CHAPTER I INTRODUCTION

A. Background

Indonesia's agricultural sector plays a critical role in driving the nation's economic growth. This sector, encompassing a variance of products including coffee plantations, has demonstrably contributed to the country's Gross Domestic Product (GDP). According to 2023 data, Indonesia's GDP reached IDR 20.892,4 trillion, translating to a GDP per capita of IDR 75 million. However, recent trends indicate a deceleration in agricultural growth, with a 5,05% increase observed in 2023 compared to a 5,31% growth rate in the preceding year. This slowdown is particularly concerning given agriculture's significance as a major export sector for Indonesia. While overall agricultural exports have exhibited a pattern of steady growth in recent years (with the exception of 2023), coffee exports have specifically declined, contributing to the observed decrease in overall agricultural exports (Central Bureau Of Statistics, 2024).

Coffee is one of Indonesia's key agricultural export commodities, contributing significantly to the country’s trade surplus. The trade performance of coffee can be assessed through the coffee trade balance, which consistently shows a positive surplus as exports exceed imports. A substantial portion of exported coffee consists of unroasted Arabica and Robusta with caffeine, which in 2022 accounted for more than 99 percent of the total coffee export volume and value. Between 2021 and 2022, the volume of coffee exports increased by approximately 12.99 percent, while the export value grew by 33.76 percent. This growth highlights the importance of maintaining and enhancing the competitiveness of Indonesian coffee in the global market. However, in the following year (January–September 2023), both export volume and value declined by 17.71 percent and 21.70 percent respectively compared to the same period in 2022, indicating a potential risk to trade performance. Strengthening coffee productivity at the farm level is therefore essential to sustain and grow Indonesia’s coffee export performance. Improved productivity will not only secure supply for international demand but also strengthen Indonesia’s position in the global coffee value chain (Central Bureau Of Statistics West Sumatra, 2024).

Coffee is a plantation commodity that has significant potential for growth in Indonesia. Despite the recent decline in coffee exports, the high demand for coffee consumption has shown a positive trend globally. World coffee consumption increased by 4,2% to 175,6 million bags in the coffee year 2021-2022, following a 0,6% rise in the previous year. The release of pent-up demand built up during the COVID-19 years, coupled with sharp global economic growth (6,0% in 2021) explains the sharp bounce back in coffee consumption in the coffee year 2021-2022 (ICO, 2023). This global trend presents an opportunity for Indonesia to leverage its coffee production capabilities to regain momentum in its agricultural export growth.

Besides the high demand from global consumers, coffee consumption in Indonesia has also increased. This is due to changing consumer preferences. Evidently, there are now many outlets, restaurants, and cafes providing a wide variance of coffee drinks, ranging from black coffee to various specialty blends and processed instant drinks. Notably, 33% of coffee production is channeled to the local market to meet the needs of the Indonesian people (AEKI, 2023). This domestic demand highlights the cultural and economic importance of coffee within Indonesia.

Furthermore, Indonesia is a major coffee producer, ranking second in the Asia & Pacific region behind Vietnam. Between 2020 and 2022, the total area under coffee cultivation increased by 41.400 hectares. However, Indonesia's average yield of 8,9 bags per hectare for the coffee years 2017-2021 is still below the world average of 15,6 bags over the same period (ICO, 2023). This indicates that although Indonesia has high area coffee cultivation but the average yield/productivity still low of the world average. Over the past 10 years (2010-2020), the level of Coffee production in Indonesia when compared to land availability, is still low. There was a decrease in crop area from 1,27 million ha to 1,25 million ha, or an average decrease of 0,14 percent per year. As one of the export commodities, it turns out that during the last decade the volume of coffee exports has also decreased from 432.781 tons to 375.671 tons, or decreased by an average of 1,41 percent per year. This means that farmers interest in maintaining coffee plants has decreased (BRIN, 2024).

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In the 2021-2022 coffee year, frequent rain and strong winds on the island of Sumatra during the flowering stage disrupted coffee tree growth, impacting the main harvest season between April and May. This resulted in a 1,1% decrease in coffee output compared to the previous year. These environmental factors underscore how crucial short-term weather conditions are in determining annual coffee production in Indonesia, often influencing it more than incremental growth (ICO, 2023).

