

CHAPTER I

INTRODUCTION

This chapter includes the research background, problem formulation, research objectives, problem limitations, and outline of the report used in this final project.

1.1 Background

Logistics is the process of planning, implementing, and controlling procedures for efficient and effective transportation and storage of products, including services and related information ranging from starting point to the point of consumption to meet consumer needs. This includes inbound, outbound, internal, and external movements (Garside, 2017). Logistics cost to value-added in Indonesia is relatively higher than that of competing countries so a comprehensive approach is needed to reduce logistics costs (Mulyadi, 2010). The cost of Logistics to GDP ratio can be seen in **Figure 1.1**.

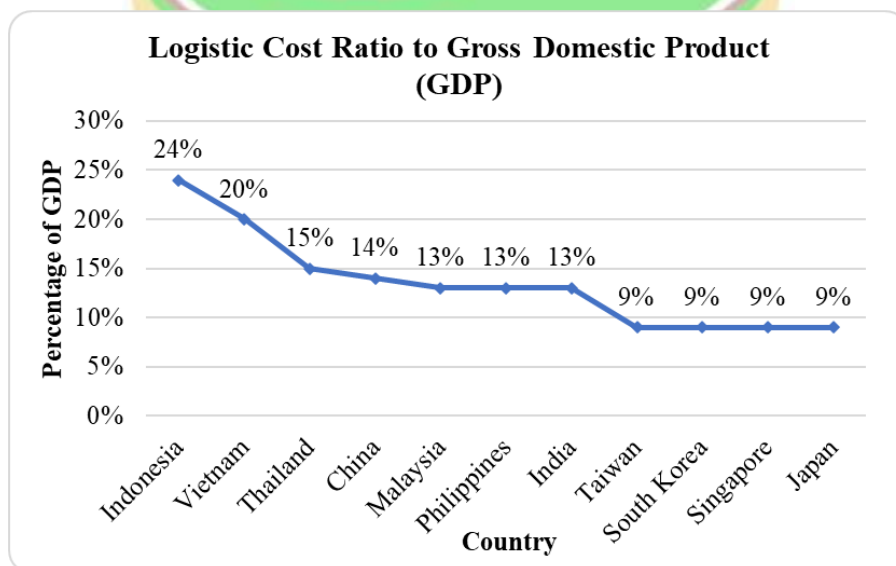


Figure 1.1 Logistic Cost Ratio to GDP
(Source: Frost & Sullivan, 2019)

Based on data on **Figure 1.1** presented by Frost & Sullivan, Indonesia has the highest logistics costs in Asia with the cost of reaching 24% of Gross Domestic Product (GDP) or reaching 3.560 Trillion Rupiah. The World Bank in 2018 also stated that Indonesia ranks 5th in ASEAN for Logistics Performance Index (LPI). The Logistics Index for ASEAN countries can be seen in **Figure 1.2**

