Analysis Impact of the Agricultural Industry on Economic Growth in Aceh Province

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Abstract:- The agricultural sector plays a pivotal role in the economy of Aceh Province, yet the contribution of the agricultural industry to economic growth remains suboptimal, as evidenced by the low proportion of legally registered agricultural industries (1.62% of the national total) and fluctuations in the growth of the agricultural industry's Gross Regional Domestic Product (GRDP). This study aims to analyze the impact of the agricultural industry on the economic growth of Aceh Province. A quantitative approach was employed, utilizing a simultaneous equation model and the Two-Stage Least Squares (2SLS) method. Secondary time-series data spanning 20 years (2004–2023) were used, including variables such as Aceh's GRDP, agricultural sector labor absorption, agricultural industry GRDP, agricultural sector investment, Farmers' Terms of Trade (FTT), and agricultural exports. The results indicate that Aceh's economic growth is significantly influenced by labor absorption, agricultural industry GRDP, investment, FTT, and exports, with a strong multiplier effect from the agroindustry sector.

Keywords: Gross Regional Domestic Product (GRDP), Agricultural Industry, Simultaneous Equations.

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I.   INTRODUCTION

The agricultural sector plays a critical role in driving economic growth and poverty alleviation in Indonesia, particularly in rural areas. Although its contribution to national GDP has declined from 45% in 1970 to 14% in 2016, agriculture remains a primary source of employment, especially in Aceh Province (Badan Pusat Statistik, 2025). Indonesia's structural economic transformation has reduced the role of agriculture, yet its development remains essential, particularly in tandem with the growth of the agricultural industry.

Fluctuations in the agricultural sector's contribution to GDP are influenced by factors such as climate change, the COVID-19 pandemic, technology adoption, government policies, and labor shifts to other sectors. In Aceh, an increase in the Farmers' Terms of Trade (FTT) during 2019–2023, particularly in the plantation and aquaculture subsectors, indicates improved farmer welfare, potentially strengthening economic growth and labor absorption.

However, the agricultural industry's contribution in Aceh remains low, accounting for only 1.62% of the national total, highlighting a gap between production potential and industrial development. Increasing the number of legally registered Agricultural Enterprises (UPB) in Aceh could enhance the agricultural industry's GRDP and improve the competitiveness of local products.

The agricultural industry subsector in Aceh exhibits varied dynamics. The plantation subsector shows positive growth trends, while others, such as tobacco, timber, and rubber processing industries, face growth challenges. This underscores the need for stronger synergy between agricultural and industrial development.

Based on these conditions, this study aims to analyze the impact of the agricultural industry on economic growth in Aceh Province, supporting economic development grounded in local potential.

II.   RESEARCH METHODS

This study was conducted in Aceh Province using secondary time-series data spanning 20 years (2004–2023). The research focused on labor absorption and economic growth in Aceh, employing Hwa's (1983) model approach.

Metode yang digunakan pada penelitian ini adalah analisis persamaan simultan. According to (Rofatunnisa and Usman, 2024) A simultaneous equation model was utilized,

defined as a system with multiple dependent variables and equations forming an interdependent system. Data were processed using Shazam and SPSS software. The simultaneous equation method is a statistical approach to model and estimate reciprocal relationships among interdependent variables.

The model examined the impact of the agricultural industry on agricultural labor absorption and overall economic growth based on relevant factors. Aceh's economic growth (GRDP) was hypothesized to be influenced by agricultural labor, agricultural industry GRDP, agricultural investment, FTT, and agricultural exports.

Model identification revealed that Aceh's economic growth (GRDP) was overidentified, allowing for robust estimation. The 2SLS method was employed due to its tolerance for model specification errors, independence of errors across equations, suitability for small sample sizes, and ability to avoid biased or inconsistent estimates. (Jurnal et al., 2025)

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Classical assumption tests were conducted to ensure the model's reliability for further analysis. For the simultaneous equation model, tests included normality, multicollinearity, and heteroskedasticity..