B. Problem Statement

Sumatra Island is the center of coffee production in Indonesia. One of the provinces that has a large contribution to coffee production from the island of Sumatra is the province of West Sumatra. In the latest data for 2023, West Sumatra province is the tenth highest coffee producing province in Indonesia with a total production of coffee is 23,8 thousand tons as shown in Figure 1 .The detail information of the production for each province year 2023 shown in Appendix 1.

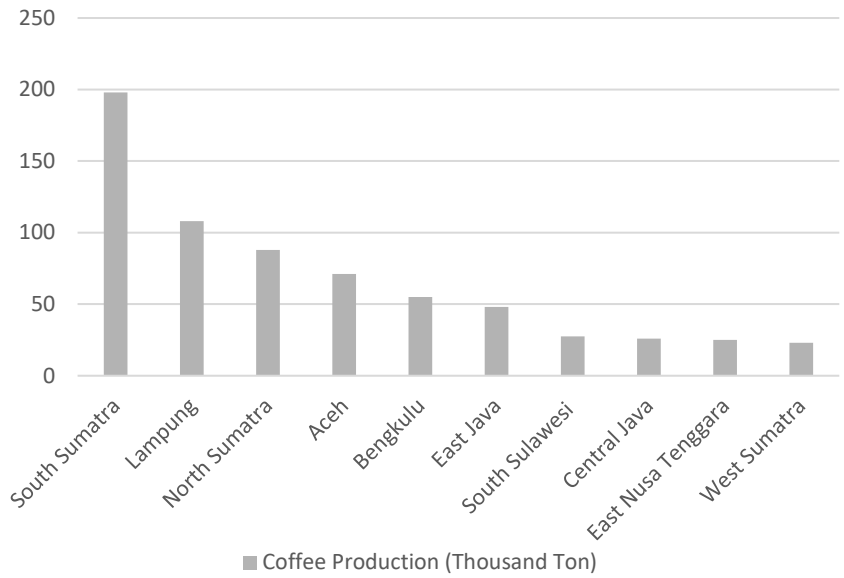

Figure 1.Ten highest Coffee production provinces in Indonesia year 2023
Source: Central Bureau Of Statistics Indonesia (2024)

There are two types of coffee produced in West Sumatra, namely Arabica Coffee and Robusta Coffee. Both types of coffee are widely grown and cultivated in this region not only require good place conditions, supervision of coffee beans until the harvest arrives, fertilizer application in accordance with the provisions, climatic conditions and soil conditions (Tantika et al., 2018). However, Robusta Coffee has properties that are resistant to temperature rises and resistant to pest and disease attacks, one of which is leaf rust. As the species with the highest diversity in the genus Coffea, Robusta coffee has the potential to be developed in quality (Syaifurrahman, M. A., et al, 2021).

Robusta coffee, with its resilience to temperature increases and resistance to pests and diseases such as leaf rust, presents a viable solution to addressing the challenges of declining coffee production due to climate change and other factors. According to the last 10 years of Coffee production in West Sumatra (Figure 2), Robusta production has consistently exceeded Arabica production from 2014 to 2023, highlighting its greater economic importance and potential for prioritization in production planning. However, given the fluctuating nature of coffee production during this period, accurate forecasting is essential to ensure effective resource allocation and strategic planning to stabilize and enhance coffee output.

