What do we know about THE FUTURE OF THE AGRIFOOD SYSTEM IN INDONESIA?

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Key messages

- Productivity growth has played a dominant role in driving the growth of Indonesia's agricultural production in recent decades, but it has been accompanied by the increasing role of land expansion.
- Indonesia is projected to achieve high-income status by 2045 if the country can maintain a 6–7 percent annual economic growth rate.
- To achieve high income and economic growth, the country needs to boost investment activities by increasing national saving, foreign direct investment (FDI), and investment efficiency.
- Future foresight research should include environmental impacts such as emissions and land use change and explore long-term changes in dietary patterns and poverty alleviation.

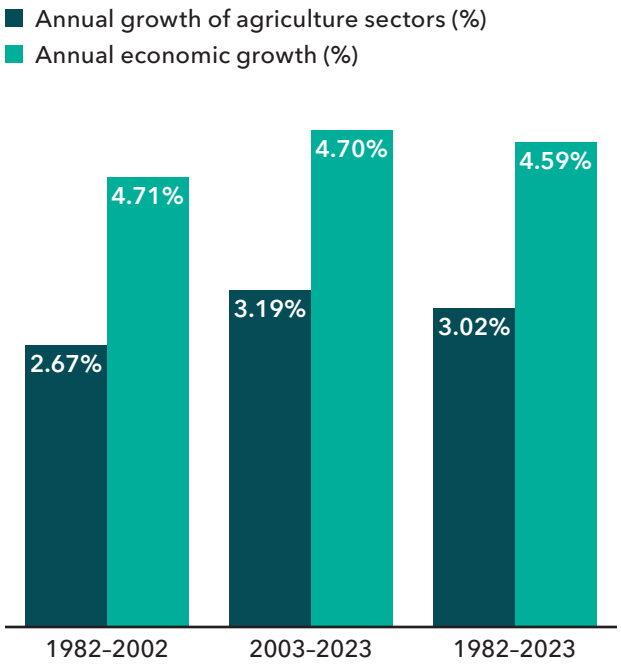
RECENT TRENDS AND CHALLENGES

Indonesia's agriculture sector experienced major shifts throughout the 1982–2023 period, growing at an average annual rate of 3.02 percent, which was slower than the overall economic growth rate of 4.59 percent (Figure 1). As a result, the agriculture sector's contribution to gross domestic product (GDP) declined significantly, from 24.02 percent in 1982 to only 12.42 percent by 2023 (Figure 2). Coinciding with this, the proportion of agricultural workers decreased from 55 percent in 1987 to 28.21 percent in 2023 (Figures 3 and 4). These decreasing trends may be attributed to "structural transformation." It is worth noting, however, that the transition away from agriculture in Indonesia is happening before manufacturing is mature (Dartanto, Yuan, and Sofiyandi 2017), so workers are more likely to be reallocated to informal services, as the manufacturing sector cannot absorb them all (Jeon 2013).

In Indonesia, food crops, especially rice, remain the main staple food source (Suhaimi et al. 2022). Rice prices thus affect inflation (Sholikhah and Anjani 2023) as well as social, economic, and political conditions in the country (Wiswayana and Pinatih 2020). For this reason, the government has made various efforts to increase rice production and its availability, with positive results: rice production growth over 1982–2020 increased 1.29 percent per year. The government has also undertaken efforts to increase maize production, for which average growth for 1982–2020 was 4.45 percent per year. Except in 2019 and 2020, the high increase in maize production in recent years was driven by the increasing use of corn as feed and by its price at the international level (FAO 2023).