III. RESULTS AND DISCUSSION

➤ *Overview of the Agricultural Industry in Aceh Province*

Aceh has a relatively low number of legally registered Agricultural Enterprises (UPB) compared to other Indonesian provinces, indicating a gap between high production potential and limited industrial development. East Java leads with 12.02% of national agricultural industries, while Aceh ranks 18th among 38 provinces with 92 agricultural industries.

A key factor hindering agricultural industry growth in Aceh is limited investment. Despite abundant natural resources and a strategic geographic position, foreign investment remains low (Aceh Investment and Promotion Agency, 2024). This constrains project realization, hampering innovation and sector development.

As of 2023, the agricultural sector dominates Aceh's GRDP contribution. Including oil and gas, agriculture contributes 28.33% to Aceh's GRDP of IDR 146,932.42 billion (Statistics Aceh, 2025). Non-oil and gas processing industries, including agricultural industries, contribute 4.22%.

Table 1. Aceh Province GRDP at 2010 Constant Prices by Economic Sector, 2023 (IDR Billion)

No	Economic Sector	GRDP with Oil and Gas	
		(IDR Billion)	%
I	**Agriculture, Forestry, & Fisheries**	**41.626,32**	**28,33**
1	Agriculture, Livestock, Hunting, & Agricultural Services	32.494,04	22,11
2	Forestry & Logging	1.434,46	0,98
3	Fisheries	7.697,81	5,24
II	**Mining & Quarrying**	**10.330,73**	**7,03**
III	**Manufacturing Industry**	**6.371,28**	**4,34**
1	Coal & Oil Refining Industry	1.225,85	0,83
2	Food Industry	2.793,90	1,90
3	Tobacco Processing Industry	20,22	0,01
4	Textile & Apparel Industry	12,02	0,01
5	Leather Goods & Footwear Industry	5,35	-
6	Timber Industry	55,05	0,04
7	Paper & Printing Industry	90	0,06
8	Chemical & Pharmaceutical Industry	1.607,63	1,09
9	Rubber & Plastic Industry	165,38	0,11
10	Other Industries	395,87	0,35
IV-XVI	**Others**	**88.604,08**	**60,30**
	Gross Regional Domestic Product	**146.932,41**	**100,00**
	Non-Oil and Gas GRDP	**141.011,03**	**95,97**

The table illustrates that agriculture, livestock, hunting, and agricultural services are the largest contributors to GRDP, reflecting Aceh's reliance on primary sectors. This highlights a resource-based economic structure. In contrast, the secondary sector, including manufacturing, contributes only 4.34%, encompassing industries like food, chemicals, and textiles. The low contribution of manufacturing indicates that most of

Aceh's agricultural products remain unprocessed raw materials, limiting economic value-added.

With the dominance of primary sectors, particularly agriculture, and minimal manufacturing contributions, Aceh has yet to transition to a more advanced economic structure. Strengthening the manufacturing sector and improving

infrastructure are priorities in regional development plans (Aceh Development Planning Agency, 2023).

➢ *Normality Test*

The normality test at a 5% significance level showed a significance value of 0.151 for the economic growth equation, indicating that the data are normally distributed.

➢ *Autocorrelation Test*

The Durbin-Watson statistic for the economic growth equation was 1.5802, falling between the lower (dL) and upper (dU) bounds of the Durbin-Watson table (dL < DW < dU). As this value lies in the inconclusive region, no definitive conclusion can be drawn regarding the presence or absence of autocorrelation.

➢ *Multicollinearity Test*

The multicollinearity test showed that all independent variables had tolerance values above 0.10 and Variance Inflation Factor (VIF) values below 10.00, indicating no multicollinearity in the model. Thus, relationships among independent variables do not affect the accuracy of regression coefficient estimates.

➢ *Analysis of Aceh's Economic Growth*

Aceh's economic growth is influenced by agricultural labor absorption, agricultural industry GRDP, agricultural investment, FTT, and agricultural exports. The R-squared value of 0.9814 indicates that 98.14% of the variation in Aceh's economic growth is explained by the independent variables in the model.

