CHAPTER I
INTRODUCTION

Chapter I discusses the research background, problem formulation, research objectives, research objectives, research scopes, and outline of final project report.

1.1 Background

Indonesia is one of the exporting countries to developed and developing countries. Export is an activity of selling goods to foreign countries using the payment system, quality, quantity, and other terms of sale that have been approved by the exporter and importer (Saripurna, 2018). Indonesia carries out export activities with some of the objects of export being non-oil and gas. In September 2022, non-oil and gas exports were valued at USD 23.466,71 or 47,35% of total exports (Kementrian Perdagangan, 2022). One of the potential non-oil and gas commodities as Indonesian export commodities is essential oil.

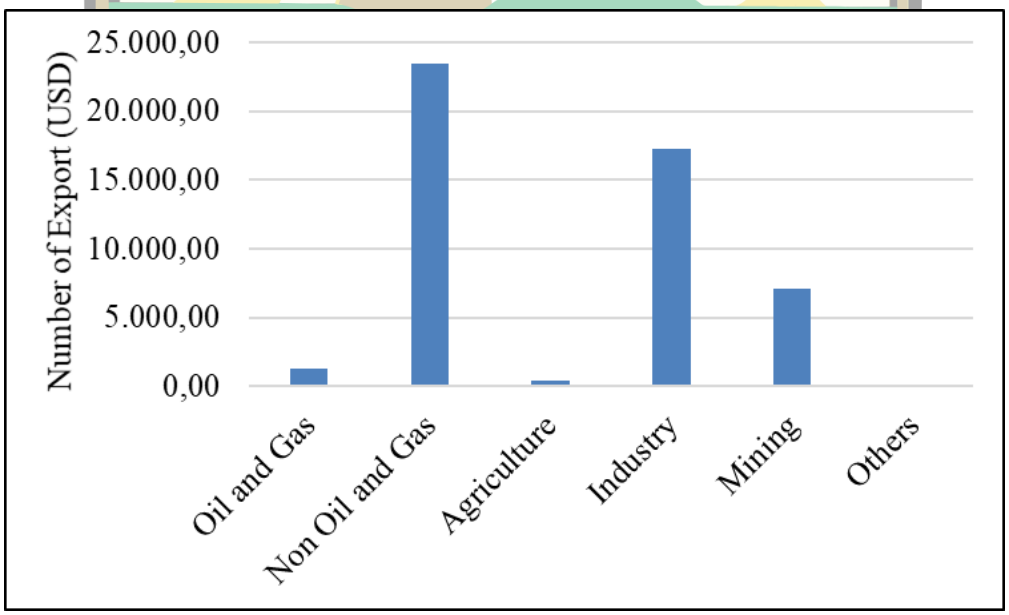

Figure 1.1 Indonesia Export Data in September 2022
(Source: Kementerian Perdagangan, compiled by the author, 2022)

Essential oils are organic compounds contained in aromatic plants. These aromatic plants are processed using a steam distillation process. This process is carried out on certain parts of aromatic plants, such as parts of flowers, leaves, stems, fruits, roots, or seeds (Agustina and Jamilah, 2021). One of the essential oil commodities that have the potential as an Indonesian export commodity is citronella oil. Citronella (*Cymbopogon nardus L*) is a kind of grass plant that is not too tall, has thick and light green leaves. This plant has a rough leaf texture and has a distinctive scent (Adam, 2020). Citronella can be processed into citronella oil which is very prospective to be exported as an essential commodity. The benefits of citronella are that citronella has been used as a fragrance, aroma, and flavor (Barber and Hall, 2016). It also contains monoterpene compounds such as *citronellal*, *citronellol*, *limonene*, *geraniol*, and *α-pinene* which are useful as insect repellent compounds (Agustina and Jamilah, 2021). With the benefits of citronella which is useful as a fragrance ingredient and anti-insect component, the production of citronella oil has a good opportunity to be developed.