Other commodities such as horticulture and plantation products and poultry show better performance. Horticulture products can also be considered staple foods and are categorized as high-value, enjoying a strong position in both domestic and export markets (Edi et al. 2023; Indrasti and Rawung 2021). Since the economic value of horticultural products is quite high, it is reasonable for farmers to switch to this subsector. Several factors play an important role in this development, such as superior varieties (Mustaffa and Kumar 2012). For plantation crops, average growth in oil palm fruit production averaged 11.30 percent per year over 1982–2020. Coffee, tea, and cocoa experienced relatively stable annual

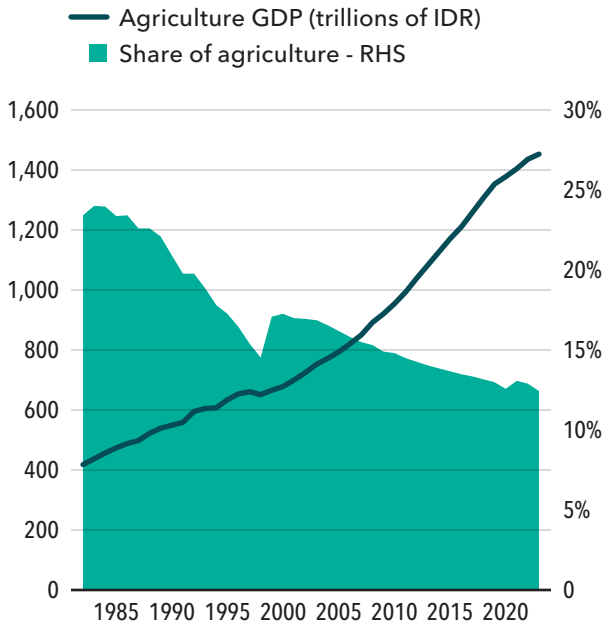
FIGURE 1 Annual agriculture and economic annual growth, 1982–2023



Source: Statistics Indonesia.

Note: Based on constant 2010 prices.

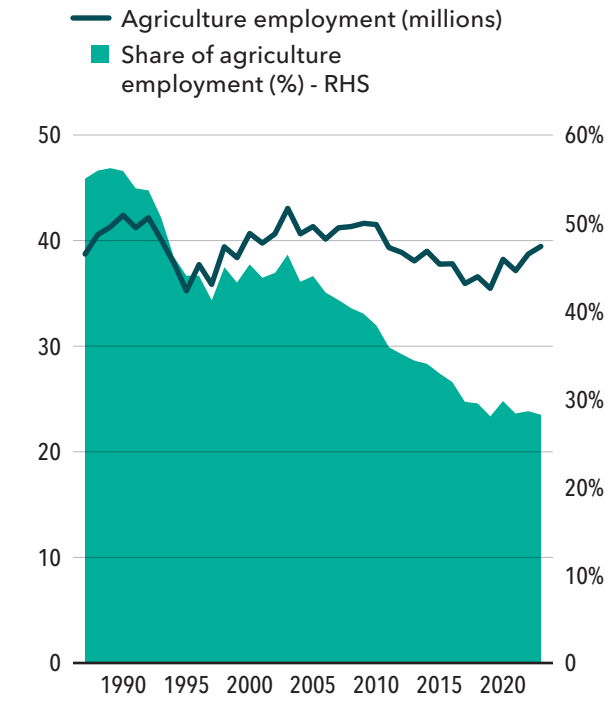
FIGURE 2 Agricultural GDP and share of total GDP, 1982–2023



Source: Statistics Indonesia.

Note: Based on constant 2010 prices.