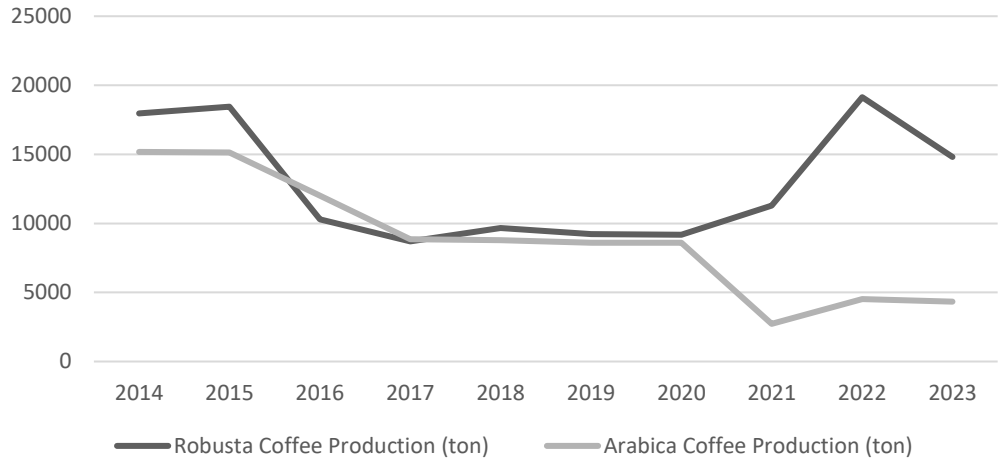

Figure 2. Robusta and Arabica Coffee production in West Sumatra 2014-2023
Source: West Sumatra in Figures, Central Bureau Of Statistics West Sumatra (2015-2024)

Robusta coffee has experienced a significant price increase due to the drought in Vietnam, as it is widely used in instant coffee and coffee blends. Meanwhile, Arabica coffee is preferred for its higher market value and is primarily used for premium-quality coffee (AEKI, 2024). Given these potential, forecasting both Robusta and Arabica coffee productivity is crucial to ensure stable production, prevent shortages, and maintain supply chain efficiency.

In West Sumatra, coffee production data has been recorded for the past 24 years (2000–2023) (Appendix 3), which provides a foundation for forecasting. However, due to limited availability of separate productivity data for Arabica and Robusta coffee, most analyses rely on aggregate coffee productivity data. This presents a challenge, as both coffee types have distinct growth characteristics, market demands, and responses to environmental conditions. Robusta coffee is more resistant to pests, diseases, and climate fluctuations, while Arabica coffee requires specific altitudes and careful cultivation techniques.

Indonesia's coffee sector faces challenges such as declining agricultural growth, reduced coffee exports, and fluctuating production levels, particularly in West Sumatra. Additionally, adverse weather conditions and lower productivity compared to global standards further impact production. Despite these difficulties, the increasing global and domestic demand for coffee highlights the need for a reliable forecasting model.

To develop effective agricultural policies and investment strategies, it is essential to forecast coffee productivity. It plays a crucial role in meeting market demand. Accurate forecasting coffee productivity is necessary to provide better insights into future production trends, improve farm management strategies, and ensure market stability. By leveraging historical production data, policymakers can make informed decisions regarding resource allocation, technological advancements, and strategic interventions to enhance coffee productivity and support sustainable growth in Indonesia's coffee sector.

It also important to adopts a five-year forecasting approach**,** considering that agricultural policies and development plans are generally evaluated and updated within this timeframe. Aligning the forecasting model with this cycle enables stakeholders to formulate more effective strategies, optimize resource allocation, and implement targeted measures to address challenges in coffee production. This alignment ensures that policy decisions remain adaptive and responsive to market fluctuations, climate variations, and industry developments, ultimately supporting sustainable growth and economic stability in the coffee sector.

Based on the problem description provided above, it is possible to formulate research inquiries as follows:

1. How has coffee productivity developed in West Sumatra?
2. How can the best model for forecasting coffee productivity in West Sumatra be identified and the projection of productivity levels for the years 2024 to 2028?

From the question above, the author will conduct a research entitled "**Forecasting Coffee Productivity In West Sumatra**"

C. Research Objectives

Based on the formulation of the problem that has been explained earlier, the objectives of this study are:

1. To analyze the development of coffee productivity in West Sumatra.
2. To identify the most suitable forecasting model for coffee productivity in West Sumatra and to project productivity levels for the years 2024 to 2028 using the selected model.

D. Research Benefits

The results of this study are expected to provide the following benefits:

1. For the government, this study findings can provide valuable insights for the office to develop targeted programs and support systems for coffee farmers.
2. For the Author, this study will demonstrated author expertise in agricultural forecasting methods and author ability to apply them to real-world problems.