Chapter 2

THE AGRIFOOD SYSTEM: STRUCTURE AND CONTRIBUTION TO DEVELOPMENT GOALS

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As countries develop, agrifood systems (AFS) are expected to evolve beyond primary agriculture (Diao, Hazell, and Thurlow 2010; Timmer 1988). The earliest stages of development are typically characterized by subsistence farming; as agricultural productivity rises, farmers begin to supply surplus production to markets, which creates employment opportunities for workers in the off-farm economy (Haggblade, Hazell, and Dorosh 2007). Rising rural incomes generate demand for more diverse products; this leads to more nonfarm activities such as processing, packaging, transporting, and trading. In the early stages of transformation, the agriculture sector serves as an engine of rural—and even national—economic growth. Eventually, urbanization, the nonfarm economy, and nonagricultural incomes play more dominant roles in propelling AFS development, with urban and rural nonfarm consumers creating most of the market demand for agricultural outputs via value chains that connect rural areas to towns and cities (Dorosh and Thurlow 2013). The exact nature of this transformation process varies across countries because of the diverse structure of their economies and the unique growth trajectories of their various agrifood and nonfood subsectors. A focus solely on primary agriculture without an understanding of its linkages to off-farm components of the economy masks the importance of AFS to the overall economy and its potential contribution as a driver of development going forward.

In this chapter, we first measure the size, structure, and historical contribution of the AFS to economic growth and transformation in Myanmar. Second, we assess the potential for AFS growth led by productivity gains in different agricultural value chains to contribute to development outcomes in Myanmar using the Rural Investment and Policy Analysis (RIAPA) model (IFPRI 2023b). We measure AFS using national accounts and employment statistics to either track or simulate growth and employment changes over time. We disaggregate AFS into several value chain groups, which allows the analysis to offer a unique and useful perspective on the drivers of AFS growth and transformation. Finally, we discuss the implications of the recent crises for the future of the AFS and propose both short- and long-term policy recommendations to help steer recovery.

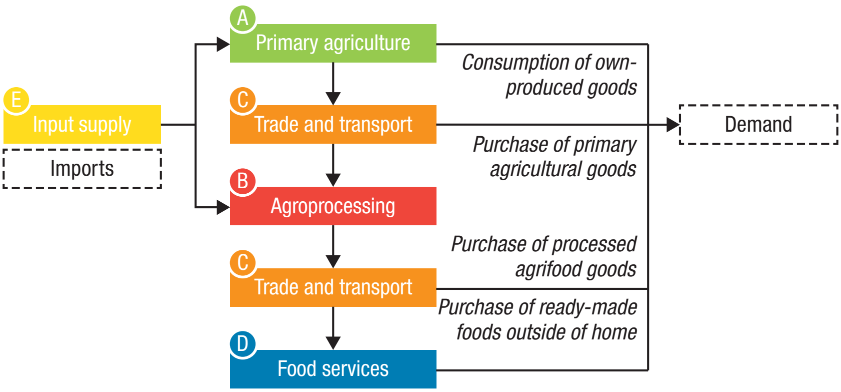
Myanmar's agrifood system

A simple conceptual framework

A country's AFS is a complex network of actors connected by their differing roles in supplying, using, and governing agrifood products (Fanzo et al. 2020). Figure 2.1 provides a simplified conceptual framework of AFS made up of five components, A to E (Thurlow et al. 2023). Primary agriculture (A) comprises the supply and demand of all agricultural products, including crops, livestock, fisheries, and forestry products. Agro-processing (B) is part of the manufacturing sector and includes those subsectors that process agriculture-related food or nonfood products. Trade and transport services (C) include those associated with transporting, wholesaling, and retailing agrifood products among farms, firms, and final points of sale. Food services (D) includes services such as meals prepared at restaurants, food stalls, or hotels. Finally, input supply (E) is the portion of domestically produced intermediate inputs used directly in agricultural and agro-processing production, such as fertilizers and financial services.

Using this conceptual framework, a social accounting matrix (SAM), and complementary national accounts and statistics, it is possible to measure the size and structure of an AFS from a supply-side perspective. Following the definitions of Thurlow et al. (2023), AFS gross domestic product (or AgGDP+) is the sum of the value added from the five components (A to E), while AFS employment (or AgEMP+) is the total number of jobs across those components. As the economy grows and transforms over time, changes will occur in the relative contributions of the various on-farm and off-farm components of AFS to total AgGDP+ or AgEMP+. A transforming economy, for example, will typically be characterized by more rapid growth in the off-farm components of AFS; there will thus be an increased contribution from off-farm components to AgGDP+ and AgEMP+ and a relative decline in the contribution of primary agriculture. By disaggregating AgGDP+ and AgEMP+ into distinct agricultural value chains, we can further assess the contribution of each of those value chains to AFS growth and transformation.

FIGURE 2.1 A simple conceptual framework of the agrifood system



Source: Thurlow et al. (2023).

Structure of Myanmar's agrifood system in 2019

Table 2.1 presents the structure of the AFS in 2019. GDP figures for the total economy and aggregate economic sectors, such as primary agriculture, total manufacturing, and total services, come from the latest national accounts data for Myanmar, while employment figures were obtained from the International Labour Organization (ILO 2020). The breakdown in Table 2.1 of the non-farm components of AFS (corresponding to components B, C, and D of Figure 2.1) is based on the 2019 SAM for Myanmar (IFPRI 2023a), which includes disaggregated economic activities and the input-output relationship between economic subsectors. The SAM triangulates subsectoral employment data from the 2014 population census (MoLIP 2015), household budget and labor force surveys (MNPED 2011; ILO 2017), and additional international databases containing sectoral employment time series (de Vries et al. 2021).

Table 2.1 presents the value and shares of GDP and employment (i.e., AgGDP+ and AgEMP) for the total economy, the entire AFS, and the rest of the economy outside AFS. AFS is further broken down into on-farm (primary agriculture) and the four off-farm components. Furthermore, it provides information on total manufacturing and services, including the trade and transport services subsector, encompassing activities in both AFS and non-AFS sectors. This offers insights into the relative size of the off-farm AFS components within the overall manufacturing and services sectors.

