

Area of Plantation Crops to the Contribution of the Plantation Sector in South Halmahera Regency in 2017- 2023

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Abstract. Although not all sub-districts have lost their plantation land, mining activities in the upstream and downstream forest areas have had an indirect impact on the decline in the productivity of the remaining plantation land in the surrounding area. Therefore, this study aims to examine the extent of plantation crops on the contribution of the plantation sector in South Halmahera Regency. This research was conducted in 2024. The design of this study is quantitative research using secondary data sourced from the Central Statistics Agency (BPS). This study itself is for the purpose of testing the hypothesis using a simple linear regression analysis tool. The statistical results show $\beta = 0.119$ $t = 0.605$ $\text{sig} = \geq 0.05$. This study reveals that the area of plantation crops has no contribution to the plantation sector in South Halmahera Regency. The main causes are many clove and coconut trees have entered the old/damaged plant phase, a very massive surge in investment in the nickel mining sector and the upstream-downstream processing industry and the price of commodities such as copra (coconut processing) and dried cloves at the farmer level which are often uncertain.

Keywords: Area, Plantation Crops, Plantation Sector, South Halmahera

1 Introduction

Indonesia is a region with abundant natural resources, making it known as an agricultural country. In fact, the majority of Indonesians' livelihoods are derived from the agricultural sector, making it a key pillar of the Indonesian economy, which is why Indonesia is referred to as an agricultural country [1]. This is because Indonesia has enormous potential for developing agricultural businesses.

The agricultural sector plays a strategic role in the structure of national economic development [2]. The agricultural sector's role in a country's or region's economy can be seen from one aspect, namely its contribution to employment. The agricultural sector is a highly strategic factor, serving as the economic base of rural communities,

driving the population's livelihoods, absorbing a larger workforce, and even serving as a safety net during Indonesia's economic crisis. Every country desires a developed economy to increase people's income and welfare [3]. Therefore, economic development is crucial to achieving this goal.

One of the agricultural subsectors is plantations. A phenomenon that occurred in South Halmahera Regency between 2017 and 2023, in aggregate, showed that the utilization of plantation areas had not been completely diverted to the mining sector. Although not all sub-districts lost their plantation land, mining activities in upstream and downstream forest areas have indirectly impacted the productivity of the remaining plantation land in the surrounding area [4]. This is caused by massive overlapping land conflicts and land use changes in certain areas rich in nickel mining commodities [5].

Furthermore, research findings have also been inconsistent, such as Feni & Marwan [6] who found that oil palm plantation area had no significant partial impact on the GRDP of the plantation subsector in Bengkulu. Furthermore, research by Helmi et al. [7] showed that the strategy for developing superior commodities in the plantation subsector in Buleleng Regency has significantly improved and can be optimized. Therefore, based on the phenomena and research results presented, this study attempts to examine the impact of plantation area on the contribution of the plantation sector in South Halmahera Regency from 2017 to 2023.

2 Literature Review

2.1 Agricultural Sector

The agricultural sector is the human use of biological resources to produce food, industrial raw materials, or energy sources, as well as to manage the environment [8]. Agriculture is a key economic sector in developing countries, particularly Indonesia. Its role and contribution to a country's economic development is crucial [3].

2.2 Plantation

Plantations are a sub-sector of the agricultural sector that focuses on the cultivation, management, and marketing of commercial crops on a large scale. Unlike food crops, which grow rice or corn for daily consumption, the plantation sector produces industrial crops with annual or seasonal characteristics that have high economic value, primarily as industrial raw materials and export commodities [9].

Plantations are one of the subsectors experiencing the most consistent growth, both in terms of area and production. Of several important plantation commodities in Indonesia (rubber, palm oil, coconut, coffee, cocoa, tea, and sugar cane), coffee and cocoa have grown more rapidly than other plantation crops annually [10]. This rapid growth of these three commodities is relatively better, as is government policies encouraging the expansion of these commodity areas in each region.