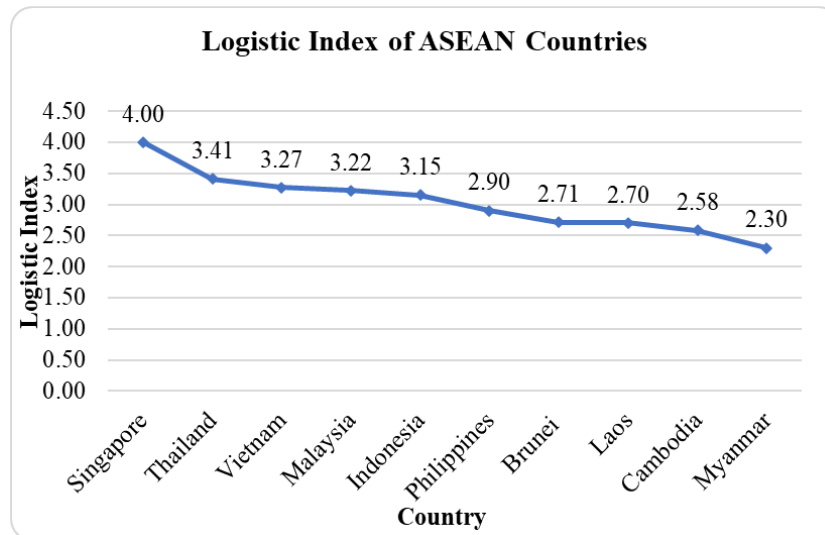


Figure 1.2 Logistics Index in ASEAN Countries
(Source: World Bank, 2018)

Based on the results (Logistics Performance Index / LPI) in Figure 1.2 released by the World Bank, Indonesia has a value of 3.15 on a scale of 1-5, the closer to 5 indicates that the logistics competitiveness of a country is getting better, on the contrary, if it is closer to 1, it is getting worse. The LPI is a logistical performance parameter released by the World Bank every two years. LPI is calculated based on six components, consisting of customs and excise, infrastructure, international products delivery, quality and logistics competence, tracking/tracing, and timeliness. The amount of logistics costs requires companies to implement the right strategy so that the company can survive in the business world.

Planning the distribution process which is important so that companies can deliver products to consumers on time, in the right place, and good condition. The distribution of products from source to several destinations is certainly a fairly

complex problem because the existence of several places of destination for product delivery will cause several distribution lines that are longer travel times. This of course, will impact the cost of delivery (transportation) which is quite large. Poor distribution system planning will lead to wasteful transportation costs.

Distribution problems also occur on the CV. Abro Mandiri as an authorized distributor of PT Kao Indonesia. PT Kao Indonesia is a multinational company originating from Japan. CV. Abro Mandiri distributes Kao products with coverage of Pariaman City, Padang Pariaman Regency, and a small part of the Agam Regency. CV. Abro Mandiri is a company of Abro Group (Abadi Brother), which is a family company of Padang Panjang City named Abadi. CV. Abro Mandiri Pariaman branch is located at Jl. Wolter Mongisidi Jati Hilir Pariaman. Products distributed by CV. Abro Mandiri is a wide range of Biore soaps, Attack detergents, and baby pampers with Merries brand and a wide range of other personal care products. The Company distributes products using 2 Mitsubishi Canter vehicles with a maximum capacity of 24 Cubic Metres (CBM). The process of ordering products on the CV. Abro Mandiri can be seen in **Figure 1.3**