TABLE 2.1 Structure of Myanmar's agrifood system and economy, 2019

Category	GDP		Employment		Average GDP per worker ($)
	Value (US$ billions)	Share (%)	Workers (millions)	Share (%)	
Total economy	69.4	100.0	23.3	100.0	2,975
Agrifood systems	32.2	46.3	14.9	64.0	2,155
Primary agriculture (A)	15.2	22.0	11.5	49.2	1,328
Off-farm agrifood systems	16.9	24.4	3.4	14.8	4,909
Processing (B)	5.7	8.2	0.6	2.5	9,626
Trade and transport (C)	7.8	11.2	2.0	8.7	3,811
Food services (D)	2.3	3.3	0.7	2.9	3,392
Input supply (E)	1.2	1.7	0.2	0.7	7,787
Rest of economy	37.3	53.7	8.4	36.0	4,431
Total manufacturing	15.2	21.9	1.5	6.6	9,903
Total services	30.9	44.5	8.8	37.6	3,520
Total trade and transport	23.3	33.6	6.4	27.4	3,652

Source: Authors' calculations based on 2019 Myanmar SAM (IFPRI 2023a).

Note: GDP in the 2019 Myanmar SAM is in Myanmar kyat and converted to US$ using the 2019 exchange rate of 1,518.3 kyat to 1.00 US$ from the World Development Indicators database (World Bank 2024). A to E correspond with the five agrifood system components from Figure 2.1.

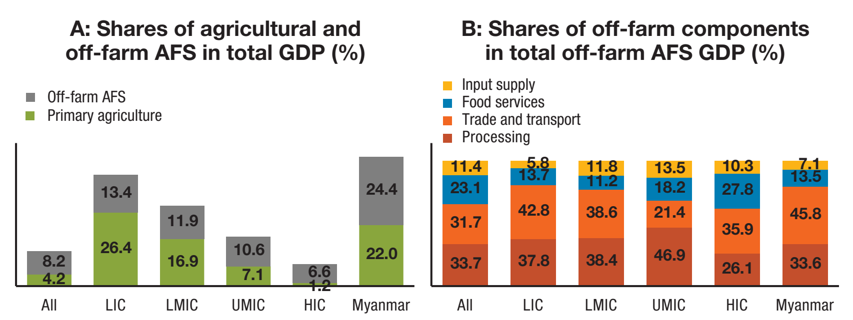
In 2019, AFS was the primary contributor to national GDP (46.3 percent) and the economy's largest employer (64 percent). Primary agriculture alone contributed 22 percent to GDP and represented almost half of all employment. In contrast, the four off-farm components collectively represented 24.4 percent of the GDP, surpassing primary agriculture, while accounting for 14.8 percent of employment and 23 percent of AgEMP+. The comparison of on- and off-farm GDP and employment shares shows that labor productivity is significantly higher in the off-farm components. Consequently, the transition of farm workers into these off-farm components, a natural evolution in agricultural transformation, raises economywide labor productivity and would potentially enhance household incomes.

AgGDP+ amounted to $32.2 billion, more than double the $15.2 billion generated by the primary agriculture sector. This implies that for every $1.00 of GDP generated on-farm, an additional $1.12 of GDP is generated off-farm in the AFS. Trade and transport was the largest contributor to off-farm GDP. However, labor productivity, measured as GDP per worker, was highest in agro-processing, likely because the sector is more capital intensive and uses relatively less labor than other components in the off-farm AFS. In general, the off-farm labor productivity of $4,971 aligns with the average in the broader economy outside AFS ($4,440) and is significantly higher than on-farm labor productivity ($1,322).

Comparing Myanmar's agrifood system to other countries

The structure and economic contribution of the AFS vary across different stages of a country's development. Figure 2.2 illustrates this by comparing the AFS structures of low-income, lower-middle-income, upper-middle-income, and high-income countries with Myanmar's AFS in 2019. Both the on- and off-farm composition of Myanmar's AFS and its contribution to national GDP are larger than those of its peer lower-middle-income countries (panel A). However, within the four off-farm components of AFS, the trade and transport component is relatively larger in Myanmar compared to other lower-middle-income countries (panel B). This reflects the delayed transformation of Myanmar's AFS as well as high transport costs due to poor infrastructure (discussed in Chapter 3).

FIGURE 2.2 Comparing Myanmar's agrifood system to other countries, 2019



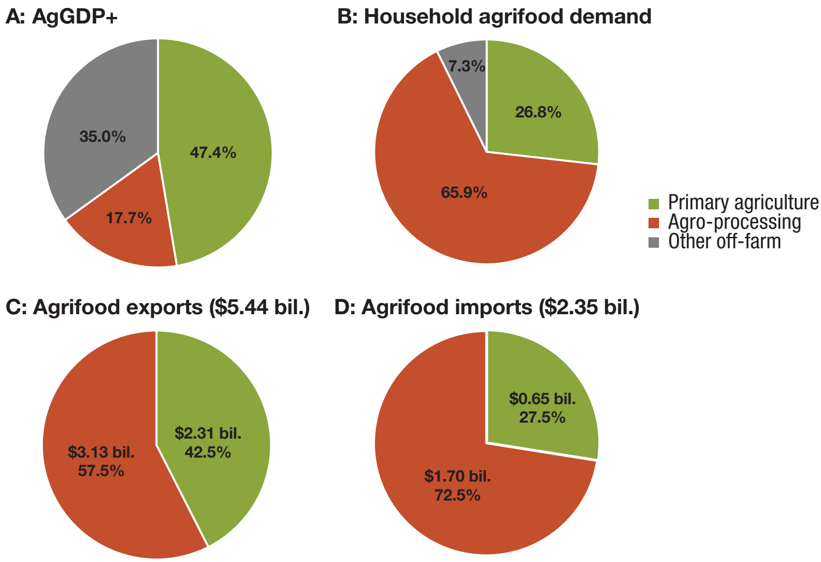
Source: IFPRI's Agrifood System Database (Thurlow et al. 2023) and 2019 Myanmar SAM (IFPRI 2023a).