2.3 Research Framework

Based on the literature review and previous research that has been discussed previously, this study develops a conceptual model that places the area of plantation crops as an independent variable or X1 which influences the plantation sector which is referred to as the dependent variable or Y, for this reason this conceptual framework model can be illustrated as in the figure below.

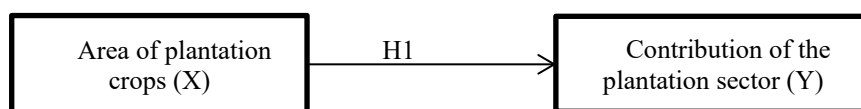


Fig. 1. Research Framework

H1: The area of plantation crops influences the contribution of the plantation sector in South Halmahera Regency.

3 Research Methodology

3.1 Research Approach and Data Collection Technique

This research is a quantitative study with a causal-associative approach, namely determining the cause-and-effect relationship between two or more variables [11]. Data used in this study are sourced from the Statistics Indonesia (BPS) of South Halmahera Regency, such as the area of plantation crops and the sector's contribution from 2017-2023. In addition, secondary data from scientific journals, books, news media, and other relevant literature sources are used to support the research.

3.2 Data Analysis Method

This research begins with data collection and then testing using established analytical tools, ultimately yielding results that can be interpreted by the researcher. The data analysis method used to test the hypotheses in this study is simple linear regression analysis. This test tool aims to determine the influence or relationship between the independent and dependent variables according to established statistical analysis procedures.

4 Research Results

4.1 Hypothesis Testing

The t-statistical test is used to determine whether or not each independent variable individually influences the dependent variable tested at a significance level of 0.05. The results of the t-test in this study are shown in the table below.

Table 1. Recapitulation of Regression Analysis Results

Types of Testing	Statistic Value / Result	Decision
Normality Test	$0,639 \geq 0,05$	Normally distributed data
t Test	$0.605 \leq 2.447$ or $\geq 0,05$	The area size variable has no effect on the plantation sector.
Adjusted R^2	0,708	Model capability 70.8%

Source: processed by researchers, 2025

The results of the normality test show a significance value of $0.639 \geq 0.05$, so it can be concluded that the research data is normally distributed and meets the classical assumptions of regression. t-test (Partial): The calculated value of the t-test of 0.605 was found to be smaller than the t-table value of 2.447 or has a significance value of ≥ 0.05 . This shows statistically that the area variable does not have a significant influence on the plantation sector during the observation period. The Adjusted R-Squared value was recorded at 0.708. This figure confirms that the ability or capacity of the model to explain variations in the relationship between variables is 70.8%, while the rest is explained by other factors outside the model.

4.2 Discussion

The empirical analysis in this study shows that the area variable does not significantly influence the contribution of the plantation sector in South Halmahera Regency. This finding strongly indicates that land expansion (physical extensification) is no longer the primary driver of economic growth in the plantation sector in the region. Although the partial test results showed insignificance, this model still has strong empirical relevance and predictive power, as evidenced by the Adjusted R-Squared value of 0.708, indicating the model's ability to explain 70.8% of the variation in the relationship between variables [12].

Furthermore, this study aligns with the research of Feni & Marwan [6] that there is indeed no relationship between plantation area and the contribution of the plantation subsector. These results also support the phenomenon described by Sangaji et al. [4] that although not all regions have lost plantation land, this actually reduces overall plantation productivity. This empirical insignificance of the land area variable can be comprehensively explained through a collaboration of three main approaches: the productivity trap theory, commodity price volatility, and geographical characteristics in the form of island logistics barriers.

First, the plantation sector in South Halmahera is strongly indicated to be experiencing a productivity trap. Cultivation patterns are still dominated by traditional

smallholder plantations with minimal adoption of modern agricultural technology, limited access to fertilizer, and a high proportion of aging plants, meaning that additional land area is not accompanied by a linear increase in output [13]. In line with the concept of diminishing returns, area expansion without increasing technological efficiency actually reduces the marginal efficiency of land, resulting in stagnant economic contributions to GRDP despite apparent increases in land area [14].