Indonesia is one of the world's exporters of citronella oil, with countries actively buying it from Indonesia are Singapore, Japan, the United States, Australia, the Netherlands, England, France, Germany, Italy, India, and Taiwan (Nabila and Nurmalina, 2019). Based on information provided by the Director General of Plantations, Ministry of Agriculture (Direktorat Jendral Perkebunan) (2020), Indonesia is the second largest supplier of citronella oil after China. China is able to supply citronella oil to the world market as much as 600 to 800 tons per year, while the world market demand for citronella oil reaches 2.000 to 2.500 tons per year so that Indonesia still has the opportunity to meet the needs of the world market (Direktorat Jendral Perkebunan, 2020). Citronella plants can grow in almost all lands in Indonesia, because these plants can live on land with low fertility. The main producing areas of citronella plants in Indonesia are the Province of Nanggroe Aceh Darussalam (NAD), West Java, Central Java, West Sumatra, South Sumatra, West Kalimantan, and South Sulawesi (Sulaswatty et al., 2019). One of the areas in West Sumatera that cultivates citronella plants is Rambatan Subdistrict, Tanah Datar Regency with an area of ±40 ha for citronella cultivation.

According to data from Badan Pusat Statistik (BPS), in 2023, Indonesia's citronella oil export tends to increase, which data can be seen in **Figure 1.2** (Badan Pusat Statistik, 2023).

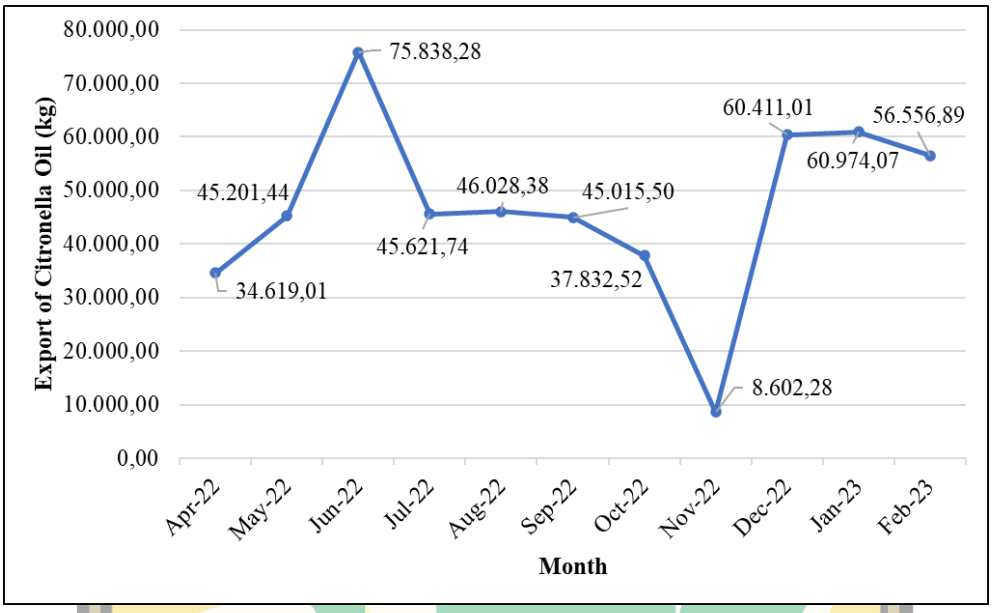

Figure 1.2 Indonesia Citronella Oil Export Data
(Source: Badan Pusat Statistik, compiled by the author, 2023)

One of the organizations that will process citronella oil is Koperasi Unit Desa (KUD) Sarasah. The Koperasi Unit Desa Sarasah is a cooperative located in Nagari III Koto, Rambatan Subdistrict. For the rest of discussion in this research report, Koperasi Unit Desa Sarasah will be called as Sarasah Village Cooperative. The cooperative wants to build a citronella oil processing unit and run the business so that the citronella plants that have been planted by the community can be used in Rambatan Subdistrict. The construction of the processing unit begins in 2022. The areas that have the most citronella fields in Rambatan Subdistrict consist of Padang Lua, Rambatan Village, Belimbing, Simawang, and Padang Magek. The distributions of citronella plant area are 17,5 ha in Padang Lua, 9 ha in Rambatan Village, 8 ha in Belimbing, 4 ha in Simawang, and 1,5 ha in Padang Magek. These areas can be seen in **Figure 1.3** with a red circle symbol as a location marker.