Note: AFS = agrifood system. HIC = high-income countries. LIC = low-income countries. LMIC = lower-middle-income countries. UMIC = upper-middle-income countries.

Unpacking the demand side of Myanmar's agrifood system

Panels A and B of Figure 2.3 compare the supply side of Myanmar's AFS, as measured by AgGDP+ (panel A), with the demand side, as gauged by household consumption of agrifood products (panel B). While primary agriculture contributed 47.4 percent to AgGDP+, its products make up only 26.8 percent of household demand. Conversely, processed agrifood products represent

FIGURE 2.3 Composition of Myanmar's agrifood system GDP, household demand, and trade, 2019



Source: Authors' calculations based on 2019 Myanmar SAM (IFPRI 2023a).
Note: AgGDP+ = agrifood system GDP. bil. = billion.

65.9 percent of total agrifood demand despite accounting for only 17.7 percent of AgGDP+. This bias toward processed agrifood products is also reflected in the high share of agrifood imports, with 57.5 percent of exports being processed commodities (panel C), while 72.5 percent of imports are processed goods (panel D). Nevertheless, the agrifood export value is more than double the total value of agrifood imports and almost three times that of primary agricultural imports. Due to the significant surplus in its commodity trade balance, Myanmar has considerable potential for boosting agricultural exports.

Moreover, the value of exports from agro-processing surpasses processing imports. However, as detailed in Chapter 13, many exported agro-processing goods involve minimal manufacturing activities. For instance, milled rice and rubber are important export commodities. Although categorized as agro-processing exports, the value addition to paddy rice and raw rubber materials is minimal. In essence, the value of agro-processing exports predominately reflects the value of primary agricultural products.

Disaggregating the agrifood system across value chains

Decomposing AFS across major product groups enables us to understand the structural and historical growth patterns of the AFS and track the value added by each of its five components. The 2019 Myanmar Social Accounting Matrix (SAM) includes 33 primary agricultural subsectors and 19 agro-processing subsectors/commodities organized into 13 groups (Table 2.2). The agro-processing subsectors are grouped based on their association with each of the 33 primary agricultural subsectors. However, two processed agricultural subsectors that manufacture highly processed food products—processed foods and beverages—are classified as "unattributable" and are not shown in Table 2.2, due to their complex linkages back to primary agriculture. More than 90 percent of Myanmar's off-farm AFS can be mapped to these 13 distinct product groups, excluding the two omitted subsectors. We refer to these product groups as value chains, delineated by their primary agricultural products.

On the basis of their trade orientation, we further classify the 13 value chain groups into three subgroups—exportable, importable, and less traded. Exportable and importable value chains are defined by export–output and import–consumption ratios that exceed the national average, respectively, considering trade in both primary and processed agrifood products. The remaining value chains are classified as less traded. Table 2.3 shows the breakdown of these value chain groups by trade orientation and their contribution to AgGDP+, primary agricultural GDP, and GDP in the off-farm components of AFS.

Consistent with Figure 2.3, Table 2.3 shows Myanmar's comparative advantage in exports, as evidenced by the 9.7 percent export–output ratio exceeding the 4.4 percent import–consumption ratio. Together, the seven exportable value chains account for 58.1 percent of Myanmar's AgGDP+, 51.3 percent of the off-farm share of GDP, and 65.7 percent of primary agricultural GDP. Milled rice, the largest exportable commodity, accounts for more off-farm GDP (32 percent) than primary agricultural GDP (22 percent), given its value addition through activities such as milling, storage, trade, and transport. Additionally, the off-farm component of the horticultural value chain is significant. Therefore, expanding the exports of rice and horticultural products and enhancing their value addition could effectively propel agricultural transformation and off-farm employment.

It is noteworthy that many export-oriented products are widely consumed in the domestic market, while oilseeds and other cereals, which include sorghum, millet, wheat, and barley, hold potential for import substitution. The four less-traded value chains collectively represented 25.2 percent of AgGDP+.

TABLE 2.2 Value chain groups and their corresponding agricultural subsectors

Value chain group and share of Myanmar's AgGDP+	Individual value chains or agricultural subsectors in the group (share of group's AgGDP+)
Maize (1.7%)	Maize (100%)
Rice (27.2%)	Rice (100%)
Other cereals (2.9%)	Sorghum & millet (78.7%), wheat & barley (14.1%), other cereals (7.2%)
Oilseeds (5.8%)	Pulses (100%)
Pulses (3.7%)	Groundnut (46.3%), other oilseeds (53.7%)
Roots (2.6%)	Cassava (47.4%), Irish potatoes (17.8%), sweet potatoes (34.8%)
Horticulture (12.5%)	Leafy green vegetables (14%), other vegetables (24%), bananas (18.1%), other fruits (43.9%)
Other export crops (1.0%)	Nuts (73.8%), cut flowers (3.2%), rubber (23%)
Other crops (9.7%)	Sugarcane (29%), tobacco (25.8%), cotton & fibers (0.8%), leaf tea (9.5%), coffee (19.2%), other crops (15.7%)
Cattle & dairy (9.1%)	Cattle meat (56.8%), raw milk (43.2%)
Other livestock (3.8%)	Poultry meat (28.9%), eggs (9.9%), small ruminants (23.6%), other livestock (37.6%)
Fish (9.6%)	Aquaculture (43.6%), capture fisheries (56.4%)
Forestry (2.4%)	Forestry (100%)

Source: Authors' calculations based on 2019 Myanmar SAM (IFPRI 2023a).
Note: AgGDP+ = agrifood system GDP.

Moreover, crops like sugarcane, tobacco, coffee, tea, cattle, and milk have substantial off-farm components, contributing similar shares to both on- and off-farm GDP (25.0 and 25.4 percent, respectively).[1]

The information provided in this section is valuable in comprehending linkages between the AFS and the broader economy and implications for further structural changes. For instance, the off-farm AFS exhibits considerably lower labor intensity than farming, necessitating significant off-farm expansion to absorb workers transitioning out of agriculture as the sector transforms. However, off-farm labor productivity is higher, suggesting that transitioning workers to other sectors could enhance overall labor productivity across the economy and raise incomes for rural households. Last, breaking down AgGDP+ across value chains enables us to anticipate how different sources of agricultural growth may impact agricultural transformation differently, favoring either on-farm or off-farm growth.

