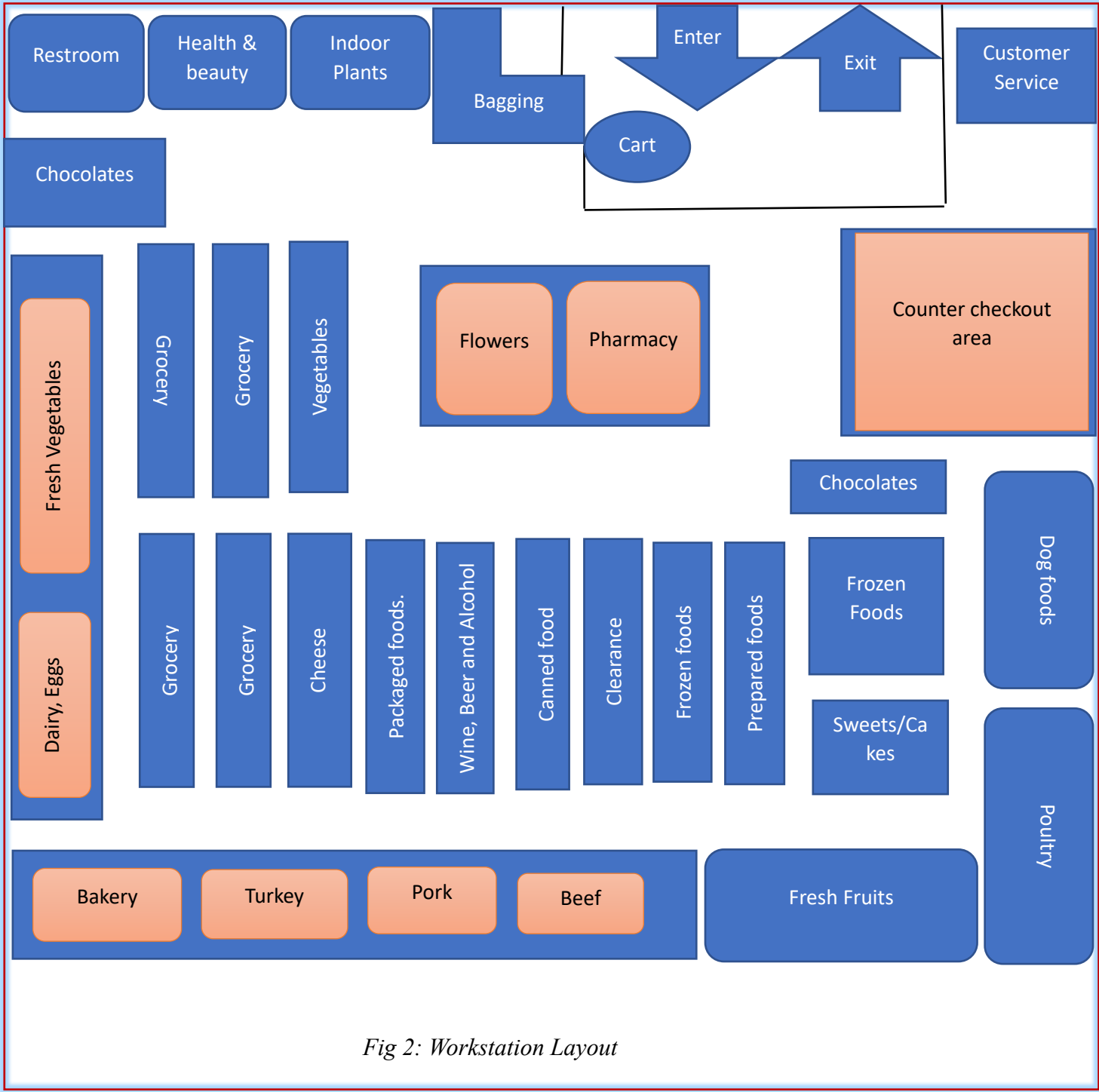


Fig 2: Workstation Layout

The workstation layout shown in Figure 2 shows the arrangement of various sections and aisles in a grocery store. The layout comprises various sections, including the entrance area, fresh produce, bakery, meat, poultry, dairy, frozen foods, and clearance sections, among others.