FIGURE 3 Employment in agriculture, 1987–2023

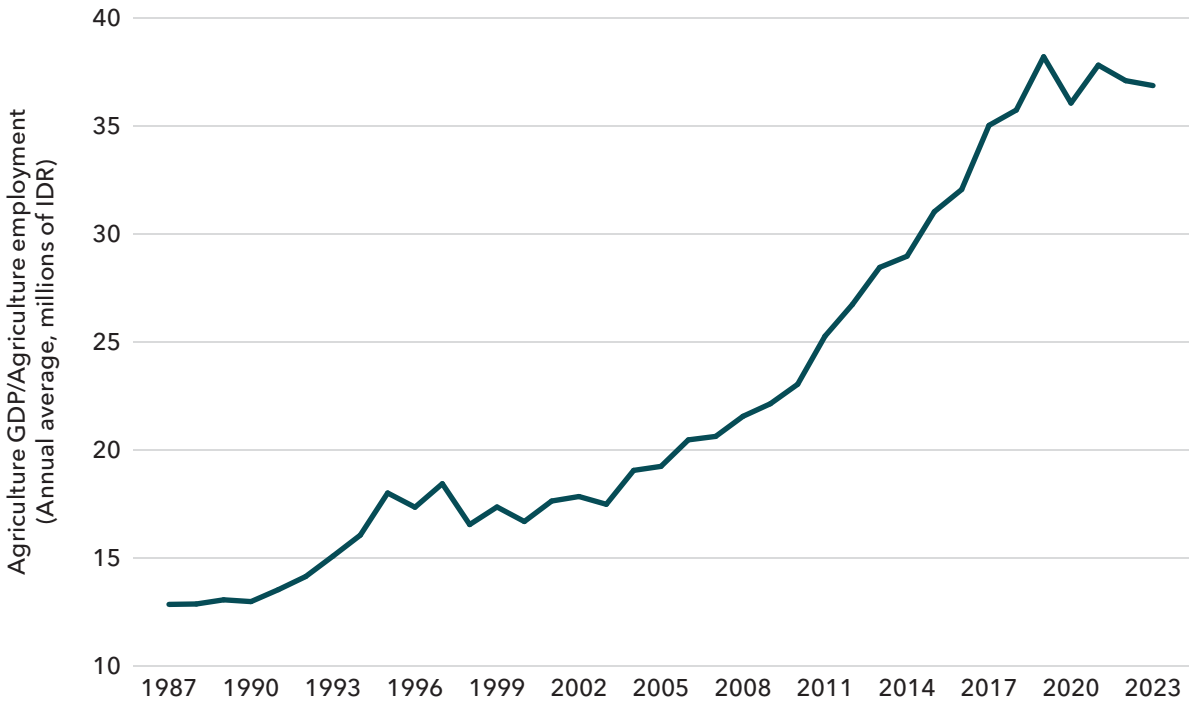


Source: Statistics Indonesia.

growth of 4.53 percent, although their production growth slowed in the 2010s. For poultry commodities, chicken and egg production grew at an average annual rate of 8.40 percent from 1982 to 2020, in line with the increase in worldwide chicken meat and egg production from pure-bred chickens and the shift to their commercial production in Indonesia (Putri and Sukandar 2023).

Our analysis shows that total factor productivity (TFP) consistently played a dominant role in the growth structure of Indonesia's agriculture production throughout the 1982–2020 period. However, we note that the role of land expansion increased as well. From 1982 to 1990, our calculations show that agricultural growth was primarily supported by TFP growth and labor expansion. More specifically, output grew by an impressive 4.87 percent per year, with TFP growth and labor expansion accounting for about 30 percent and 31 percent of this growth, respectively. In the following decades (from 1990 to 2020), TFP growth remained the primary driver, but the role of labor dropped (−0.79%), while land expansion gradually became more dominant (+0.81%).

FIGURE 4 Agricultural productivity per worker, 1987–2023



Source: Statistics Indonesia.

Our analysis at the commodity level suggests that almost all commodities relied heavily on extensification factors (that is, land and livestock expansion). For instance, output growth for rice between 1982 and 2000 averaged 2.45 percent annually and land expansion contributed 1.52 percent. However, over the 2001–2020 period, rice production grew more slowly (by only 0.42 percent) and land contracted correspondingly (by 0.4 percent). Other commodities — including maize, roots, palm oil, coffee, tea, and cocoa, and poultry and cattle — experienced a similar slowdown.