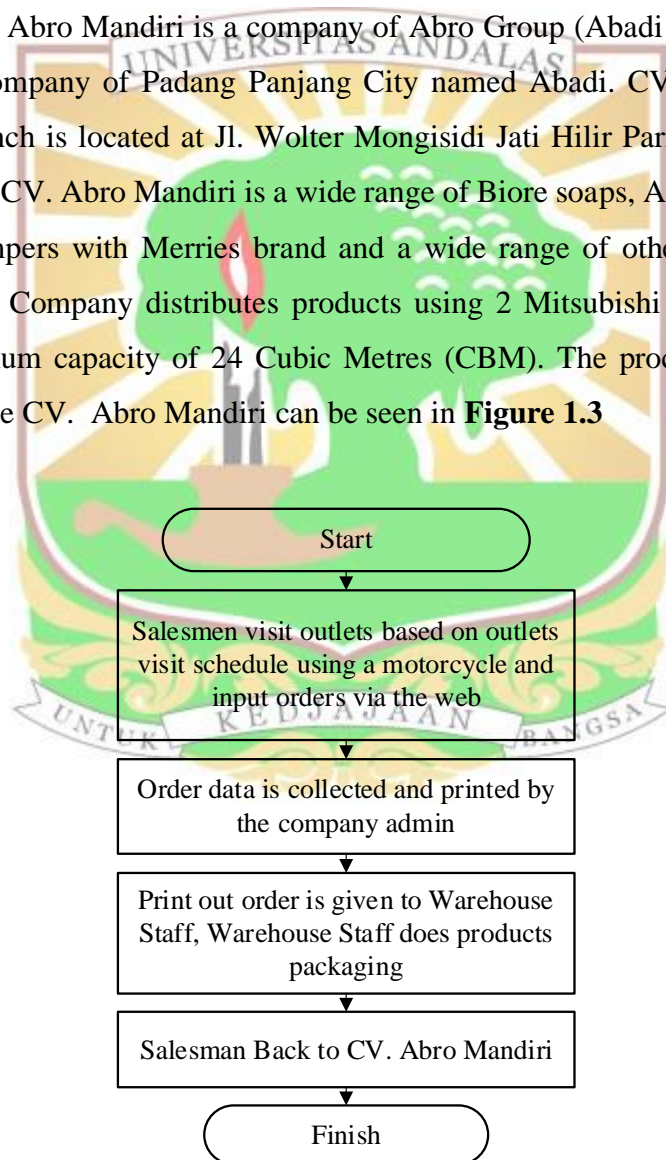


Figure 1.3 Process of Ordering Products at CV. Abro Mandiri

Based on **Figure 1.3**, CV. Abro Mandiri conducts the delivery of products using the take order system with a direct visit to the store. The delivery and ordering process is done by CV. Abro Mandiri starts from Monday to Saturday and holidays are Sundays and public holidays. CV. Abro Mandiri divides the stores visited into several criteria based on the types of outlets: wholesaler, mini market, pharmacy, baby shops, and family stores. When visiting, the salesman makes a list of products demands and performs online input on the company servers. The company admin will print the invoice and give it to the warehouse staff. After finishing visiting the store based on the salesmans schedule, the salesman returns to the CV. Abro Mandiri. Warehouse staff will carry out packaging and will be loading vehicles on the same day and the products will be delivered the next morning. Distribution systems on the CV. Abro Mandiri can be seen in **Figure 1.4** below.

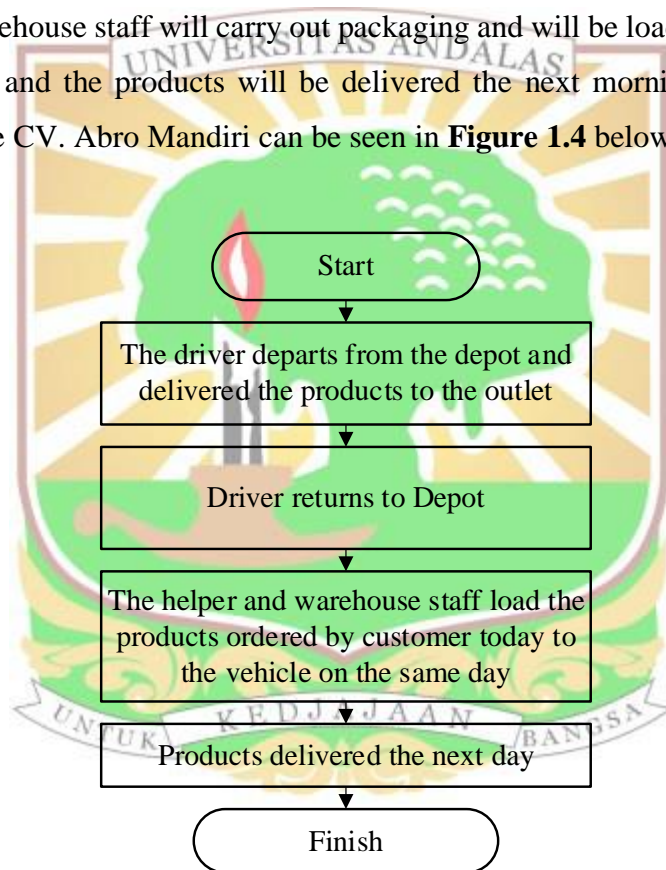


Figure 1.4 CV. Abro Mandiri Distribution Process

Based on **Figure 1.4**, the company implements a next day delivery system, so that the process of loading products is usually done in the afternoon or evening after the driver delivers the products ordered on the previous day. For route determination, based on the results of an interview with the CV Manager. Abro Mandiri Pariaman branch, the company does not provide the order of stores to visit and offers full distribution to drivers, so the distance of the shop visited is not

