

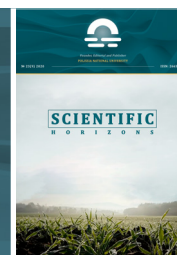
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Patterns and growth dynamics of the plantation sector in South Sumatra, Indonesia

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Abstract. The plantation sector is a crucial pillar of South Sumatra Province's economic structure, as it contributes significantly to the Gross Regional Domestic Product. Therefore, an in-depth study of its growth dynamics and shifts in regional structure is necessary. This study aimed to identify production characteristics, area, commodity growth, and changes in the plantation sectoral structure across regencies/cities in South Sumatra. Using secondary data from Central Statistics Indonesia and the Plantation Office for 2021-2025, this study applied quantitative descriptive methods through percentage analysis, growth analysis, and a shift-share approach to examine the competitive position of each plantation commodity. The analysis showed that palm oil, rubber, and coffee are the dominant commodities in both production and spatial distribution, while coconut and cocoa make more limited contributions. The growth analysis for 2021-2025 indicated that coconut (0.025) and coffee (0.023) recorded positive growth, while palm oil (-0.019), rubber (-0.053), and cocoa (-0.021) experienced negative growth. Shift-share analysis further revealed that palm oil ($C_{ij} = 2,161,960.89$), rubber ($C_{ij} = 374,948.27$), and cocoa ($C_{ij} = 337.51$) possessed positive regional competitive advantages, whereas coconut ($C_{ij} = -249.30$) and coffee ($C_{ij} = -6,770.39$) exhibited negative competitive values and remained concentrated in limited production areas. These findings indicate a dualistic plantation structure in

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South Sumatra, where a limited number of commodities function as regional growth drivers while others remain stagnant and require revitalisation. The results provide an empirical basis for local governments to strengthen leading commodities, improve plantation productivity, and formulate differentiated commodity development policies according to regional potential and competitiveness. These findings provide a strategic basis for local governments to strengthen the development of leading commodities, increase area productivity, and design differentiated policies according to the potential and dynamics of each district

Keywords: leading potential; structural transformation; shift-share; Gross Regional Domestic Product; plantation structure; plantation productivity; commodity development

INTRODUCTION

South Sumatra Province is a key region in the Indonesian economy, marked by significant potential in the plantation sector (Ciptawaty *et al.*, 2020). The plantation sector has long been the backbone of the local economy, as South Sumatra's agro-climate supports the development of strategic commodities such as palm oil, rubber, coffee, and sugarcane. In the 2019-2023 South Sumatra Provincial Medium Term Development Plan (MTDP), the agriculture, forestry, hunting, fisheries, and plantation sectors are listed as among the most significant contributors to the province's Gross Regional Domestic Product (GRDP) (South Sumatra Province, 2019).

According to data from the Central Statistics Agency (CSA) of South Sumatra Province, the South Sumatra economy is showing a stable growth trend. In 2024, the provincial economy is projected to grow by 5.03% based on GRDP (CSA South Sumatra, 2025). Furthermore, in the first quarter of 2025, South Sumatra's contribution to Sumatra Island's total GRDP was recorded at 13.58%, according to the provincial fiscal report (Ministry of Finance of the Republic of Indonesia, 2025). This data demonstrates South Sumatra's strategic role in the regional economy and the importance of its leading sectors (basic sectors) within the local economic structure.

The plantation sector is one of the main drivers of regional economic development in South Sumatra, accounting for a substantial share of agricultural output and supporting employment, exports, and rural livelihoods. However, recent changes in plantation commodity performance, spatial concentration, and regional competitiveness have created uneven development among districts. Understanding the patterns and growth dynamics of plantation commodities is therefore essential for identifying regional competitive advantages, evaluating structural transformation, and providing evidence-based guidance for sustainable regional development and investment policies, including Musi Banyuasin, Banyuasin, East OKU, and Lahat. This confirms that plantation activities dominate the local economy and provide a source of prosperity for rural communities. However, the development of the plantation sector in South Sumatra has not been evenly distributed spatially. Structural inequalities exist: some regencies have experienced rapid growth in plantation output, making significant contributions to the provincial economy.

The plantation sector has become one of the most strategic components of Indonesia's regional economy because it contributes substantially to employment, export earnings, rural development, and regional gross domestic product. South Sumatra is among the country's leading plantation provinces, with oil palm, rubber, coffee, coconut, and cocoa serving as the dominant commodities. Although these commodities have long supported regional economic growth, recent changes in commodity prices, land-use dynamics, productivity, and regional competitiveness have altered the spatial distribution of plantation development. These changes have increased the need to understand how plantation growth differs across districts and commodities, particularly in the context of regional development planning and sustainable agricultural transformation.