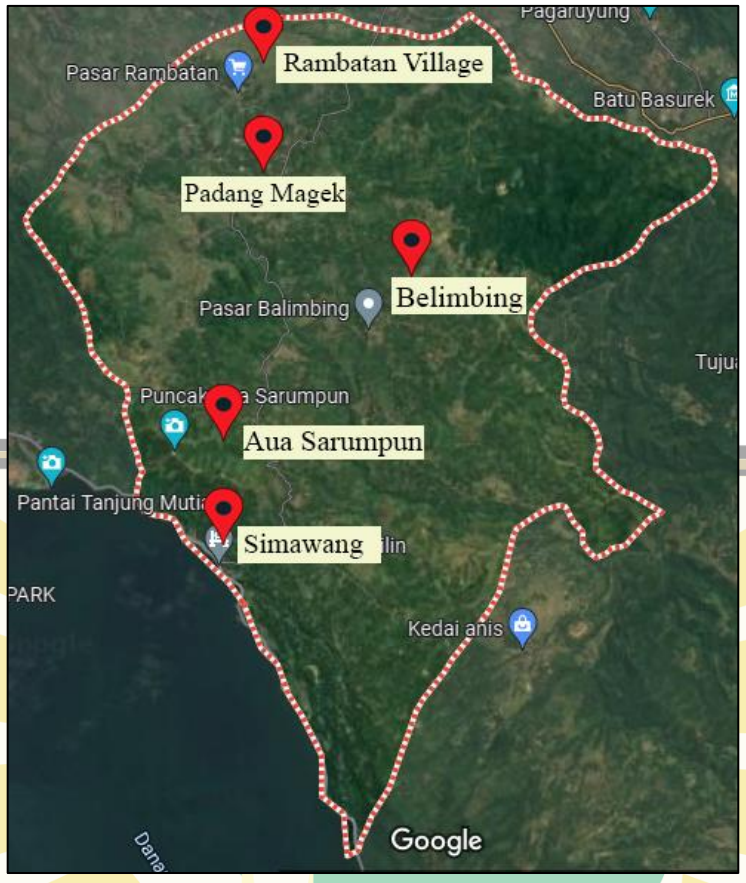

Figure 1.3 Distribution Area of Fragrant Citronella Planting in Rambatan Subdistrict (Source: Google Maps, 2022)

However, even though there is community land that is used as land to develop citronella plants, the production of citronella oil in Rambatan Subdistrict is no longer carried out by the local community. This is because the selling price of citronella oil is smaller than the cost of production so that farmers experience losses. In 2018, the price of citronella oil has range from Rp215.000,00 to Rp225.000,00 per kg with the price of fresh leaves around Rp1.000,00 per kg and the citronella oil can be purchased at prices ranging from Rp120.000,00 to Rp140.000,00 per kg with the price of fresh leaves ranging from Rp250,00 to Rp500,00 per kg (Setiawan et al., 2021). With the low selling price of citronella oil, the selling price of citronella oil leaves is low. This can cause farmers to be reluctant to manage citronella fields because the selling price of the leaves cannot provide benefits to farmers. The citronella oil processing unit must obtain products that can be sold at better prices so that farmers' incomes can be increased. To get a better price for the product, the citronella oil processing unit must be able to reduce production costs.

According to Ballou (2004), the two things that cost a company the most are cost of goods manufactured and logistics cost. For companies, logistics costs will affect the selling price of the final product (Zaroni, 2017). Supposedly, the national logistics cost is 12% of the total Gross Domestic Product (GDP), but Indonesia's logistics costs are 23% of GDP, as explained by the Indonesia's Minister of SOEs in the Kagama webinar (detikFinance, 2021). In general, there are main components of distribution and logistics which can be seen in **Figure 1.4**.