LATEST FORESIGHT RESEARCH

A study conducted by the Food and Agriculture Organization of the United Nations (FAO 2023) analyzed the impacts, synergies, trade-offs, and political feasibility of various policy interventions for agrifood systems transformation in Indonesia (Woolfrey et al. 2024). This study explored Indonesia's effort to make steady progress across several food system policy interventions. Continued economic growth and rising incomes will both contribute to declining rates of poverty and undernourishment. Increasing demand for food in Indonesia is projected to lead to a substantial increase in food production, with corresponding increases in greenhouse gas (GHG) emissions from agriculture. Rice availability in Indonesia still needs to increase, and various efforts to boost its production still need to be carried out. The government's efforts to increase maize production have borne fruit: recently, maize has been used not only for household consumption but also as a source of animal feed and as material for the food-processing industry.

However, the FAO study did not explore how the agriculture sector could contribute to achieving the government's targets associated with plans to celebrate the 100th anniversary of Indonesia's independence in 2045. The Indonesian government's long-term vision for the Golden Indonesia Era in 2045 (Indonesia Emas 2045) specifically aims to raise the country's per capita income to the level of high-income countries. A recent study by the team of the CGIAR Research Initiative on Foresight in Indonesia strives to identify how this can be achieved by investigating the country's past agricultural development and its implications for future economic growth and the agrifood system as a whole. The analysis is primarily focused on baseline projections, which serve as a critical tool for identifying existing trends, challenges, and