The existing studies have investigated various aspects of plantation development in Indonesia, but important research gaps remain. A. Syahza *et al.* (2021) demonstrated that sustainable plantation commodities contribute significantly to regional economic development, although their study focused primarily on sustainable commodity development without analysing spatial differences in regional competitiveness. M.F. Ali *et al.* (2021) examined the dynamics of rubber production and concluded that international price volatility strongly influences plantation performance; however, the study did not investigate regional structural change at the subnational level. P. Wang *et al.* (2021) highlighted the importance of governance and institutional capacity in improving agricultural competitiveness, but their analysis was not specifically directed toward plantation-based regional economies. J.D. Merfeld & P. Brummund (2022) showed that sectoral productivity differences strongly influence regional economic performance, yet they did not evaluate how plantation commodities contribute differently across local administrative regions. Later, T.H. Masitah *et al.* (2023) reported that labour quality, production area, and investment significantly determine oil palm productivity in Indonesia, whereas their analysis was limited to productivity determinants rather than regional structural dynamics.

Studies conducted by Indonesian researchers also reveal similar limitations. T. Feninda (2023) reported that oil palm plantations substantially contribute to

South Sumatra's regional economy but did not compare the performance of multiple plantation commodities across districts. J. Barkah & M. Rojali (2024) demonstrated that oil palm expansion promotes regional economic growth and poverty reduction; nevertheless, their study concentrated on Kalimantan and did not evaluate structural changes in South Sumatra. M.A.R. Mauladi *et al.* (2022) analysed coffee supply-chain management in West Java and highlighted institutional and marketing constraints, although the study did not examine the regional competitiveness of plantation commodities using spatial economic approaches. Overall, previous studies have mainly focused on individual commodities, productivity determinants, supply chains, or economic contributions, while comprehensive analyses integrating plantation production, plantation area, commodity growth, and structural change across all districts within a province remain limited. Using a descriptive-analytical framework, this study sought to objectively present the condition of the plantation sector, thereby providing a basis for assessing its development and the challenges it faced.

This study addresses these research gaps by integrating descriptive analysis, growth analysis, and shift-share analysis to evaluate the patterns and growth dynamics of the plantation sector across all regencies and cities in South Sumatra Province during the 2021-2025 period. Unlike previous studies that examined individual commodities separately, this research simultaneously analyses plantation production, cultivated area, commodity growth, and structural competitiveness to identify leading commodities, regional growth patterns, and structural transformation. The findings are expected to provide stronger empirical evidence for regional economic planning, commodity development strategies, and sustainable plantation policy in South Sumatra.

MATERIALS AND METHODS

This study used a quantitative descriptive method to provide an empirical understanding of the dynamics of the plantation sector in South Sumatra Province. This approach was chosen because it can systematically describe phenomena by presenting characteristics, trends, and variations in data related to the sector's growth and contribution. A quantitative approach was applied to process numerical data derived from the area and production of various plantation commodities. This data was analysed using shift share analysis to identify growth patterns, contribution levels, and shifts in the structure of the plantation sector within the regional economy. Through quantitative analysis, this study produced a comprehensive and relevant understanding that supported the formulation of sustainable plantation development policies in South Sumatra Province.

This research was conducted in South Sumatra Province, which comprises 17 regencies/cities with

diverse economic and spatial characteristics. This area was selected based on regional economic growth dynamics and differences in sectoral structures across regions, making it relevant for analysis in the context of economic geography. This diversity provided a strong foundation for examining variations in regional performance and identifying factors influencing shifts in the regional economic structure. The research took place from February to December 2025, encompassing a series of systematic stages, from data collection and quantitative and qualitative analysis to the interpretation of results based on the theoretical framework. All stages culminated in the preparation of a final report that contained the key findings and their implications for regional development policy.

Data type and source. This research utilised secondary data sourced from official government institutions. The primary data included commodity types, commodity area, and plantation commodity production volumes. All data were obtained from the 2025 publications of the CSA of South Sumatra Province. Furthermore, the CSA data was validated by comparing it with data from the South Sumatra Provincial Plantation Office for 2025. This validation was conducted to ensure consistency in statistical figures across agencies and to reduce potential bias arising from differences in data collection methods. The integration of these two data sources enabled this research to produce more comprehensive findings and to more accurately depict the actual conditions of the plantation sector.

Data collection in this research was conducted using a documentation study method. Documentation studies allow researchers to obtain historical and current data from official institutions, particularly from the CSA for 2025, which provides various figures on plantation areas and production. Furthermore, this study also utilised the 2025 report from the South Sumatra Provincial Plantation Office as a more specific sectoral data source, particularly regarding the dynamics of plantation commodities, the spatial distribution of production, and the development of the region's leading subsectors (CSA South Sumatra, 2025).