1 Though livestock is categorized as less tradable in Table 2.3, this classification is influenced by an export ban on livestock that was temporarily eased in October 2017 but then effectively reinstated in 2019.

TABLE 2.3 Myanmar's agrifood system composition by value chains trade orientation, 2019

Value chain	Share of GDP (%) AFS (AgGDP+)	Share of GDP (%) Primary agriculture	Share of GDP (%) Off-farm AFS	Exports / output (%)	Imports / demand (%)
Total	100.0	100.0	100.0	9.7	4.4
Exportable	58.1	65.7	51.3	16.8	1.1
Maize	1.7	2.2	1.3	35.1	3.9
Rice	27.2	22.0	32.0	10.6	0.3
Pulses	3.7	6.8	0.9	45.4	0.0
Horticulture	12.5	16.3	9.0	10.4	1.7
Export crops	1.0	1.8	0.3	37.5	0.1
Fish	9.6	14.7	5.1	27.1	1.2
Forestry	2.4	2.0	2.8	33.7	11.2
Importable	8.7	9.3	8.1	1.6	19.4
Other cereals	2.9	1.4	4.2	0.1	23.4
Oilseeds	5.8	7.9	3.9	2.6	16.6
Less tradable	25.2	25.0	25.4	1.1	4.2
Roots	2.6	3.9	1.4	0.0	0.0
Other crops	9.7	4.5	14.3	2.6	2.0
Cattle and milk	9.1	9.8	8.6	0.1	8.3
Other livestock	3.8	6.8	1.1	0.4	0.4

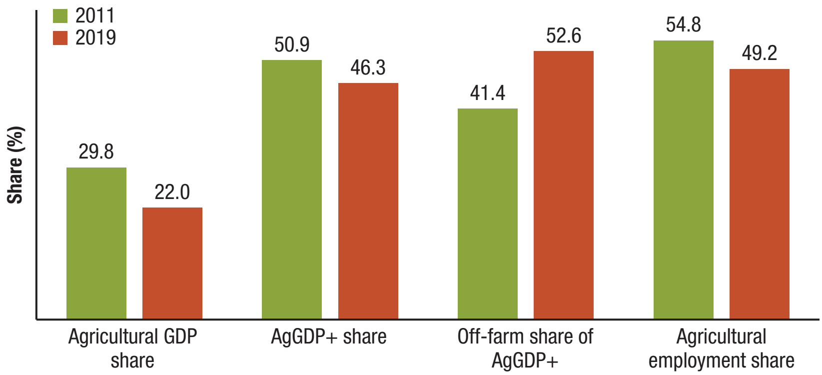
Source: Authors' calculations based on 2019 Myanmar SAM (IFPRI 2023a).
Note: AFS = agrifood system. AgGDP+ = agrifood system GDP.

Recent growth and transformation

In this section, we assess the performance and structural transformation of Myanmar's AFS from 2011 to 2019. AgGDP+ and AgEMP+ were derived from two SAMs—one for 2011 and another for 2019—to illustrate growth trends between the two periods. The SAMs were constructed to align with official GDP estimates at both the national and sectoral levels. Although SAMs are typically measured in current prices, the estimates were adjusted to constant prices to facilitate comparisons over time, using GDP deflators from Myanmar's most recent GDP series.

Typically, labor productivity is lowest in primary agriculture but higher in off-farm activities, such as agrifood processing, food services, or sectors outside the AFS. Economic growth and urbanization correlate with relatively faster expansion in these nonagricultural sectors, potentially generating higher-paying employment opportunities for both rural and urban households.

FIGURE 2.4 Agriculture GDP and agrifood system GDP as share of total GDP, off-farm share of agrifood system GDP, and agricultural share of total employment, 2011 and 2019



Source: Authors' estimates using IFPRI's Myanmar 2011 and 2019 SAMs (IFPRI 2023a).
Note: AgGDP+ = agrifood system GDP.

Consequently, even smallholder farm households with family members securing off-farm employment could benefit from structural transformation.

Figure 2.4 shows for 2011 and 2019 the share of national GDP made up by agricultural GDP and AgGDP+, the off-farm component's share of AgGDP+, and agricultural employment as a percentage of total employment. During the period from 2011 to 2019, there was a notable decline in the share of agricultural GDP and AgGDP+ in total GDP and in the share of total employment made up by agricultural employment. In contrast, the share of AgGDP+ made up by the off-farm component experienced a rapid increase. The significant structural changes witnessed in the broader economy during this period of rapid economic growth have led to the transformation of AFS. The fact that by 2019 the share of AgGDP+ generated off-farm surpassed that of primary agriculture confirms this transformation. However, primary agriculture still maintains a substantial portion of employment despite its lower labor productivity compared to the off-farm components of AFS.

Table 2.4 assesses the growth performance across AFS value chains between 2011 and 2019. The value chains remain categorized based on their trade orientation. Overall, AFS grew at a 4.3 percent annual rate in total AgGDP+, with the off-farm component growing significantly faster (7.5 percent per year) than primary agriculture (1.6 percent per year). Agrifood

TABLE 2.4 Agrifood system GDP growth rates by value chain, 2011–2019

	Average annual GDP growth rate (%)			
Value chain	Total AFS	Primary agriculture	Off-farm AFS	Agro-processing
Total AFS	4.3	1.6	7.5	10.0
Exportable	3.3	0.9	6.8	8.6
Maize	2.1	3.1	0.8	8.5
Rice[a]	6.6	3.5	9.1	10.3
Pulses	–4.7	–4.5	–5.8	NA
Horticulture	1.6	–1.1	8.1	14.2
Export crops	1.9	1.7	2.7	10.4
Fish[a]	4.3	3.6	6.6	17.5
Forestry	–2.4	–1.7	–2.8	–5.9
Importable	3.2	–0.2	8.2	6.9
Other cereals[a]	10.1	–3.1	21.0	22.3
Oilseeds	0.9	0.4	1.8	3.3
Less traded	5.7	4.4	7.0	11.1
Roots	–3.1	–3.5	–2.0	NA
Other crops[a]	5.9	2.4	7.0	10.3
Cattle and milk[a]	9.7	10.3	9.1	11.8
Other livestock[a]	6.2	5.7	9.2	14.1

Source: Authors' analysis using IFPRI's 2011 and 2019 Myanmar SAMs (IFPRI 2023a).