opportunities within the agrifood system needed to understand plausible future scenarios. Specifically, this study examines major drivers of agricultural production — including intensification, extensification, and changes in TFP — and projections of economic growth pathways based on different growth drivers, using an economywide modeling framework designed to explore ways of achieving Indonesia's vision for 2045.

Departing from the historical lessons learned, we analyze the plausible future of the Indonesian economy based on low (5 percent), medium (6 percent), high (7 percent), and ambitious (8 percent) growth rate scenarios, which are aligned with the Bappenas[1] scenarios. To demonstrate how the country could reach high-income status, we compare the dynamic real income per capita growth projections[2] from our economywide modeling analysis to the World Bank's high-income country classification in 2024–2025, that is, US$14,005 gross national income (GNI) per capita (World Bank 2024).

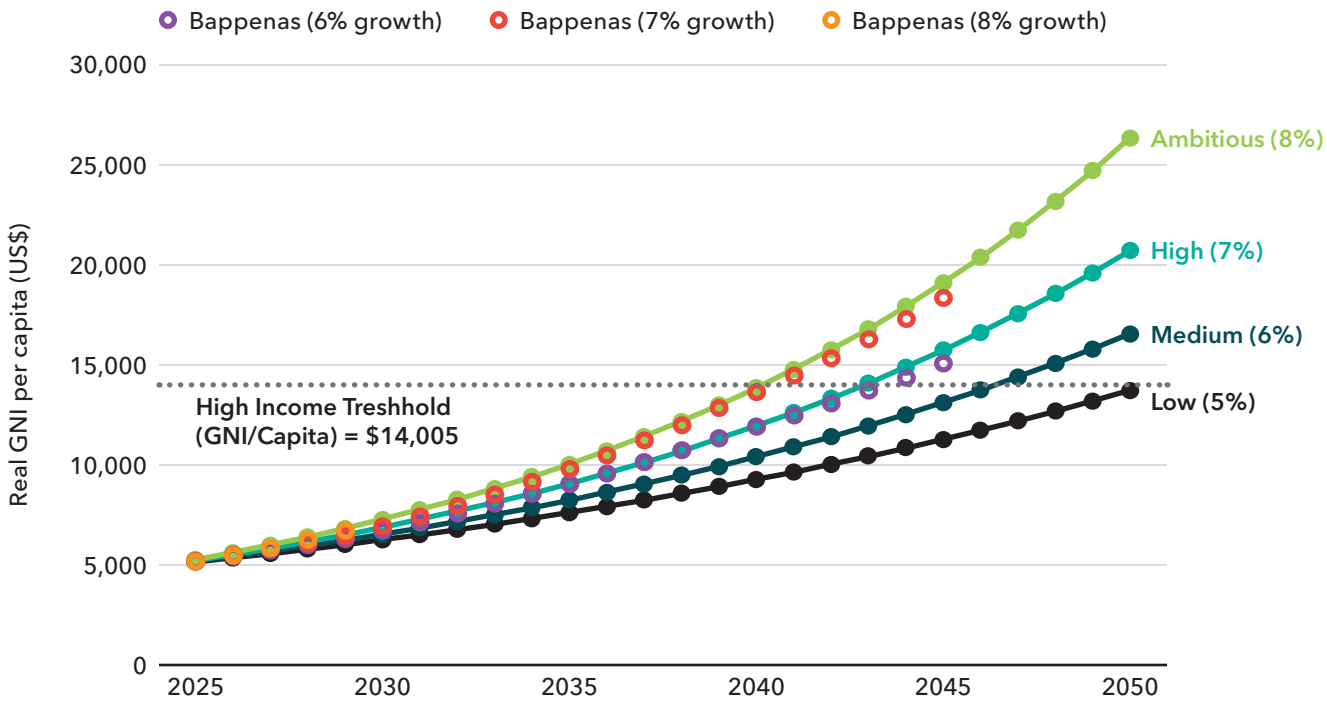
Based on model projections, Indonesia could pass this real income threshold and become a high-income country by 2040 under the ambitious-growth scenario and by 2043 under the high-growth scenario. However, the target may not be met until 2046 or 2050 if the country's growth follows the medium or low growth rate trajectories, respectively (Figure 5). To meet these growth targets for the whole economy, the agriculture sector must grow at 4.6 percent per year (ambitious growth) or 4.5 percent per year (high growth). This would require significant effort, as the sector grew by only 3.3 percent per year between 2003 and 2023. Additionally, our projections underscore the critical role of the fisheries subsector. To support the high growth target in the agriculture sector, the fisheries economy needs to grow by at least 6.4 percent annually.