Data analysis techniques. Analysis of area and production using a descriptive percentage approach illustrates the relative contribution of a commodity, region, or unit of analysis to the overall production system. This approach is essential because it can more clearly demonstrate the spatial structure and distribution of production capacity. Percentages allow researchers to see the proportion of land area and production volume controlled by each commodity or region, thereby identifying growth centres, commodity dominance, and any spatial inequalities. Technically, this analysis compares the area or production of each entity to the total area or total output. The results are then translated into percentages for easy reading and analysis. The percentage formula is as follows:

$$\text{Percentage (\%)} = (\text{Number of Shares}) / (\text{Total Shares}) \times 100\%. \quad (1)$$

The average GRDP growth of the plantation sector for each district/city during the 2020-2025 period using the following annual geometric growth average was calculated by the following formula:

$$\text{Average growth rate (r)} = \left(\frac{P_0}{P_t} \right)^{\frac{1}{t}} - 1, \quad (2)$$

where P_0 = GRDP of the plantation sector in the initial year (2020), P_t = GRDP of the plantation sector in the final year (2025) and t = number of years (2025-2020 = 5 years). To calculate the contribution of the plantation sector to the total GRDP of the district/city, the following formula was used:

$$\text{Share} = \frac{\text{GRDP of the plantation sector}}{\text{Total GRDP}} \times 100\%. \quad (3)$$

The following analysis focused on the general formulation of the shift-share equation and its constituent components. In economic geography, this method is used to identify the sources of changes in a region's performance by separating regional, structural, and local factors. Therefore, understanding the general form of the equation provides an essential foundation for comprehensively interpreting the dynamics of interregional economic growth.

In principle, the basic shift-share equation consists of three main components: regional share, industry mix, and local shift. The regional share component shows how national economic growth influences a sector's performance in a given region. The industry mix component assesses whether a sector in that region is growing faster or slower than national sectoral growth. Meanwhile, the local shift component indicates competitive advantages or disadvantages between districts, as evidenced by differences in sectoral growth within that district compared to provincial performance.

By understanding the basic structure of this equation, shift-share analysis can provide a more accurate picture of the sources of district growth. Furthermore, the study can indicate whether regional factors, regional economic structure, or district competitiveness more influence economic change. This approach is crucial for developing more adaptive economic development strategies that focus on the district's unique potential. The shift share analysis formula is as follows:

$$D_{ij} = N_{ij} + M_{ij} + C_{ij}, \quad (4)$$

where i represent economic sectors studied, j – regional variable studied (Regency), D_{ij} – change in sector i in region j (Regency), N_{ij} – national growth of sector i in region j (Regency), M_{ij} – industrial mix of sector i in region j (Regency), C_{ij} – competitive advantage of sector i in region j .

Despite the robustness of the quantitative descriptive and shift-share approaches in identifying growth patterns and structural changes in the plantation sector, this study had several limitations. First, the analysis relied exclusively on secondary data obtained from official government sources, making the findings dependent on the accuracy, consistency, and completeness of the published statistical records. Second, the shift-share method primarily measured changes in regional competitiveness and sectoral structure but did not explicitly capture the influence of external factors such as international commodity price fluctuations, climate variability, technological innovation, institutional quality, or policy interventions that may have affected plantation performance during the study period.

RESULTS AND DISCUSSION

South Sumatra Province exhibited considerable regional variation in plantation development during the 2021-2025 observation period, reflecting differences in biophysical conditions, land availability, and commodity specialisation across its 17 regencies and cities. The plantation sector was dominated by five major commodities oil palm, rubber, coffee, coconut, and cocoa which differed substantially in terms of cultivated area, production volume, and growth performance. Oil palm occupied the largest plantation area, followed by rubber and coffee, while coconut and cocoa covered relatively smaller areas. Production was spatially concentrated in several leading regencies, particularly Musi Banyuasin for oil palm and rubber, Banyuasin for coconut, South Ogan Komering Ulu and Empat Lawang for coffee, and Lahat for cocoa. The observed production patterns were generally associated with regional differences in land suitability, agroclimatic conditions, infrastructure availability, and commodity-based economic specialisation. Overall, the empirical results indicated contrasting development trends among plantation commodities. Growth analysis showed positive growth for coconut (0.025) and coffee (0.023), whereas oil palm (-0.019), rubber (-0.053), and cocoa (-0.021) experienced declining growth during the study period (Muchane *et al.*, 2020; Hayashi *et al.*, 2020; Wang *et al.*, 2021). Furthermore, the shift-share analysis revealed that oil palm, rubber, and cocoa maintained stronger regional competitiveness, while coconut and coffee remained concentrated in specific districts with relatively limited competitive performance. These findings provide an empirical overview of the plantation sector before presenting detailed results on production, plantation area, commodity growth, and structural dynamics (Merfeld & Brummund, 2022).

Extent and distribution of plantations in South Sumatra. During the 2019-2024 period, the development of primary commodity plantations in South Sumatra Province exhibited varying spatial and temporal dynamics across regions. For rubber, Musi Banyuasin Regency

consistently had the most significant area, peaking in 2020, followed by North Musi Rawas and Muara Enim Regencies, which also have substantial land coverage. In contrast, urban areas such as Pagar Alam, Prabumulih, and Lubuk Linggau showed relatively small and stable regions. For coconut, Musi Banyuasin again dominated, with the most significant area throughout the observation year. At the same time, other regencies, such as Ogan Komering Ulu, Ogan Komering Ilir, Musi Rawas, and Banyuasin, had much smaller and relatively stable areas. This indicates that coconut development in South Sumatra is centralised and has not experienced significant expansion during the study period.