Note: [a] Value chains that experienced above-average AgGDP+ growth over the period 2011–2019 (that is, higher than 4.3 percent). AFS = agrifood system. AgGDP+ = agrifood system GDP. NA = not applicable.

processing, a subcomponent of the off-farm segment, expanded at an impressive rate of 10.0 percent annually.

Growth varied significantly across value chains. Among the 13 value chains, six exceeded the 2011–2019 average of 4.3 percent per year. These are indicated by an asterisk in Table 2.4. Three value chains experienced negative growth rates, including pulses, Myanmar's primary agrifood export commodity. Among the importable and less-traded value chains, cereals (mainly wheat) and the two livestock value chains had growth rates surpassing the AFS average. Conversely, growth stagnated in oilseeds and declined in root crops.

In all the rapidly growing value chains, the off-farm components of AFS experienced substantially higher growth rates than the primary agricultural component. Moreover, the processing components exhibited rapid growth in both high-growth and slower-growing value chains. This pattern in the value chains is consistent with the broader pattern of growth and structural change observed in AFS as a whole, in which off-farm component growth outpaced that of primary agriculture and agro-processing expanded particularly rapidly.

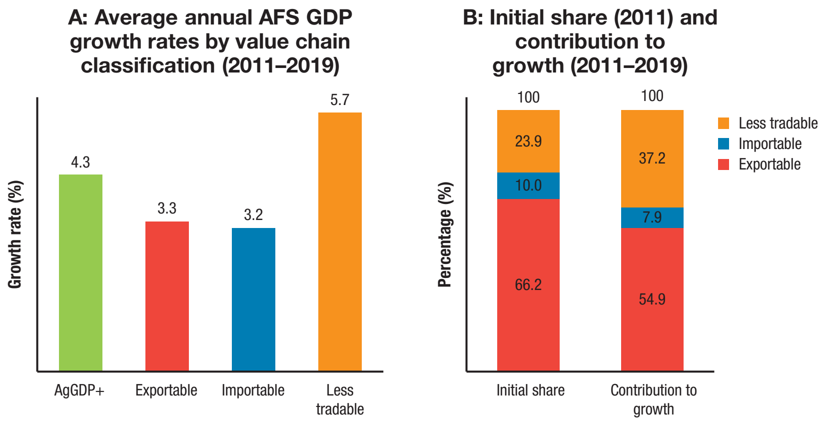
Figure 2.5 illustrates the key growth trends in Table 2.4. On average, less-traded value chains (5.7 percent) exhibited faster growth compared to the national average growth in AgGDP+ (4.3 percent) (panel A). However, given that exportable value chains constitute a significant portion of AFS (66.2 percent), they contributed the most to growth at 54.9 percent, followed by the less-traded value chain group at 37.2 percent (panel B).

Furthermore, as a country develops, it is expected that the share of employment in primary agriculture will decrease. Increases in economywide labor productivity, closely tied to economic development, typically arise through two channels. First, productivity can increase among workers within their respective sectors of employment. Second, economywide productivity rises when workers transition to more productive sectors. These two channels are commonly referred to as the "within-sector" and "between-sector" (or "structural change") drivers of labor productivity growth. As previously mentioned, GDP per worker in agriculture is lower than in other segments of AFS and the broader economy. Hence, a shift away from agriculture toward other sectors generally enhances economywide labor productivity.

The distinct contributions of these structural drivers of growth can be estimated using a decomposition approach outlined by McMillan, Rodrik, and Verduzco-Gallo (2014). Panel A of Figure 2.6 illustrates that economywide labor productivity, as measured by GDP per worker, expanded at an average annual rate of 4.54 percent between 2011 and 2019. Roughly 80 percent was driven by within-sector labor productivity growth from both agriculture and nonagriculture sectors. Notably, the within-sector labor productivity growth in agriculture accounted for 11.7 percent of the total labor productivity growth. This is likely due to rapid mechanization during this period (see Chapter 7) and growth in high-value chains such as poultry and aquaculture (see Chapters 9 and 12).

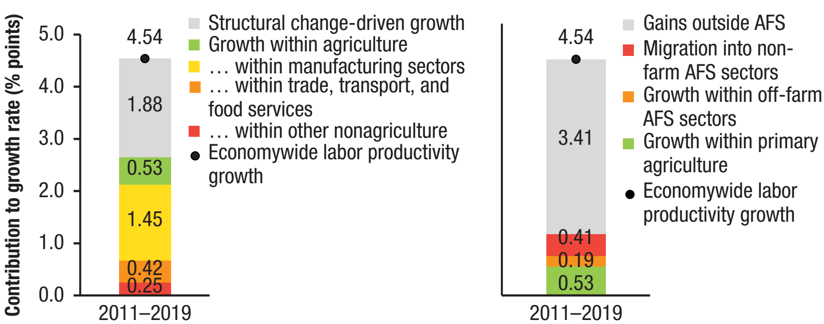
The agriculture sector accounted for 29.8 percent of total GDP in 2011. While agricultural productivity did not necessarily grow faster than economywide productivity, agricultural productivity made a significant contribution to economywide productivity growth due to the large size of the sector. However, the most substantial contribution to economywide labor productivity growth between 2011 and 2019 stemmed from within the manufacturing sector, accounting for 1.45 percentage points, 31.9 percent of the total growth registered. Overall, Figure 2.6 (A) suggests that nearly all sectors experienced

FIGURE 2.5 Drivers of Myanmar's agrifood system GDP growth, 2011–2019



Source: Authors' analysis using IFPRI's 2011 and 2019 Myanmar SAMs (IFPRI 2023a).
Note: AFS = agrifood system. AgGDP+ = agrifood system GDP.