optimal, mostly if the shop visited is very much. Manual routing is also difficult because of CV. Abro Mandiri does not yet have analyst employees for this problem. Distribution time on 6 July 2020 - 11 July 2020 can be viewed in **Table 1.1**

Table 1.1 Distribution Time (Driver Departs and Returns to the Depot)

Date	Driver 1			Driver 2		
	Depart from Depot (time)	Back to Depot (time)	Lateness	Depart from Depot (time)	Back to Depot (time)	Lateness
06-Jul-20	08:03	17:26	00:26	08:04	20:14	03:14
07-Jul-20	08:06	20:27	03:27	08:07	18:26	01:26
08-Jul-20	08:02	17:11	00:11	08:04	18:25	01:25
09-Jul-20	08:03	18:04	01:04	08:05	18:20	01:20
10-Jul-20	08:08	17:15	00:15	08:01	17:27	00:27
11-Jul-20	08:01	18:46	01:46	08:04	17:58	00:58

(Source: Direct Observation on CV. Abro Mandiri)

Based on **Table 1.1**, there was a lateness for the driver to return to the depot during the distribution process on 6 July 2020 - 11 July 2020. The lateness for Driver 1 with a lateness of up to 11 minutes to 3 hours 27 minutes and Driver 2 was around 27 minutes to 3 hours 14 minutes,. From this data, it can be seen that the distribution process is still being carried out outside of daily working hours, which is above 17:00. This problem occurs because of the next day delivery system at CV. Abro Mandiri, customers order products today from the salesman and the next day the products must be delivered by the driver. This is because Kao products are Fast Moving Consumer Products (FCMG), which are daily necessities so it require a fast distribution process. The company only has two vehicles, so it is quite challenging to distribute products when demand increases. It can be seen that on 7 July 2020, driver 1 delivered products to 50 outlets, so without planning a distribution route, it is very difficult to distribute products within a range of working hours. List of visited outlets and demand can be seen in **Appendix E**.

This lateness has enough effect on the increase in working time so that the company must provide overtime wages. This is quite disruptive to the distribution process of the company because the company loads the products when the truck has returned to the depot so that the loading of products is carried out until evening. The additional hours worked into the evening required high overtime costs for

warehouse staff and helpers. In the distribution process, the company distributes products with fixed territories that have been determined by the company, namely the West and East territories. The determination of territory by the company causes the allocation of vehicle capacity to be not optimal