Oil palm plantations exhibit extreme concentration in the Musi Banyuasin, Ogan Komering Ilir, Muara Enim, and Banyuasin regions, with a trend of increasing area in 2020, followed by relative stability until 2024. Meanwhile, urban areas continue to show minimal area. For coffee, production centres shifted, with Empat Lawang, Muara Enim, and South Ogan Komering Ulu dominating at the beginning of the observation period. However, during the 2020–2024 period, South Ogan Komering Ulu shows increasingly strong dominance. Coffee plantations in several cities remain small and stable, with a trend of decreasing area towards the end of the period. Cocoa is highly concentrated in Lahat, Musi Rawas, and Ogan Komering Ulu Regencies, with a peak area in 2020 followed by a decline. Overall, these results indicate that plantations in South Sumatra remain concentrated in certain regencies, with signs of slowing expansion and a decline in area for some commodities after 2020 (Barkah & Rojali, 2024).

The growth and contribution of the plantation sector to South Sumatra Province's GRDP demonstrate its highly strategic role in the regional economic structure. Plantation subsectors such as rubber, palm oil, coffee, cocoa, and coconut have been shown to contribute significantly to regional added value, primarily due to their export-oriented nature and high labour-absorption capacity. The consistent dominance of rubber and palm oil as regional economic drivers aligns with literature findings that indicate the plantation sector in Indonesia contributes significantly to resource-based regional growth. This aligns with the view that leading commodities have a multiplier effect on local economic activity and improve the welfare of surrounding communities (Syahza *et al.*, 2021). Furthermore, within the framework of economic geography, dominant commodities function as growth poles, attracting investment and strengthening a region's competitive position (Chetty & Hendren, 2018).

The contribution of plantation subsectors shows an uneven economic structure, with palm oil, rubber, and coffee as the three commodities that dominate South Sumatra's plantation GRDP. This aligns with shift-share analysis, which shows that subsectors with high production capacity and strong markets tend to have

larger regional shares and greater proportional shifts than other subsectors, such as cocoa or coconut, whose contributions are relatively small and stagnant. This distribution of contributions reinforces the literature's view that productivity disparities between commodities are caused by differences in technology, business scale, and the effectiveness of regional governance (Reisman, 2022). Thus, the dominance of Musi Banyuasin in palm oil and rubber production, and South OKU and Empat Lawang in coffee, demonstrates agro-based growth centres that determine the overall structure of the provincial plantation economy.

Biophysical factors, including land suitability, soil characteristics, topography, and favourable microclimate, strongly influence variations in contributions and production growth across regions. As explained in the agronomic literature, successful plantation commodity production depends heavily on the suitability of ecological systems and specific biophysical conditions to plants' physiological needs (Muchane *et al.*, 2020). The high productivity of oil palm and rubber in Musi Banyuasin, as well as coffee production in South OKU and Empat Lawang, can be explained by biophysical factors such as rainfall levels, elevation, and soil fertility, which are highly suited to the characteristics of these crops. This confirms that physical geography remains a key determinant in the formation of plantation production centres in South Sumatra.

In addition to biophysical factors, the success of the plantation sector is strongly influenced by socio-economic factors and environmental and ecological dynamics. Business scale, land ownership patterns, farmer access to markets, road infrastructure, and local government policies all play significant roles in determining production performance and long-term growth. Research shows that regions with strong institutional governance, access to technology, and good market integration can increase production efficiency and strengthen commodity competitiveness (Wang *et al.*, 2021). However, environmental pressures, such as land degradation, climate change, and ecological vulnerability, pose long-term challenges that can reduce productivity (Hayashi *et al.*, 2020). Therefore, the sustainability of the growth of the South Sumatra plantation sector is greatly influenced by how the three factors – biophysical, socioeconomic, and ecological – are managed in an integrated manner to maintain production stability and strengthen the plantation sector's contribution to the province's GRDP.

Plantation production in South Sumatra. Rubber production in South Sumatra Province during the 2019–2024 period exhibited quite fluctuating spatial dynamics across regencies. At the beginning of the period, Muara Enim Regency was recorded as the highest rubber producer, but from 2020 to 2024, production dominance shifted consistently to Musi Banyuasin Regency. This shift indicates differences in land carrying capacity,

planted area, and the effectiveness of plantation management across regions (Muchane *et al.*, 2020). In addition to Musi Banyuasin, Muara Enim, and Musi Rawas Regencies, the three also demonstrated relatively high and stable production capacity, categorising all three as major rubber production centres in South Sumatra. Conversely, other regencies/cities contributed less, with production tending to stagnate or decline, possibly related to limited land area, low productivity, and sub-optimal management of smallholder plantations (Masitah *et al.*, 2023).

Coconut production in South Sumatra exhibits a highly concentrated spatial pattern. Throughout the 2019-2024 period, Banyuasin Regency consistently produced the highest coconut production, reaching approximately 4-5 million tons per year, while other regencies produced only a few thousand tons per year. This reflects the geographic characteristics of Banyuasin Regency, which is dominated by coastal areas and tidal swamps suitable for coconut cultivation. Meanwhile, palm oil production also exhibited a strong dominance pattern, with Musi Banyuasin Regency as the largest producer throughout the observation period, followed by Banyuasin Regency. Other regencies, such as Musi Rawas, Ogan Komering Ilir, and South Ogan Komering Ulu, contributed moderate amounts, while other regions produced relatively small quantities. In general, palm oil production in South Sumatra has been stable, with high concentrations in several key regencies.