FIGURE 2.6 Decomposition of average annual labor productivity growth rate, 2011–2019



Source: Authors' analysis using IFPRI's 2011 and 2019 Myanmar SAMs (IFPRI 2023a) and employment database.
Note: AFS = agrifood system.

productivity improvements within sectors during this period, indicating a promising phase for Myanmar's economic performance. Equally important, the structural change-led growth, which reflects shifts in employment trends aligned with workers transitioning from low-productivity sectors, like agriculture, to higher-productivity sectors, explains 1.88 percentage points of economywide labor productivity growth between 2011 and 2019.

Panel B of Figure 2.6 demonstrates the estimated contribution of AFS to economywide labor productivity growth. The within-sector contribution from agriculture remains consistent across both panels (0.53 percentage points). The migration of workers from the agriculture sector to a set of nonagriculture sectors—defined as structural change-driven growth in panel A—is disaggregated into two subcomponents in panel B. The labor mobility from primary agriculture to AFS's off-farm components, which are part of the nonagriculture sectors, accounted for 0.41 percentage points in panel B, equivalent to 21.8 percent of the structural change-led growth during this period—specifically, 0.41 percentage points out of a total of 1.88 percentage points shown in panel A. This structural change-led growth within AFS is in addition to the annual increase in labor productivity among workers already engaged in the off-farm sectors (0.19 percentage points). Consequently, the growth from the three components associated with AFS, as shown in Figure 2.6 (B), contributed to 24.9 percent of total labor productivity growth between 2011 and 2019.

The remaining 75.1 percent of total labor productivity growth originated in two sources outside AFS:

- Within-sector productivity growth in the rest of the economy—that is, 1.45 + 0.42 + 0.25 in panel A minus 0.19 in panel B, which equals 2.17, equivalent to roughly 42.6 percent of total labor productivity growth rate of 4.54 on the top of both panels.
- Migration of farm workers into sectors outside AFS—that is, 1.88 in panel A minus 0.41 in panel B, which equals 1.47, equivalent to roughly 32.5 percent of total labor productivity growth rate of 4.54 on the top of both panels.[2]

Between 2011 and 2019, Myanmar's economy experienced a swift structural transformation. The combined impacts of within-sector productivity improvements and structural change-driven growth in labor productivity, alongside the notable expansion of GDP and employment in the off-farm segments of AFS, indicate a steady progression in agricultural transformation. As a result, identifying opportunities to expedite growth beyond agricultural

2 The percentage of within-sector productivity growth is the sum of the within-nonagriculture productivity growth (panel A) minus the growth within the off-farm AFS (panel B), divided by the annual average economywide labor productivity. The percentage of migration of farm workers into sectors outside AFS is the structural change-driven growth (panel A) minus the migration to nonfarm AFS sectors divided by the annual average economywide labor productivity.

activities and bolster transformation remains a priority for both AFS and the broader economy.

Future drivers of inclusive agricultural transformation

Policymakers typically seek multiple development outcomes. These often include increased economic growth, higher employment, poverty reduction, and improved food security and nutritional status of the population. Understanding how productivity growth in different agricultural value chains can contribute to these developmental outcomes is useful for allocating public sector investment in the agriculture sector, as well as for policies to encourage private sector investment. This is especially important for Myanmar, where rice production has historically been prioritized by the government to the neglect of almost all other value chains. In this section, we use IFPRI's Rural Investment and Policy Analysis (RIAPA) model to simulate the impact of productivity growth in 11 agricultural value chain groups on development outcomes. We considered five developmental outcomes:

- Poverty reduction, which is assessed by a poverty–growth elasticity that measures the percentage-point change in the poverty head count per unit of agricultural GDP growth generated within the targeted value chain.
- Growth effect, which is assessed by a growth multiplier that measures the change in GDP per unit of increase in agricultural GDP in the targeted value chain.
- Job creation, which is assessed by an employment multiplier that measures the change in the number of jobs created per unit of increase in agricultural GDP in the targeted value chain.
- Nutrition/diet effect, which is assessed by a diet-quality indicator that measures the percentage change in a diet quality index per unit of agricultural GDP growth generated within the targeted value chain.
- A hunger-growth elasticity that measures the percentage-point change in the rate of undernourishment per unit of agricultural GDP growth generated within the targeted value chain.

The model simulates an exogenous increase in on-farm productivity for 11 of the original 13 value chains, excluding other cereals and forestry, and measures the impact of these productivity increases on five development outcomes. Although the exogenous productivity increase is imposed solely on the primary agriculture component of each value chain, spillover effects occur into the off-farm components of each value chain, as well as into other agricultural value chains or sectors outside AFS. A core element of RIAPA is a computable general equilibrium (CGE) model, an economywide model. In the CGE part of RIAPA, commodity prices and returns to labor, land, and capital are endogenous variables. Also, as a dynamic model, capital accumulation and capital allocation across sectors occur endogenously. With such endogenous changes in a general equilibrium model, production, exports and imports of all sectors, and household incomes and demand for all commodities also endogenously change. A detailed description of the CGE model can be found in Diao and Thurlow (2012). We focus more on the insights into the transformation effects from agricultural productivity growth within different AFS value chains on the broader economy and other development outcomes.

A microsimulation model is another core element of RIAPA. It is linked to the CGE model through a top-down approach such that the development outcomes for poverty, nutrition/diet, and hunger can be measured at the household level. The microsimulation model is built on the data from the 2017 Integrated Household Living Conditions Survey (IHLCS) for Myanmar, and all sample households in the survey are used in the analysis. All sample households are mapped into the 15 household groups defined in the CGE model. The groups are classified by income level (five income quintiles) and whether they are rural or urban. The rural households are further distinguished by whether the household obtained any nonfarm income, resulting in 10 rural household groups in the CGE model. The initial poverty status for all sample households in the microsimulation model is consistent with the IHLCS poverty analysis (CSO, UNDP, and World Bank 2019); the initial households' hunger status in the microsimulation model is consistent with an assessment by the Food and Agriculture Organization of the United Nations (FAO); and the initial diet quality measure for each household is based on the Reference Diet Deprivation index developed by Pauw and colleagues (2023).