However, there are several issues with this layout that can lead to customers spending a lot of time finding items. For instance, the other meat section and poultry section are separated, which can make it challenging for customers to find the items they need. Additionally, the clearance section is in an area that is not easily accessible, making it difficult for customers to find items on sale. Moreover, the customer service counter is in the corner of the store, which can make it hard for customers to locate and get assistance when needed. The checkout section has only counter checkout, and there is no self-checkout, which can lead to long wait times and customer frustration.

Overall, the workstation layout has several deficiencies that need to be addressed to enhance the customer shopping experience, reduce time-consuming and ensure that customers can easily locate items they need.

Current State Mapping:

The process starts with the customer creating a shopping list at home and entering the store.

Upon entering, the customer grabs a shopping cart/basket and proceeds to find the items on their list in the store's aisles. The process of finding and selecting each item can take up to 7 minutes and 2 minutes per item, respectively.

Once the customer has found all the items on their list, they choose the checking out method and proceed to the checkout area, where they may experience long lines and wait times. Once they

reach the front of the line, they scan each product, choose their payment method, pay for the products, and bag them in the bagging area. Finally, they exit the store.

Overall, this current state mapping highlights several potential inefficiencies and opportunities for improvement in the grocery shopping experience, including long checkout lines and crowded stores, long wait times, and difficulties in finding products. The current state mapping serves as a starting point for identifying areas of waste and improvement opportunities in the grocery shopping process.