We also explore pathways toward achieving an 8 percent growth rate to support the Indonesia Emas 2045 vision using China and Viet Nam as benchmarks for the change

1 Indonesia's Ministry of National Development Planning/National Development Planning Agency.

2 In this study, we proxy the real income per capita by using real gross national income (GNI) per capita (GNI of a country, adjusted for inflation and expressed on a per-person basis).

FIGURE 5 Economic growth and income projections, 2025–2050



Source: Model simulations (authors) and Bappenas growth projections (Presidential Regulation Number 12 of 2025).

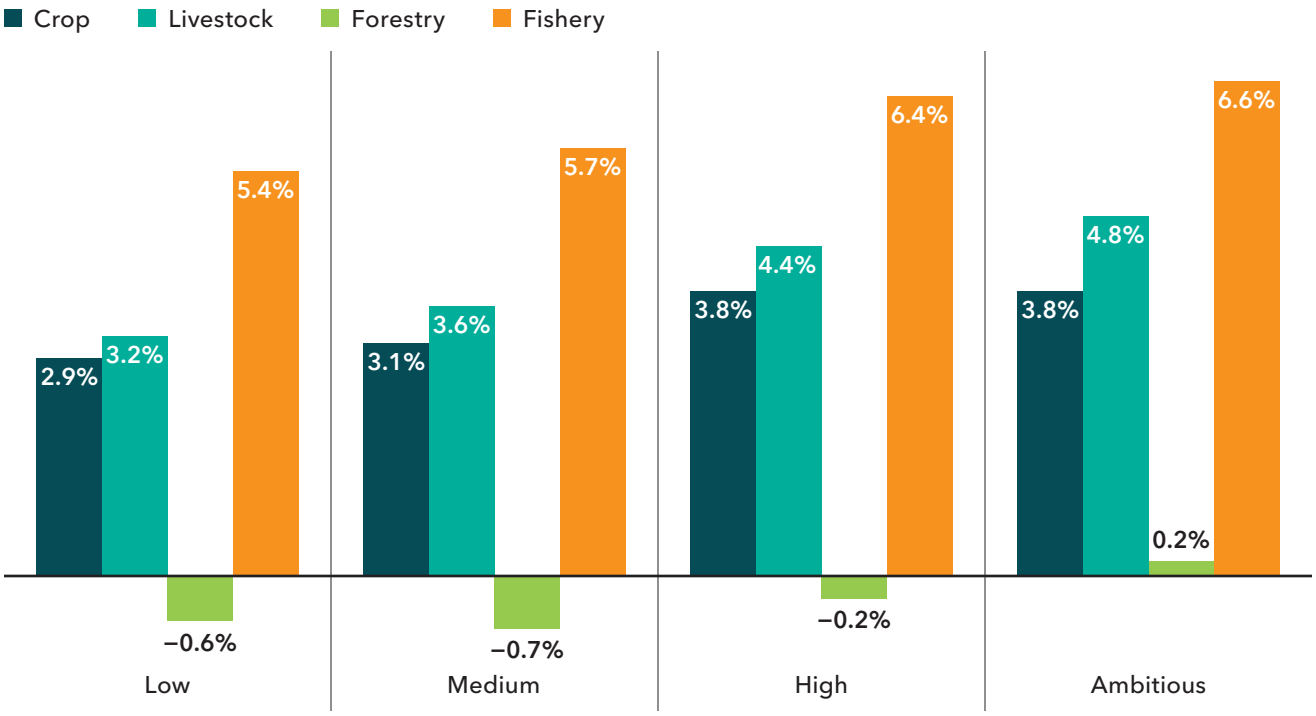
needed in Indonesia. One notable source of GDP growth that distinguishes China and Viet Nam from Indonesia is the growth of gross fixed capital formation. In the long run, national savings and FDI play key roles in boosting economic growth. Another challenge lies in Indonesia's low investment efficiency, as indicated by a high incremental capital output ratio (ICOR) of 6.2, compared with lower ratios in China (4.4), Thailand (5.0), and Viet Nam (5.2). On the supply side, the growth of input factors has been a key driver for rapid economic growth in China and Viet Nam.

The simulation results indicate the trajectory of structural transformation in Indonesia toward 2045, reflected in the agriculture sector's declining share in GDP and in employment. In the faster growth rate scenarios, the reduction in the share of agricultural employment becomes more profound. A more detailed look at the agriculture subsector projections shows that crops, livestock, and especially fisheries experience output expansion across all the scenarios. However, the forestry subsector experiences slight decreases in most scenarios through 2045 (Figure 6). At the commodity level, the distribution of agricultural outputs and employment emphasizes the ongoing importance of oilseeds and rice, while high-value agricultural products such as fruits, vegetables, and other crops gradually play a larger role (Figure 7). These findings are consistent with the transformation toward high-value agriculture commodities that is shaping a more diversified output and employment structure in the sector.

Our findings shed light on several important policy implications. First, despite potential adverse environmental effects (Nowosad and Stepinski 2019; Bengochea Paz, Henderson, and Loreau 2020), the government appears to be continuing to rely on extensification programs to boost production, such as the Food Estate program for rice production in Merauke, Papua. Second, agricultural R&D should be given greater support, as data show that Indonesia's agriculture sector R&D spending is still relatively low compared to that of other countries, especially in Asia. Third, institutional arrangements still play a crucial role in stimulating output and TFP growth. More specifically, regulations that promote economies of scale and horizontal integration through formal agreements (that is, contract farming between small and large farms) are essential to increase technical change and efficiency.