With detailed agriculture and nonagriculture sectors in the model, factor intensity and the input-to-output relationship differ across the simulated 11 value chains, which creates unique links to other sectors as suppliers or users of intermediate inputs across value chains. Moreover, sources of income and demand structure differ within the 15 groups of households in the CGE model, and the demand structure further differs among all sample households in the microsimulations. All these differences alter the impact of on-farm agricultural productivity growth through varying connections to rural or urban households across different income groups and then different sample households within groups. This complexity results in differential impacts being seen from on-farm productivity growth in the 11 value chains across the development outcomes considered.

We expect each value chain growth scenario to have a distinct impact on development outcomes, with some value chains being more effective than others in attaining specific outcomes. As a result, there may be trade-offs due to differential effects among the development outcomes and resource competition across value chains. The RIAPA model helps to unpack these complex effects, offering information to governments or development partners that can be used to prioritize resource allocations across different value chains, depending on the development outcomes they value most.

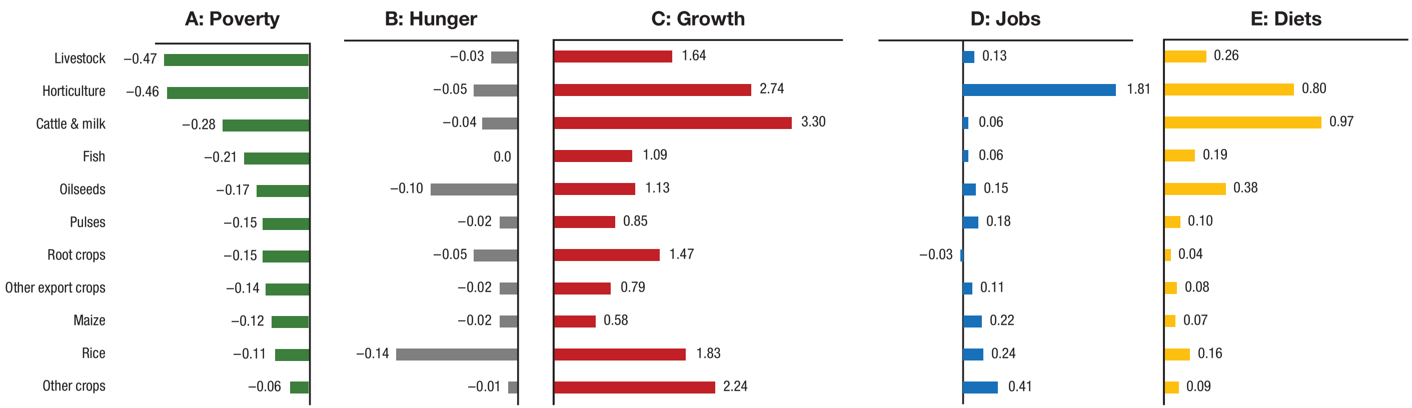
It is important to acknowledge that this analysis is rooted in a period of stability in Myanmar before the COVID-19 pandemic and recent political instability. Although the situation has changed drastically since 2020, identifying priority value chains remains essential for the long-term recovery of Myanmar's economy.

Comparing development outcomes associated with growth driven by agrifood value chains

Figure 2.7 depicts the scores of each value chain across the five development outcome indicators. We have arbitrarily ranked the value chains based on their poverty score. Notably, value chains exhibit significant differences in their efficacy in enhancing various development outcomes. For instance, while the other livestock value chain demonstrates strong poverty-alleviating effects, its impact on improving diet quality or generating employment is comparatively limited. Conversely, the cattle and milk value chain boasts a growth multiplier of 3.36, the highest among all value chains. This implies that for every US$1 increase in GDP within the cattle and milk value chain due to enhanced on-farm productivity, an additional US$3.36 is generated in total GDP. However, despite its economic impact, the cattle and milk value chain ranks lower in job creation outcomes.

While there is a degree of correlation between the AgGDP+ and AgEMP+ outcome indicators, the value chains most effective in generating growth are not necessarily the most effective in job creation. The sole exception is the horticulture value chain, which consistently demonstrates strong employment and GDP impacts within AFS, alongside its positive effects on poverty alleviation and dietary outcomes. This is likely attributed to high domestic consumption of fruits and vegetables coupled with moderate exports. The

FIGURE 2.7 Impact of value chain growth on development outcomes in Myanmar



Source: RIAPA model results.

Note: Panel A is the percentage-point changes in the poverty rate associated with a 1 percent increase in agricultural GDP; panel B is the percentage point changes in the hunger rate associated with a 1 percent increase in agricultural GDP; panel C is the change in total GDP (in US$ millions) associated with a US$1.0 million increase in agricultural GDP from the targeted value chain; panel D is the change in total economywide employment (in thousand persons) associated with a US$1.0 million increase in agricultural GDP from the targeted value chain; and panel E is the percentage improvement in diet quality associated with a 1 percent increase in agricultural GDP. The figure is ordered by the poverty rate outcome.

demand side plays a pivotal role in the horticulture value chain's pronounced growth multiplier effect in AgGDP+.

On the contrary, the three export-oriented value chains—pulses, maize, and other export crops—exhibit a modest growth multiplier effect in AgGDP+, as they are exported in minimally processed form (e.g., sorted and graded), resulting in limited value addition from AFS beyond the farmgate. Additionally, as export crops, their growth exerts less influence on their prices, which are predominantly determined by international markets.

The significant differences in the efficacy in enhancing various development outcomes across value chains first come from differential general equilibrium effects of productivity growth from different value chains. Generally speaking, agricultural supply is met mainly by domestic demand. With agricultural productivity growth, domestic prices generally fall because the income elasticity of food demand is inelastic, especially among staple foods. The more income-inelastic the demand for a food item is, the more negative is the impact on this product's price when its production increases. This implies that, while consumers increase their consumption of this food item with a falling price and increasing incomes from its productivity growth, demand for other food and nonfood commodities also increases. The supply response to the change in relative prices and increased demand across consumption goods leads to resources moving out of the sector with a productivity growth shock into other sectors, where consumption demand increases as a result of the shock. Increased demand and, hence, value-added generated from other sectors becomes a GDP growth multiplier. The more such increases in value added are generated from the nontargeted sectors, the higher the GDP growth multiplier effect. In Figure 2.7, that the cattle and milk value chain has the highest GDP growth multiplier of 3.36 implies that a 1 unit increase in cattle and milk value added from its productivity increase creates 2.36 units of value added in total from other sectors, including some value added from the nonfarm part of the cattle and milk value chain.