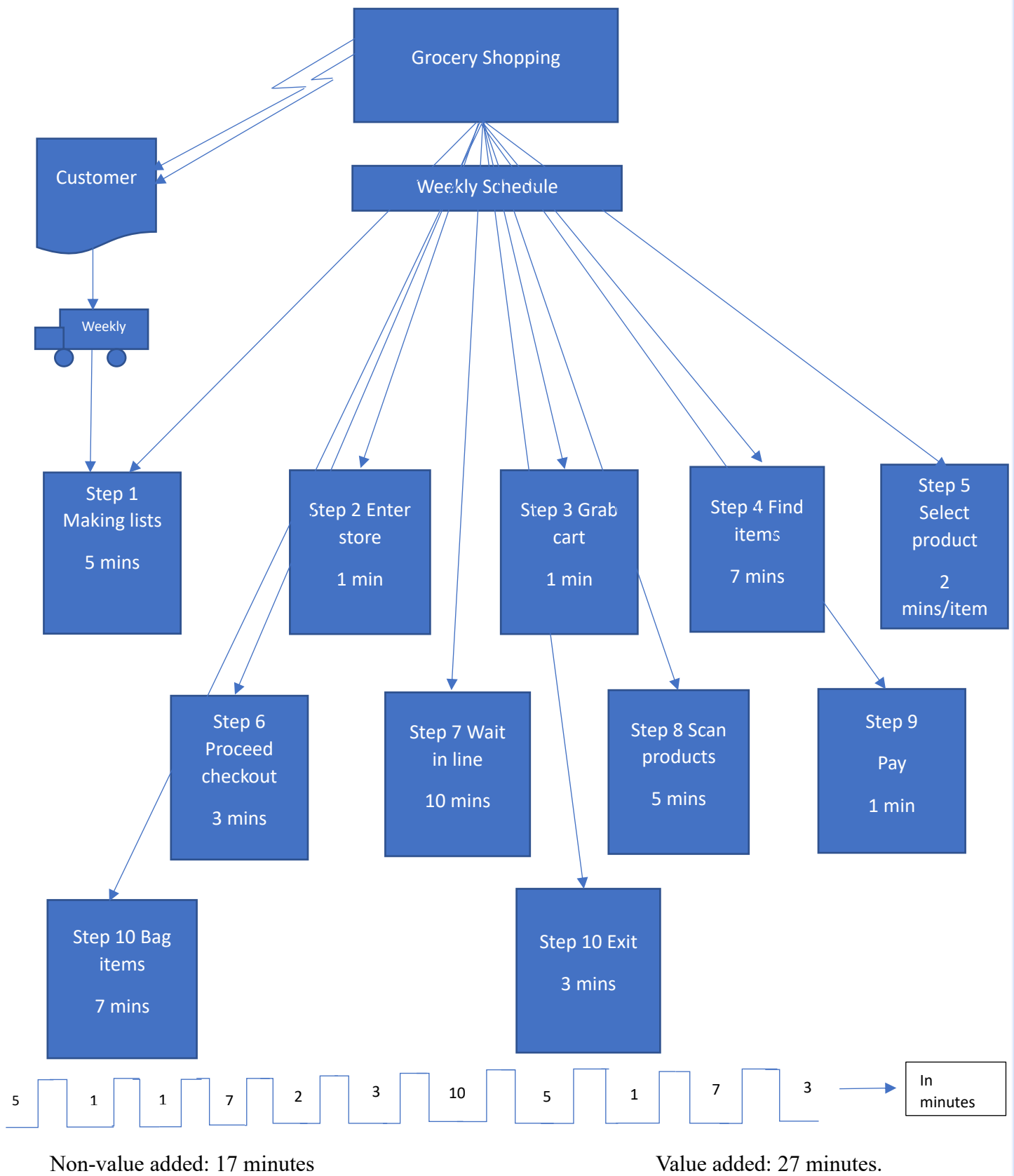


Figure 3: Current State Mapping

Future State Mapping:

By applying Value Stream Mapping (VSM) methodology, the grocery shopping process can be improved to provide a better shopping experience for customers. Some potential improvements include:

- 1) Reorganize the store layout: Group related items together, such as chicken and fresh produce, and move the clearance section to a more visible location. Place the customer service counter near the entrance for easy access.
- 2) Increase self-checkout options: Add self-checkout machines to reduce waiting times in line and enhance customer convenience.
- 3) Streamline product selection: Reduce the time customers spend searching for items by implementing clear labeling and signage. Also, ensure that products are always in stock.
- 4) Improve payment processing: Streamline payment processing by increasing the number of payment kiosks, adding contactless payment options, and training employees to process payments more efficiently.
- 5) Implement Cross-Training: Staff should be trained to handle multiple tasks, such as restocking shelves, helping customers find products and processing payments. This would increase staff efficiency and reduce wait times for customers.

These improvements can help to reduce the time and stress associated with grocery shopping, providing a more pleasant experience for customers.

Step	Description	Process Changes	Time (minutes)
1	Make shopping list	-	5
2	Enter store	-	1
3	Grab a shopping cart/basket	-	1
4	Find items on the shopping list	-	4
5	Product selection	-	2
6	Choose checkout method	Implement self-checkout machines in addition to counter checkout	1
7	Scan the product		3

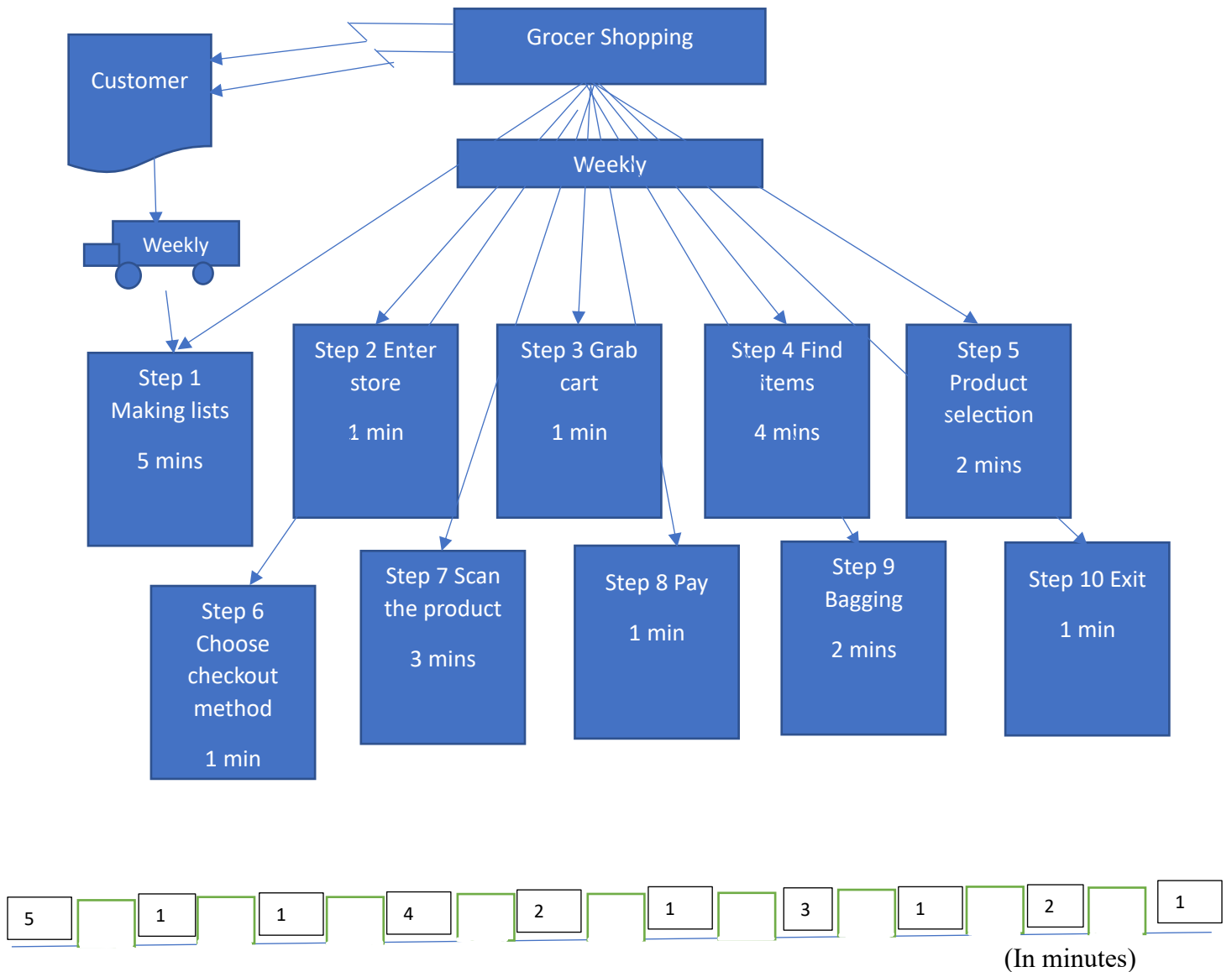
Step	Description	Process Changes	Time (minutes)
9	Pay for the products	Streamline payment processing by increasing the number of payment kiosks	1
10	Bag items	Add more bagging stations and make sure they're always stocked with bags	2
11	Exit store	-	1