Coffee and cocoa commodities exhibited different production characteristics. South Sumatra's coffee production during 2019-2024 was dominated by South Ogan Komering Ulu and Empat Lawang Regencies, with the highest and relatively stable production volumes, followed by Lahat, Muara Enim, and Ogan Komering Ulu Regencies. In contrast, urban areas such as Palembang, Pagar Alam, and Lubuk Linggau contribute virtually no coffee production. For cocoa, Lahat Regency has the highest production, although it has shown a downward trend over the past six years. Musi Rawas and Ogan Komering Ulu Regencies also produce significant amounts of cocoa, although this fluctuates. Overall, cocoa production in South Sumatra remains concentrated in specific regions and is in decline, indicating the need for strengthened cultivation, rejuvenation, and improved sustainable plantation management (Toffolini *et al.*, 2020).

Research results indicate that the plantation sector in South Sumatra Province makes a significant economic contribution to the region's GRDP. Based on previous research, the plantation sector accounts for approximately 45% of South Sumatra Province's GRDP (Feninda, 2023). This indicates that the rapid expansion of plantation areas, such as rubber, oil palm, coffee, cocoa, and coconut, is not merely an agrarian phenomenon but also a major driver of regional added value. This high contribution reinforces the understanding that the

plantation sector is the backbone of South Sumatra's economy, particularly given its labour-intensive nature, upstream and downstream value chain linkages, and potential to export leading commodities.

Analysis of growth and share across subsectors reveals interesting dynamics. Based on land area data, oil palm appears to be very dominant in South Sumatra, particularly in regencies such as Musi Banyuasin, Muara Enim, and Banyuasin, which consistently had the most significant areas from 2021 to 2024. As a leading subsector, oil palm is highly likely to contribute a significant percentage of the province's plantation GRDP. This aligns with findings that palm oil area expansion has historically been positively correlated with regional economic growth (Barkah & Rojali, 2024). Meanwhile, for rubber, although Musi Banyuasin Regency has a large and fluctuating land area, its potential contribution to GRDP may be influenced by land productivity. Factors such as labour, investment, and rubber prices significantly determine the efficiency of rubber plantations, as research shows that productive land area, the quality of farmers' human resources, and rubber prices significantly influence rubber productivity (Barkah & Rojali, 2024). Coffee and cocoa, despite their smaller areas, still have the potential to be growth-promoting subsectors, given their relative stability in some regions and the added value of their exports.

The underlying determinants of plantation area growth and land distribution in South Sumatra include several structural and economic variables. For palm oil, land expansion is often driven by global and domestic demand, as well as by incentive policies and relatively easy access to land, particularly in flat areas and near forests (Barkah & Rojali, 2024). Additionally, empirical studies show that palm oil industry productivity is influenced by worker wages, worker education level, and the size of the production area (Masitah *et al.*, 2023). For rubber, another study found that, in addition to rubber prices, aspects such as equipment investment, bank financing, and farmers' human resources significantly influence the growth and productivity of rubber plantations. On the social side, a case study in South Sumatra also influenced decisions about rubber plantation expansion and maintenance (Mulyo *et al.*, 2023).

The geographic-economic implications of the observed land-use patterns are highly relevant to regional development planning. The concentration of palm oil plantations in regencies such as Musi Banyuasin and Muara Enim indicates the presence of major plantation centres with the potential to become value-adding centres and integrated agribusiness clusters. However, fluctuations in rubber plantation area and decreases in several regions in recent years indicate sustainability risks, especially if not offset by investments in productivity and plantation maintenance. Within a growth-share framework, regions with large areas must focus on increasing productivity and down streaming to not

only grow in area but also increase their share of GRDP contributions. Local policies need to align incentives for plantation maintenance, technology adoption, and value chain development to optimise the economic potential of superior commodities and manage the risk of future land area reduction.

Plantation growth in South Sumatra province. The research results show that the plantation sector in South Sumatra Province makes a significant contribution to the regional economy, with key commodities including palm oil, rubber, and coffee. Based on data from 2019-

2024, considerable variations in dynamics are observed between regencies/cities, both in terms of area and production of each commodity. The development of land area for several key plantation commodities in South Sumatra Province and Indonesia in 2021 and 2025, along with the results of growth analysis over the four years, are presented. Overall, variations in growth dynamics are observed between commodities, both regionally and nationally. The average annual growth rates of the major plantation commodities, calculated using the geometric growth rate formula, are presented in Table 1.