Differential impacts on poverty, hunger, and diet quality depend not only on such different general equilibrium impacts across value chains in the CGE model, but also on the distribution patterns of households in their consumption structure. If there are many poor households whose total expenditure is only slightly below the poverty threshold and whose income increases rely more on livestock-led growth, increased total expenditure of these households resulting from livestock productivity growth will allow many of them to move out of poverty, resulting in a larger poverty reduction elasticity for growth led by livestock productivity. The same applies to the differential impacts on hunger and diet quality indicators. That is, it is the changes in the consumption structure of poor households with a total calorie intake just slightly below the thresholds for the hunger measure or with a diet quality measure slightly below the national threshold indicator that determine the changes in hunger and diet quality levels nationwide.

The results in Figure 2.7 suggest that households whose total expenditure is slightly below the poverty line often rely on livestock or horticulture for their income. Similarly, households whose calorie intake is slightly below the hunger threshold measure are likely to rely on rice production for their income. Meanwhile, improvements to the dietary quality indicator are driven by increased consumption of horticulture and cattle and milk products.

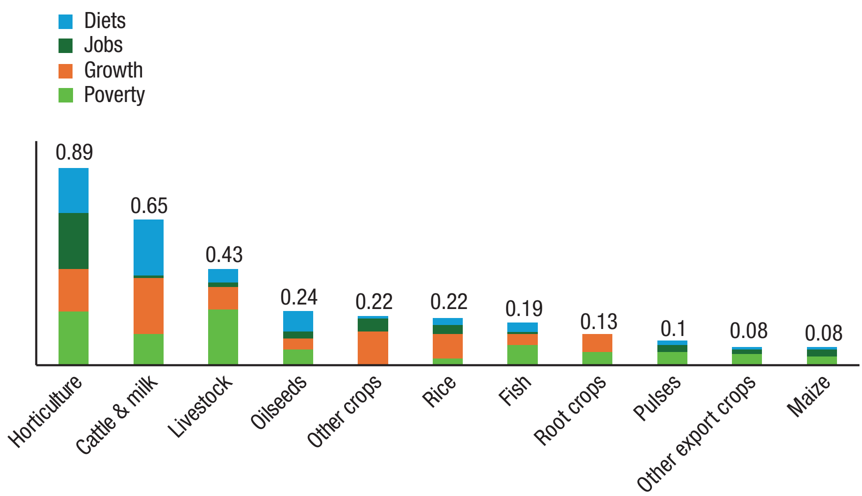
While these findings are not easy to fully understand due to the complexity of general equilibrium effects in the CGE model and the distribution effects on poor households' income and consumption patterns in the microsimulation model, the findings underscore the potential trade-offs that may arise when prioritizing individual value chains—there exists no single value chain that excels in achieving all development objectives. By promoting a prioritized selection of value chains collectively, not only can agricultural growth be diversified, but multiple development objectives can be pursued concurrently.

Prioritizing value chains

To identify priority value chains, a composite score encompassing various outcome indicators is devised (Figure 2.8). Given the strong correlation between poverty and hunger impacts across value chains, the hunger score is excluded from the composite score. Additionally, as the outcome indicators have different underlying units, they are normalized to ensure comparability while preserving their ranking within each outcome category. Normalization involves assigning a score of one to the most effective value chain within an outcome category, and zero to the least effective. Value chains with adverse effects on an outcome, such as those with a growth multiplier below one or with a negative employment effect, are also assigned a score of zero. The remaining value chains receive a score between zero and one proportional to their original score relative to the highest-ranked value chain. These individual normalized scores for the outcomes are then amalgamated into a composite score for each value chain. Each component in the bars denotes the relative contribution of a particular outcome indicator to the final score.

The approach in Figure 2.8 assumes equal importance for each of the four outcome indicators, so an equal weight is assigned to each score. However,

FIGURE 2.8 **Composite score of value chain growth on development outcomes in Myanmar, equal weights**



Source: RIAPA model results.

Note: The composite score is a simple average (equally weighted) of the scores for each of the four outcome categories. The figure is reordered according to the highest composite score.

policymakers can adjust the weights assigned to specific outcome scores based on their priorities.

Horticulture and the two livestock value chains have the highest scores. In the case of horticulture, the highest-ranked value chain, all four outcome components significantly contribute to the composite score. In contrast, in the second-ranked cattle and milk value chain, productivity growth plays a minor role in job creation, despite its significant impact on other development outcomes. While ranking the impacts of value chains on multiple development outcomes based on composite scores aids in identification and prioritization, it is evident that trade-offs exist regarding which outcomes are most significantly influenced by productivity-led growth in each value chain.

Discussion and policy recommendations

Although Myanmar's AFS transformation stalled following the military coup, the preceding analysis provides importance guidance on policies and investment priorities for recovery:

- Both the primary and downstream components of the AFS are very important parts of the economy for achieving economic growth, increased employment, poverty reduction, and dietary diversity. A restored democratic government and development partners should prioritize investment in the AFS for growth and poverty reduction.
- Accelerated diversification of the system, especially promoting fruits, vegetables, and livestock, will have a high payoff for nutrition-sensitive growth. This requires relaxing restrictions on the conversion of paddy land to permanent alternative agricultural uses (Boughton et al. 2022).
- Expanding downstream value-added processing for minimally processed exports, such as maize and pulses, could improve their contribution to the development impacts of agricultural productivity growth.
- Access to improved genetic material and management practices could substantially improve productivity in primary agriculture. At the same time, transport and electricity infrastructure improvements could result in comparable gains in the downstream value-added components of AFS.

Taken together, early investments and policy innovation in Myanmar's AFS will provide a valuable springboard for rapid poverty reduction, nutritional gains, and further structural transformation of the economy.

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