Second, the economic determinants of the plantation sector in this region are highly vulnerable to price volatility of key commodities (such as cloves, nutmeg, and copra) in both domestic and global markets. According to the theory of commodity price fluctuations, when prices drop drastically at the market level, the economic incentive for farmers to perform optimal maintenance and harvesting will significantly decrease [15]. As a result, even though the planted area in South Halmahera continues to be maintained or expanded, the real economic value generated and farmers' incomes fluctuate sharply according to global market uncertainty, rather than the size of the land [16]. This demonstrates that price stability is a far more important determinant of regional economic output than the physical expansion of the land itself.

Third, a fundamental factor exacerbating this distortion between land area and economic output is the inherent geographical logistical constraints of South Halmahera Regency. As an archipelagic region with limited connectivity, inter-island freight costs from production centers (such as Obi, Bacan, or Gane) to major urban collecting ports are extremely high [17]. The long supply chain structure, reliance on weather-vulnerable maritime transportation, and the lack of integrated warehousing infrastructure create information asymmetries and depress farm-gate prices [18]. This massive logistics cost burden absorbs a significant portion of the economic profit margin that would otherwise be generated, so physical expansion in the form of land area expansion fails to stimulate a significant increase in the plantation sector's contribution to the regional economy.

Accumulatively, the combination of these three factors provides valid theoretical and empirical justification for why area expansion is not positively correlated with economic output in this study. The growth of the plantation sector in South Halmahera is no longer determined by physical input factors (land area), but is much more sensitive to strengthening price stability, increasing the efficiency of the island supply chain, and transforming internal land productivity through integrated agricultural modernization.

5 Conclusion

This study provides several conclusions: first, plantation area does not determine the economic contribution of the plantation subsector. Second, in South Halmahera, this decline is caused by three main factors: low productivity due to aging trees, supply chain issues (middlemen), and massive macroeconomic shifts caused by the rapid growth of the mining industry.

Furthermore, recommendations for future researchers based on the conclusions discussed are: first, to examine the impact of post-harvest processing levels (downstream processing) and the establishment of micro-processing industries/MSMEs on farmer incomes, and to compare their economic value with raw commodity sales. Second, to conduct a technical and economic efficiency analysis by examining the role of adopting modern agricultural technology, fertilizer systems, and superior varieties in increasing production on limited land. Third, to analyze the efficiency of distribution channels or supply chains (trade systems) for plantation products in South Halmahera and measure the profit margins received by farmers compared to intermediary traders. Fourth, to examine the influence of subsidy policies, the availability of access to capital, and the activeness of farmer groups on increasing income and the contribution of the plantation sector in the region.

Furthermore, in response to the economic decline of plantations in South Halmahera, a strategy is needed that shifts from simply expanding land to intensification, downstreaming, and supply chain integration. First, to promote a plantation rejuvenation program (replanting) by replacing old trees with superior clonal seedlings. This ensures that plants begin bearing fruit earlier and yields are significantly more optimal. Second, shortening the supply chain by establishing village-owned enterprises (BUMDes) or farmer cooperatives. These institutions can purchase harvests at fair prices and provide bridging funds to farmers to avoid being tied to middlemen. Third, shifting from selling raw materials to downstream commodity processing. Farmers can be trained to produce high-value products such as Virgin Coconut Oil (VCO), nutmeg powder, and essential oils (from cloves and nutmeg). This step is also supported by the government through the national plantation downstreaming project.

Given the limited sample size of this study, which only used 7 years of annual data ($(N=7)$), future research is recommended to expand the data by modifying the privacy or data structure. Future researchers can use quarterly or monthly data to increase the number of observations and statistical degrees of freedom, thus making the resulting regression analysis more robust.

Finally, to broaden the scope of this study's findings, future researchers are advised to add external macroeconomic variables. Given that the area variable did not show a significant impact in the short term, the addition of variables such as fertilizer subsidy policies, global commodity price fluctuations, or inflation rates is projected to provide a more comprehensive explanation of the dynamics of the plantation sector.

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