Table 2: Future State Table

Process changes:

- 1) Group similar items together: For example, move the poultry section closer to the meat section and the bakery section away from the meat section.
- 2) Improve customer service: Move the customer service counter closer to the entrance and make it more visible.
- 3) Improve store layout: Rearrange aisles to make it easier for customers to find what they need. Group related items together, such as meat and vegetables. Move the clearance section to a more visible location.
- 4) Implement self-checkout machines: Reduce wait times and increase convenience for customers.

- 5) Increase the number of bagging stations and ensure they're stocked with bags: Reduce wait times and increase efficiency for customers.
- 6) With these changes, we can reduce wait times, improve efficiency, and enhance customer satisfaction.



Non-value added: 6 minutes

Value added: 17 minutes.

Figure 4: Future State Mapping

Action Plan:

Based on Future State Mapping, an action plan can be developed to implement the necessary changes. Here is a sample action plan:

1) Reorganize the store layout:

- a. Group similar items together to reduce the time customers spend looking for products.
- b. Place high-demand items and frequently purchased products at the front of the store.
- c. Create a clearance section near the entrance for easy access.

2) Increase self-checkout stations:

- a. Add self-checkout stations to reduce the checkout wait time for customers.
- b. Provide training to customers on how to use the self-checkout stations.

3) Improve signage and labeling:

- a. Use clear and consistent signage to direct customers to the various sections of the store.
- b. Use color-coded labels to indicate product categories.
- c. Use clear and visible price tags on all products.

4) Increase staffing levels:

- a. Add more staff to assist customers in finding products and to reduce checkout wait times.

- b. Cross-train employees to be able to work in different areas of the store as needed.

5) Implement a customer feedback system:

- a. Collect feedback from customers on their shopping experience.
- b. Use the feedback to identify areas for improvement and make necessary changes.

6) Implement an inventory management system:

- a. Use an inventory management system to ensure that products are always in stock and available for purchase.
- b. Use data analytics to forecast demand and order products accordingly.

7) Develop a customer loyalty program:

- a. Implement a loyalty program to reward loyal customers.
- b. Use the program to offer discounts and promotions to customers.

8) Train employees on customer service:

- a. Provide training to employees on customer service best practices.
- b. Encourage employees to provide personalized service to each customer.

9) Enhance the online presence:

- a. Develop an online store to provide customers with the option of ordering products online.
- b. Offer curbside pickup and delivery options to customers.