Simultaneous testing at a 95% confidence level ($\alpha = 0.05$) yielded an F-statistic of 137.973, exceeding the F-table value of 2.914 (F-statistic > F-table), rejecting the null hypothesis (H0) and accepting the alternative (Ha). This confirms that agricultural labor absorption, agricultural industry GRDP, agricultural investment, FTT, and agricultural exports collectively and significantly influence Aceh's economic growth.

Table 2 Estimation Results of Factors Influencing Economic Growth in Aceh Province

Economic Growth in Aceh Province			R-sq	F-Stat
			0.9814	137.973
	Coef	Std.err	T-Ratio	P-Value
Constant	-0.18026E+06	0.5172E+05	-3.485	0.001
AL	0.94173E-01	0.4949E-01	1.903	0.057
AIG	17.175	2.086	8.234	0.000
INV	28.118	0.7508	3.745	0.000
FTT	946.19	325.2	2.909	0.004
EXP	99.441	4.599	2.162	0.031

The economic growth equation is as follows:

GRDP = -176.56 + 0.094173AL + 17.175PAIG + 2.8118INV + 946.19FTT + 9.9441EXP + e

The regression coefficient of 0.094173 indicates that each additional agricultural laborer increases Aceh's economic growth by IDR 0.094173 billion, significant at the 10% level (p-value = 0.057). This reflects agriculture's role as a key contributor to economic value-added in Aceh. This finding aligns with classical economic theory emphasizing labor's importance in primary production, though modern contexts prioritize productivity over quantity. Jurnal et al., (2025) note that while agriculture's labor contribution to national growth is declining, it remains critical in agrarian regions like Aceh, necessitating improvements in labor quality and skills.

A coefficient of 17.175 indicates that a IDR 1 billion increase in agricultural industry GRDP boosts economic growth by IDR 17.175 billion, significant at the 5% level (p-value = 0.000). This demonstrates a strong multiplier effect from the agroindustry, consistent with Wiyani and Prihanto (2023), who highlight agroindustry's direct value-added and its backward and forward linkages in the agricultural value chain. Strengthening this sector is a highly effective development strategy for Aceh.

A coefficient of 2.8118 shows that each IDR 1 billion increase in agricultural investment drives economic growth by IDR 2.8118 billion, significant at the 5% level (p-value = 0.000). This underscores the high productivity of capital in this sector and its potential for sustainable growth. Abadi (2021) suggest that agribusiness investment, particularly in modernizing equipment and production capacity, significantly boosts regional GRDP. Enhancing the agribusiness investment climate should be a policy priority.

A coefficient of 946.19 indicates that a 1% increase in the FTT index raises economic growth by IDR 946.19 billion, significant at the 5% level (p-value = 0.004). This highlights the macroeconomic impact of improved farmer welfare. Wulandari & Tohari (2020) note that higher farmer purchasing power boosts rural household consumption, strengthens local markets, and accelerates rural economic activity. Consistently improving FTT is a key strategy for inclusive development in Aceh.

A coefficient of 9.9441 shows that a USD 1 million increase in agricultural exports increases economic growth by IDR 9.9441 billion, significant at the 5% level (p-value = 0.031). This underscores the role of international trade in regional growth, aligning with export-led growth theory (Ouadghiri and Taoufik, 2025). Studies confirm that agricultural commodity exports enhance regional economic resilience and open new markets. Increasing exports of Aceh's flagship commodities is a cornerstone of long-term economic development.

IV. CONCLUSION

The findings demonstrate that Aceh's economic growth is significantly influenced by the agricultural industry, particularly through indirect effects such as labor absorption, FTT, investment, and agricultural production volume. Simultaneous testing confirms that all model variables significantly contribute to economic growth, with a high coefficient of determination. This indicates that, despite its structural limitations, the agricultural industry provides a critical foundation for regional economic growth by enhancing value-added and expanding agriculture-related economic activities.

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