Table 1. Results of the plantation growth analysis in South Sumatra province, 2021-2025

No	Plantation sector	Growth analysis (%/year)
1	Palm Oil	-0.019
2	Coconut	0.025
3	Rubber	-0.053
4	Coffee	0.023
5	Cocoa	-0.021

Source: Data analysis results 2026

Based on Table 1, which presents the results of the Growth Analysis of the plantation subsectors in South Sumatra Province for the period 2021-2025, each commodity exhibits varying growth rates. Palm oil experienced a decline in land area from 4,267 thousand hectares in 2021 to 3,951.37 thousand hectares in 2025, with a growth rate of -0.019. This decline indicates a slowdown in land expansion and a possible shift in management focus toward production intensification.

Conversely, coconut showed a positive growth trend. Land area increased from 55.4 thousand hectares to 61.12 thousand hectares during the observation period, with a growth rate of 0.025. A positive trend was also observed for coffee, which increased its land area from 191.2 thousand hectares to 209.47 thousand hectares, with a growth rate of 0.023. The growth of these two commodities illustrates the promising potential for plantation economic development in South Sumatra.

Meanwhile, rubber and cocoa prices declined. Rubber land area decreased from 804.8 thousand hectares to 648.18 thousand hectares at the provincial level, and from 2,884.6 thousand hectares to 2,262.09 thousand hectares nationally, with a growth rate of -0.053. Cocoa also experienced a decrease in land area from 4.2 thousand hectares to 3.86 thousand hectares in South Sumatra, and from 713.4 thousand hectares to 632.7 thousand hectares nationwide, with a growth rate of 0.021.

Overall, the analysis results show that the palm oil, rubber, and cocoa sectors experienced negative growth with values of -0.019, -0.053, and -0.021, respectively, indicating a decline in performance between 2021 and 2025. Conversely, the coconut and coffee sectors showed positive growth of 0.025 and 0.023, respectively. These findings suggest that coconut and coffee

commodities have positively impacted the growth dynamics of the plantation subsector in South Sumatra Province during the analysis period.

An analysis of the growth of the plantation subsector in South Sumatra Province reveals structural dynamics reflecting changes in production patterns and spatial allocation between 2021 and 2025. Findings regarding variations in growth between commodities indicate that changes in productivity and area are not solely determined by internal factors within the plantation subsector but are also influenced by global market dynamics, policy changes, and environmental pressures. From an economic geography perspective, changes in agrarian structure and investment direction in leading commodities are often linked to regional economic restructuring, shifts in downstream industry preferences, and land-use transformation (Barrett *et al.*, 2017).

The decline in oil palm plantation area in the province, with a growth rate of 0.019%, reflects a transition from extensification to more sustainable intensification. This phenomenon aligns with global trends in palm oil-producing countries tightening land expansion due to pressures for sustainability, environmental certification, and deforestation. Furthermore, changes in international market demand and commodity diversification by farmers can also reduce dependence on single commodities such as palm oil, as demonstrated in various studies on the dynamics of tropical commodities in Southeast Asia (Carlson *et al.*, 2018).

Conversely, coconut and coffee commodities exhibited favourable growth rates of 0.025 and 0.023, respectively. This growth indicates opportunities for regional economic development, particularly given the high added value of both commodities in the supply chain and stable global demand. Coffee growth, for

example, is heavily influenced by global consumption trends and the growing specialty coffee market, which incentivises improvements in cultivation quality (Carlson *et al.*, 2018). Similarly, increases in coconut plantation area are often associated with revitalisation programs for smallholder plantation commodities and the increasing role of coconut-based industries in the local economy (Firsta *et al.*, 2020).

The declining performance of rubber and cocoa commodities indicates a significant shift in the structure of the plantation economy. The negative growth rate of -0.053 for rubber is in line with declining international prices and increased competition from other, more efficient producing countries, such as Thailand and Vietnam. Previous studies have shown that global rubber price volatility is a significant factor in farmers' declining interest in maintaining production (Ali *et al.*, 2021). Meanwhile, the decline in cocoa plantations, which grew by -0.021%, can be attributed to declining productivity of mature plants and pest and disease attacks, a situation common in tropical cocoa-producing countries (Toffolini *et al.*, 2020).

Overall, the research findings indicate that the plantation subsector in South Sumatra is in a phase of growth differentiation between commodities. Palm oil, rubber, and cocoa contracted, while coconut and coffee grew.

This condition indicates a structural change important for regional development strategies. In the context of economic geography, this phenomenon illustrates how a region's comparative and competitive advantages can change over time through interactions among market factors, policies, and agroecological capacity (Akbar *et al.*, 2020). Therefore, regional development strategies need to be directed at strengthening commodities with positive growth while simultaneously revitalising those in decline, so that the plantation subsector can maintain its contribution to the regional economy.

Analysis of the dynamics of structural change. Shift-share analysis is a quantitative approach used to understand the dynamics of changes in a region's economic structure over a specific period. This method allows researchers to identify how national factors, sectoral characteristics, and local competitive advantages influence a region's economic growth. In the context of regional analysis, shift-share provides a comprehensive picture of the extent to which economic changes at the local level follow, deviate from, or exceed growth patterns occurring at the broader regional level. In the 2021-2025 period, shift-share analysis plays a crucial role in tracking shifts in leading sectors within a district and within a province. The results of the shift-share analysis for South Sumatra Province are shown in Table 2.