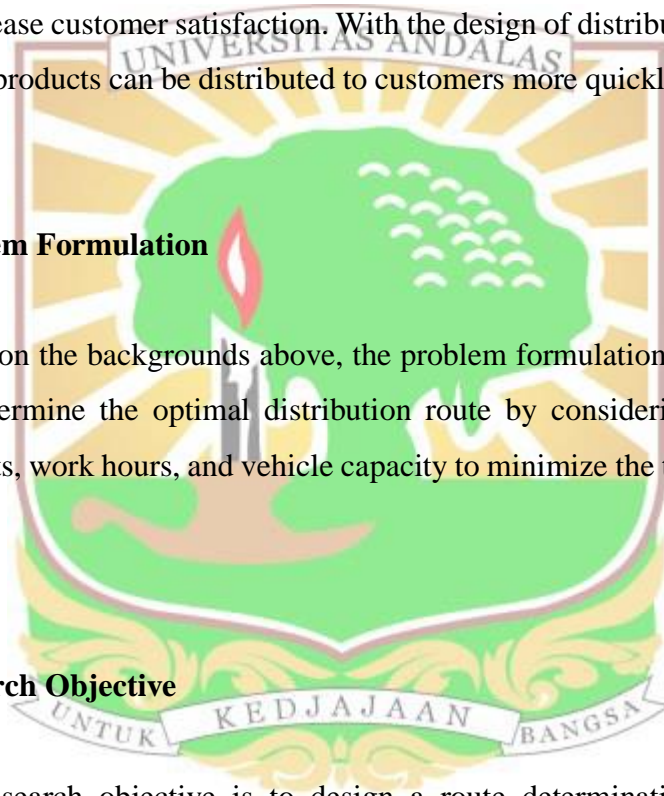
Based on the problems above, it is necessary to design a more optimal distribution route by considering the shortest distance, maximum capacity of the vehicle, and the working hours of the driver to minimize the total distribution time and save the company expenses. In addition, lateness in the delivery of products is feared to decrease customer satisfaction. With the design of distribution routes, it is expected that products can be distributed to customers more quickly and optimally.

1.2 Problem Formulation

Based on the backgrounds above, the problem formulation of this research is how to determine the optimal distribution route by considering the distance between outlets, work hours, and vehicle capacity to minimize the total distribution time.

1.3 Research Objective

The research objective is to design a route determination program by considering the distance between outlets, work hours, and vehicle capacity to minimize the total distribution time.



1.4 Research Scopes

The scopes of this research as follows:

1. The starting and ending point of distribution is the CV. Abro Mandiri warehouse. Abro Mandiri at Jl. Wolter Mongisidi Jati Mudik Pariaman
2. The driver can only visit the outlet once.
3. The case study used in determining the distribution route used is the actual distribution route from 6 July - 11 July 2020.
4. The vehicles used are following the trucks owned by the company: 2 Mitsubishi Canter 136 PS with a capacity of 24 Cubic Meters (CBM).

1.5 Research Assumptions

The assumptions used in this research are as follows:

1. The truck used is assumed to be in stable condition, not damaged, and ready for use without any constraints.
2. The condition of the transportation line is smooth. There are no severe traffic jams, road repairs, or natural disasters.
3. The supply of products in the warehouse is sufficient for consumer demand.

1.6 Outline of the Report

The outline of this final project is arranged systematically and consists of six chapters are as follows:

CHAPTER I INTRODUCTION

Chapter I is including the background of research, formulation of problems, the purpose of research, the limitations of problems, and assumptions used in research, as well as the systematics of writing this final project report.

CHAPTER II LITERATURE REVIEW

This chapter contains a review of the related literature of the research. The literature review consists of theories and tools that will be used in problem-solving, these supply chain management, Travelling Salesman Problem (TSP), and Vehicle Routing Problem (VRP), Nearest Neighbor algorithm and genetic algorithm.

CHAPTER III RESEARCH METHODOLOGY

This chapter contains the stages used by the author in research that begins with the stages of problem recognition through preliminary studies, literature studies, data collection, and data processing to the stages of suggestion for further research.

CHAPTER IV DEVELOPMENT FOR ALGORITHM AND PROGRAM

This chapter contains data that has been collected consisting of primary and secondary data such as demand data, loading and unloading time data, product data, vehicle capacity, and other data. Furthermore, the data that has been collected will be processed to obtain the proposed distribution route.

CHAPTER V PROGRAM IMPLEMENTATION AND ANALYSIS

This chapter contains an analysis of the result that has been obtained in previous chapters. This chapter describes the analysis of the results of data processing that has been done to obtain the proposed route through the method used. The analysis is to compare the actual routes available to the company with the proposed routes obtained and the analysis of the programs that have been designed.

CHAPTER VI CLOSING

This chapter contains a conclusion to the result of the research and suggestion for the next research.