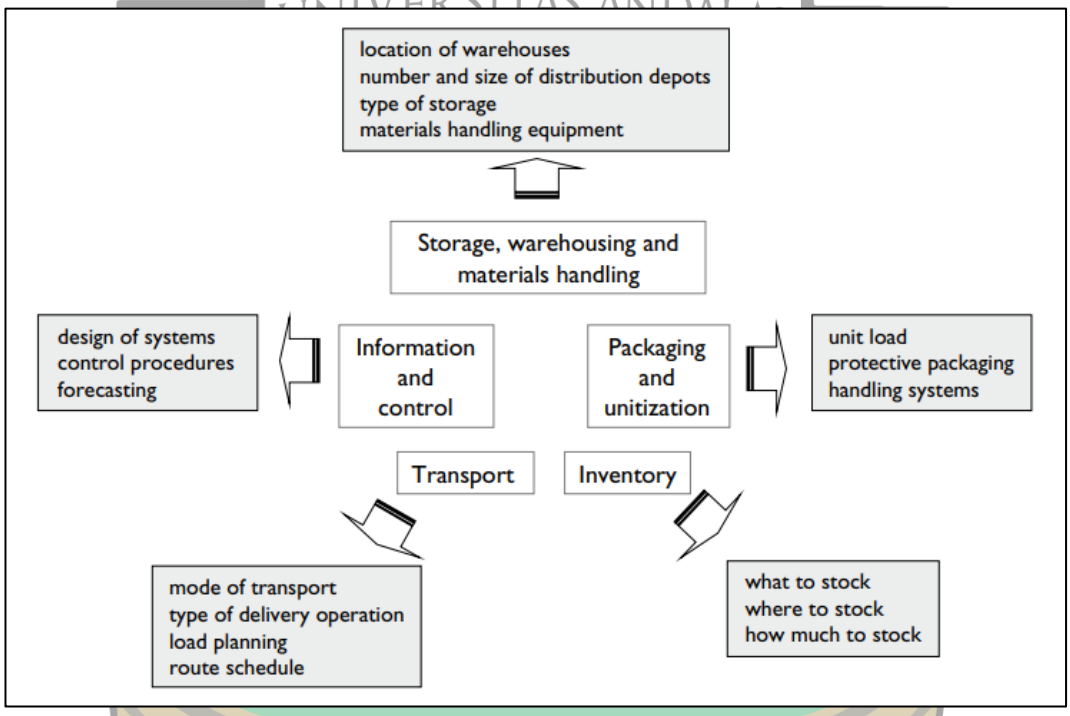

Figure 1.4 The Key Components of Distribution and Logistics (Source: Rushton et al., 2014)

There are five key components in distribution and logistics, namely; storage, warehousing and materials handling; packing and unitization; inventory; transport; and information and control (Rushton et al., 2014). These five components have a key role in distribution and logistics activities. To examine logistics, a management approach can be used which consists of planning, organizing, and controlling activities (Ballou, 2004). Planning activities are an important first step to do before running a business or company. For planning activities in logistics, the planning activities follow the primary decision triangle of location, inventory, and location (Ballou, 2004).

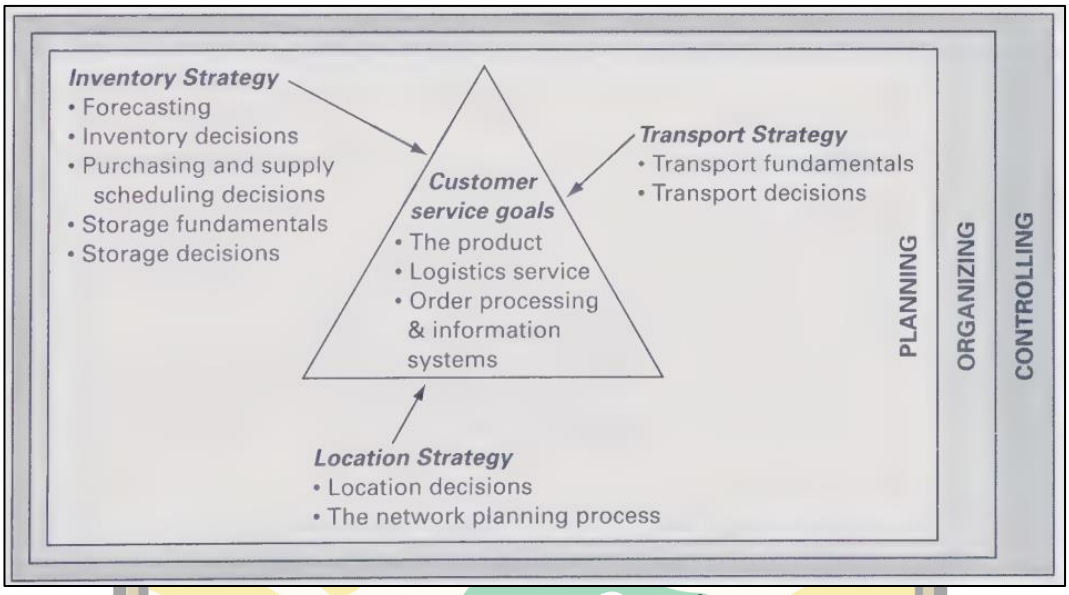

Figure 1.5 The Planning Triangle of Logistics
(Source: Ballou, 2004)