Table 2. Results of shift share analysis of the plantation sector in South Sumatra province 2021-2025

No	Plantation Sector	N_{ij}	M_{ij}	C_{ij}	D_{ij}
1	Palm Oil	-4431492.85	3644016571	2161960.89	3641747039
2	Coconut	-57535.67	-588014.5474	-249.3	-645799.5174
3	Rubber	-835825.04	520309445.7	374948.272	519848568.9
4	Coffee	-198570.76	-10659278.4	-6770.392	-10864619.55
5	Cocoa	-4361.91	352006.137	337.512	347981.739

Source: Data analysis results 2026

The analysis shows that palm oil, rubber, and cocoa experienced relatively rapid growth in South Sumatra Province. These three commodities not only demonstrated increasing production dynamics but also made significant contributions to the regional economic structure. This consistent growth indicates a strong sectoral specialisation process, along with increasing land expansion and support for agribusiness infrastructure in various regencies/cities.

Conversely, coconut and coffee commodities did not demonstrate a regional competitive advantage. Their performance tended to stagnate and did not contribute significantly to the province's economic growth. This condition indicates a weak financial base for these two commodities across productivity, business scale, and added value. Limited production facilities and a lack of technical innovation further weakened these commodities' competitiveness.

Spatially, there was a positive shift in the prices of palm oil, rubber, and cocoa, as evidenced by their

relatively even distribution across almost all regencies/cities. This broad distribution indicates that these three commodities have become a widespread economic base, supporting more equitable regional development. Conversely, a negative shift occurred for coconut and coffee. Coconut production is concentrated in Banyuasin Regency, while coffee production is limited to two regencies: South OKU and Empat Lawang. This uneven distribution indicates that these two commodities have not developed into leading provincial sectors and serve only as a local economic base in certain areas.

Research results show that shift-share analysis can more comprehensively reveal the dynamics of plantation sectoral growth in South Sumatra Province. Findings on the growth of palm oil, rubber, and cocoa indicate the effectiveness of regional economic structures in responding to changes in national and global demand. This aligns with the understanding that the plantation sector in tropical regions tends to grow positively when supported by market factors, technology,

and adaptive regional policies (Barbier, 2004). Thus, the growth patterns identified through the proportional shift and differential shift components confirm that South Sumatra Province possesses a continuously developing sectoral advantage.

The rapid growth of palm oil, rubber, and cocoa demonstrates that these sectors are highly competitive, both in terms of productivity and market structure. This positive performance can be attributed to increased agribusiness investment, strengthening supply chains, and land expansion in various regencies/cities, which is conceptually consistent with the theory of regional competitive advantage (Merfeld & Brummund, 2022). Furthermore, the growth dynamics of palm oil and rubber in Sumatra have long been influenced by global market integration, leading to more intensive and stable sectoral specialisation.

Conversely, coconut and coffee commodities exhibit uncompetitive performance, reflected in negative differential shift values. This achievement underscores that these two commodities cannot keep pace with sectoral growth at provincial and national levels. Cross-regional studies indicate that the stagnation of the coconut and coffee sectors is often associated with limited cultivation technologies, low productivity among smallholder farmers, and minimal diversification into high-value-added products (Mauladi *et al.*, 2022). In other words, the sector's inability to grow stems not only from internal production factors but also from an economic structure that does not support innovation.

From a spatial perspective, research findings confirm that palm oil, rubber, and cocoa are relatively evenly distributed across most districts/cities, strengthening their position as regionally based sectors. This wide distribution indicates the process of economic diffusion and regional integration, which are key characteristics of sectors that have achieved regional scale (Brooks *et al.*, 2020). A strong spatial distribution also indicates a region's high capacity to provide labour, land accessibility, and agribusiness infrastructure.

Conversely, the limited distribution of coconut and coffee commodities indicates that these two sectors have only a local economic base and have not yet developed into leading provincial sectors. The spatial concentration of coconut in Banyuasin and coffee in South OKU and Empat Lawang indicates that these commodities are trapped in a subsistence production structure without adequate market and technological support. The literature shows that sectors with narrow spatial distributions tend to struggle to compete in regional growth contexts due to limited economies of scale and weak market integration (Yeung & Coe, 2015). This situation reinforces the finding that coconut and coffee have not been able to expand or contribute significantly to the economic growth of South Sumatra Province.

The results of the study indicate that the growth of the plantation sector in South Sumatra Province is

dualistic: leading sectors (palm oil, rubber, cocoa) exhibit inclusive growth dynamics, both spatially and sectorally, while non-leading sectors (coconut, coffee) remain localised and stagnant. These findings provide a strategic overview of the need for policy differentiation, both to maximise the potential of leading sectors and to improve the performance of marginal sectors to contribute more to regional development. These research findings can inform the formulation of evidence-based policies for sustainable plantation development at the provincial level.