10) Monitor and evaluate the changes:

- a. Monitor the effectiveness of the changes and identify any areas for further improvement.
- b. Use data analytics to measure the impact of the changes on customer satisfaction and business performance.

These actions aim to enhance the shopping experience for customers by reducing waiting time, improving product availability, and providing better customer service. The goal is to make grocery shopping a more efficient and enjoyable experience for everyone involved.

Analysis

The VSM project aimed to improve the grocery shopping process by analyzing the current state and identifying areas for improvement, resulting in the creation of a future state map. The goal was to reduce customer wait times, improve product availability, and enhance customer service. Here's the analysis with the calculation of takt time for both the current state and future state:

Assumptions:

The grocery store is open for 12 hours a day, from 8:00 AM to 8:00 PM, which equals 720 minutes of available production time.

The customer demand rate is 100 customers per hour.

Calculations:

Takt Time = Available Production Time / Customer Demand Rate = 720 minutes / (100 customers/hour) = 7.2 minutes per customer

Current State Takt Time = Total Cycle Time / Number of Customers = 44 minutes / 1.67
customers = 26.4 minutes per customer

Future State Takt Time = Total Cycle Time / Number of Customers = 21 minutes / 1.67
customers = 12.6 minutes per customer

Analysis:

The takt time is the pace at which the grocery store needs to serve customers to meet their demands efficiently. The takt time is 7.2 minutes per customer, meaning the store should aim to serve each customer in less than 7.2 minutes to keep up with customer demand.

The current state has a longer total cycle time (44 minutes) than the future state (21 minutes), indicating that the grocery store has room for improvement in its processes. The non-value-added time in the current state is 27 minutes, which is higher than the non-value-added time in the future state (6 minutes).

The comparison of takt time with the cycle times of the current state and future state reveals that there may be a bottleneck in the process that is causing delays and inefficiencies. Both the current state and future state have longer cycle times than the takt time, indicating that the store is not meeting customer demand efficiently.

The future state has a shorter cycle time and a more reasonable takt time than the current state, which means that the grocery store is moving in the right direction by reducing non-value-added time. However, it is important to continue improving the process to further reduce cycle time and non-value-added time and meet customer demand more efficiently. Table of Comparison:

	Current State	Future State
Total Cycle Time	44 minutes	21 minutes
Value-Added Time	17 minutes	17 minutes
Non-Value-Added Time	27 minutes	6 minutes
Takt Time	26.4 min/customer	12.6 min/customer

Table 3: Compared of Current and Future states.

Results:

Based on the analysis, it can be concluded that the current state of the grocery shopping process has a longer cycle time and higher non-value-added time compared to the takt time, indicating inefficiency in meeting customer demand. The future state has a shorter cycle time and reduced non-value-added time, leading to a more reasonable takt time. However, continuous improvement efforts are necessary to further reduce cycle time and non-value-added time to meet customer demand efficiently.

Conclusion

The VSM project aimed to improve the grocery shopping process by analyzing the current state and identifying areas for improvement, resulting in a future state map that aims to reduce customer wait times, improve product availability, and enhance customer service. Based on the analysis of the current state and future state using the value stream mapping methodology, we

can conclude that the implementation of VSM can greatly improve the efficiency of grocery shopping. By reducing non-value-added time and optimizing the value-added time, the grocery store can achieve a shorter cycle time and a more reasonable takt time.

The future state has a cycle time of 21 minutes, which is more than 50% less than the current state's cycle time of 44 minutes. Additionally, the future state's non-value-added time is only 6 minutes, which is significantly lower than the current state's non-value-added time of 27 minutes. This reduction in non-value-added time indicates that the store can focus more on value-adding activities, such as restocking shelves and assisting customers, to enhance the overall shopping experience.

Overall, the implementation of VSM can lead to more efficient grocery shopping, which can ultimately result in increased customer satisfaction and higher profitability for the store.

References

- De Steur, H., Wesana, J., Dora, M., & Pearce, D. (2018). Applying Value Stream Mapping to reduce food losses and Wastes in supply chains: A systematic review. *Waste Management*.
- Fry, P. (2013). Using Value Stream Mapping to Identify Waste in the Manufacturing of Automotive Components at Federal-Mogul. *Journal of Industrial Engineering and Management*.
- Marques, P., Jorge, D., & Reis, J. (2021). Using Lean to Improve Operational Performance in a Retail Store and E-Commerce Service: A Portuguese Case Study. *Sustainability*.