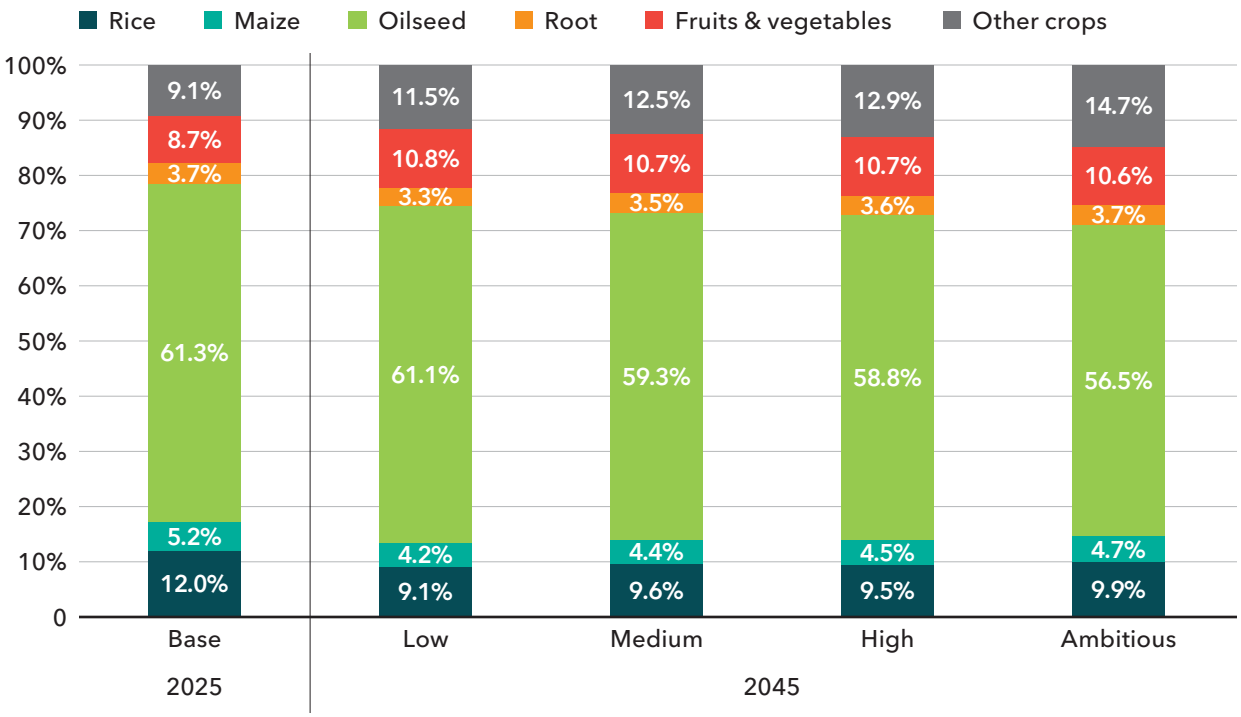
At the sector level, our analysis highlights the importance of downstream sectors in each commodity value chain.

FIGURE 6 Annual subsectoral growth in agriculture, 2025–2045



Source: Model simulations.

FIGURE 7 Share of output by commodities



Source: Model simulations.

This indicates that agriculture sector development cannot rely solely on on-farm activities. Strengthening the downstream value chain of agricultural commodities is crucial to support agrifood systems as a whole. This becomes even more pressing as structural transformation shifts labor from agriculture to non-agriculture sectors. Lastly, comprehensive transformation must be accompanied by labor market transformation in both on- and off-farm employment, suggesting that investment in agricultural human resources is essential.

KEY GAPS AND OPPORTUNITIES FOR FORESIGHT RESEARCH

Although this study illuminates several crucial aspects of agrifood system development in Indonesia, areas for future research remain. First, future foresight research should include an analysis of GHG emissions and land use change, major components of Indonesia's sustainable development agenda. How climate change will shape future developments in Indonesian agriculture is another important research question. Second, this study heavily emphasizes the supply-side drivers, but issues related to changing dietary patterns, food diversification, and poverty alleviation need more attention. Third, a critical social aspect that warrants further investigation is the impact of agrifood system transformation on rural communities, livelihoods, and social inequalities. Understanding social dynamics — such as access to resources, education, and healthcare — can provide a more comprehensive understanding of how agrifood system changes affect the broader population.

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Related chapters on the future of food system drivers and impacts, regional and national perspectives, food commodities, and foresight tools are available in our Table of Contents.

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