CONCLUSIONS

The results of this study indicate that the plantation sector holds a highly strategic position in the economic structure of South Sumatra Province. Through growth and share analysis, it is clear that differences in contributions between commodities and between regions reflect the dynamics of new growth centres and determine the direction of regional plantation transformation. Overall, the four main aspects of production, area, growth, and structural dynamics form an important foundation for understanding the potential and challenges of the provincial plantation sector.

Plantation production in South Sumatra demonstrates the dominance of rubber, palm oil, and coffee as the region's main pillars of GRDP. These three commodities not only contribute significantly to the economy but also act as growth poles that drive local economic activity through a multiplier effect. They are key determinants of production centres such as Musi Banyuasin for rubber palm oil and South OKU and Empat Lawang for coffee.

The plantation area demonstrates the dominance of oil palm, which is widespread in regencies such as Musi Banyuasin, Banyuasin, and Muara Enim. The expansion of plantation areas, particularly oil palm and rubber, has been a driving force for regional economic growth due to its strong linkages with upstream and downstream activities, employment, and export potential. However, the dynamics of land area also indicate structural shifts: rubber fluctuates, while several other commodities remain stagnant. The contribution of land to GRDP is strongly influenced by the productivity and efficiency of its utilisation. Therefore, regions with large areas need to focus on increasing productivity and downstream processing to maintain their role as value-added centres and integrated agribusiness clusters. Subsector growth indicates that plantations in South Sumatra are in a phase of sharp differentiation between commodities. Palm oil, rubber, and cocoa tend to experience contraction. Conversely, coconut and coffee show positive growth, reflecting regional development opportunities, primarily due to stable market demand and high added value in the processing industry.

The identified structural dynamics indicate that palm oil, rubber, and cocoa have strong regional

competitiveness and serve as basic sectors spread across various districts. This positive performance aligns with market integration, agribusiness investment, and strengthened supply chain networks. Conversely, coconut and coffee commodities exhibited negative differential shift values, indicating an inability to keep pace with provincial and national sectoral growth. The limited distribution of coconut and coffee indicates that both commodities remain trapped in a subsistence production structure and have not yet developed into leading provincial sectors. This finding confirms the dual nature of the plantation sector in South Sumatra: some commodities have become drivers of inclusive

regional growth, while others require revitalisation to contribute more significantly to regional development.

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CONFLICT OF INTEREST

The authors of this study declare no conflict of interest.

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Моделі та динаміка розвитку плантаційного сектору Південної Суматри, Індонезія

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Анотація. Платаційний сектор є одним із ключових елементів економічної структури провінції Південна Суматра, оскільки забезпечує вагомий внесок у валовий регіональний внутрішній продукт. Тому необхідним є поглиблене дослідження динаміки його розвитку та структурних змін на регіональному рівні. Метою цього дослідження було визначення характеристик виробництва, площ насаджень, динаміки зростання основних культур і змін у структурі плантаційного сектору в округах і містах провінції Південна Суматра. Використовуючи вторинні дані Центрального статистичного управління Індонезії та Управління плантацій за 2021-2025 роки, у дослідженні застосовано кількісні описові методи, зокрема відсотковий аналіз, аналіз динаміки зростання та shift-share-аналіз для оцінювання конкурентних позицій кожної плантаційної культури. Результати аналізу показали, що пальмова олія, каучук і кава є домінуючими культурами як за обсягами виробництва, так і за просторовим поширенням, тоді як кокос і какао роблять значно менший внесок. Аналіз динаміки зростання за 2021-2025 роки засвідчив позитивні темпи розвитку кокоса (0,025) та кави (0,023), тоді як пальмова олія (-0,019), каучук (-0,053) і какао (-0,021) продемонстрували негативну динаміку. Shift-share-аналіз також показав, що пальмова олія ($C_{ij} = 2\ 161\ 960,89$), каучук ($C_{ij} = 374\ 948,27$) і какао ($C_{ij} = 337,51$) мають позитивні регіональні конкурентні переваги, тоді як кокос ($C_{ij} = -249,30$) і кава ($C_{ij} = -6\ 770,39$) характеризуються від'ємними показниками конкурентоспроможності та залишаються зосередженими в обмеженій кількості виробничих районів. Отримані результати свідчать про дуалістичну структуру плантаційного сектору Південної Суматри, у межах якої лише обмежена кількість культур виступає рушіями регіонального економічного зростання, тоді як інші залишаються стагнуючими та потребують відновлення й розвитку. Результати дослідження формують емпіричне підґрунтя для органів місцевого самоврядування щодо зміцнення позицій провідних культур, підвищення продуктивності плантацій та розроблення диференційованої політики розвитку окремих культур відповідно до їхнього потенціалу й конкурентоспроможності. Отримані висновки також створюють стратегічну основу для посилення розвитку провідних культур, підвищення продуктивності плантаційних площ і формування диференційованої політики з урахуванням потенціалу та особливостей розвитку кожного округу

Ключові слова: провідний потенціал; структурна трансформація; shift-share-аналіз; валовий регіональний внутрішній продукт; структура плантаційного сектору; продуктивність плантацій; розвиток сільськогосподарських культур