In the planning stage, it is important to consider the site of the factory construction, the mode of transportation used, and inventory arrangements. Moreover, according to the president director of Pelindo, the company's expenditure on inventory and transportation costs is the most causing the national logistics costs to be high (detikFinance, 2021). Location is an object or phenomenon in space that can provide further clarity on the object or geographical phenomenon concerned (Rusdiana, 2014). Transportation is a system consisting of certain facilities along with flow and control systems that allow people or goods to move from one place to another efficiently at any time to support human activities (Papacostas and Prevedouros, 2009). Inventory includes all goods or items used in the production and distribution process, including raw materials, component parts, subassemblies, and finished products (Fogarty and Hoffman, 1983).

In this study, the discussion will focus on planning activities because the citronella oil processing unit in Rambatan Subdistrict is still in the development process and has not yet started. The problem is, the management of citronella oil processing unit has not determined the strategic site for the construction of the citronella oil processing unit, has not determined the policy to transport the raw materials from suppliers in Rambatan Subdistrict to the factory, and has not

calculated the number of supporting materials that must be purchased by the company at once. Referring to the planning triangle of logistics, the management of the processing unit can start planning activities so that it is expected that the logistics costs incurred by the company can be minimized. Based on these problems, this study was conducted to determine the site for the construction of the citronella oil processing unit, determine the policy to buy raw materials related to the use of truckload, and determine the order quantity and period to order supporting materials and firewood.

1.2 Problem Formulation

The problems to be solved in this research are as follows:

1. Where the strategic site as the site to build the citronella oil processing unit in Rambatan Subdistrict?
2. What is the most economical truckload to transport 500 kg citronella leaves?
3. What is the maximum acquisition price of citronella leaves in the processing unit so that processing unit still earn a minimum profit of 10%?
4. What is the order quantity and when to order supporting materials and firewood?

1.3 Research Objectives

The objective of this research based on the problem formulations above are:

1. Determine the strategic site as the site to build the citronella oil processing unit plant in Rambatan Subdistrict.
2. Determine the most economical truckload to transport 500 kg citronella leaves.
3. Determine the maximum acquisition price of citronella leaves in the processing unit so that processing unit still earn a minimum profit of 10%.

4. Determine the order quantity of firewood and supporting materials and determine when to buy them.

1.4 Research Scopes

The scope of this research as follows:

1. Citronella suppliers in this research are the citronella suppliers located in the Rambatan Subdistrict.
2. The tariff determination model refers to the model for calculating vehicle operating costs by the Ministry of Transportation (Kementerian Perhubungan) in 2002.

1.5 Outline of Final Project Report

The outline of this final project proposal as follows:

CHAPTER I INTRODUCTION

Chapter I consists of the background of this research, problem formulation, research objectives, research scopes, and the outline of final project report.

CHAPTER II LITERATURE REVIEW

Chapter II consists of basic theories from several literatures to be used as the references in solving problems in this research. Those theories are about citronella, business logistics, logistics strategy, vehicle operating costs, and lot sizing technique. This chapter includes the previous research related to the topic of research.

CHAPTER III RESEARCH METHODOLOGY

Chapter III describes the stages of research systematically. Those stages in order are preliminary study, literature study, problem formulation, data collection, data processing, discussions, conclusions, and suggestions for the next or future research. The stages will be described in the form of description and depicted in the form of a flow chart.

CHAPTER IV LOCATION, TRANSPORTATION, AND INVENTORY PLANNING

This chapter discusses the collection and processing of data from research on the planning of location, transportation, and inventory.

CHAPTER V DISCUSSIONS

This chapter discusses the results of the research which includes analysis of location, transportation, and inventory planning.

CHAPTER VI CONCLUSIONS

This chapter contains conclusions based on research results and suggestions for further related research.