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Overview of Agri-food Industries in ASEAN: Basic Information on the Food Value Chain

by

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Abbreviations and Exchange Rates

Value chain and value added	
FVC	food value chain
GVC	global value chain
VA	value added
VC	value chain
VCD	value chain development
Capability	
IC	Industrial capability
TC	Technical capability
Tariff rate	
AV	ad valorem

Data classification	
BEC	Broad Economic Categories (United Nations)
CPC	Central Product Classification
FBS	Food Balance Sheet (FAOSTAT)
FCL	FAOSTAT Commodity List
HS	Harmonized Commodity Description and Coding Systems, or 'Harmonized System'
ISIC	International Standard Industrial Classification (of all Economic Activities)
ISSCAAP	International Standard Statistical Classification of Aquatic Animals and Plants
Data classification (created for this study)	
IC1	item category level 1
IC2	item category level 2

Country, Currency, and Exchange Rates in 2015

Main target countries of this report		
1	**MYS**	Malaysia
2	**THA**	Thailand
3	**IDN**	Indonesia
4	**PHL**	Philippines
5	**VNM**	Viet Nam
6	**LAO**	Lao PDR
7	**KHM**	Cambodia
8	**MMR**	Myanmar
Other ASEAN countries		
1	**SGP**	Singapore
2	**BRN**	Brunei
+ 6 countries		
1	**AUS**	Australia
2	**CHN**	China
3	**IND**	India
4	**JPN**	Japan
5	**KOR**	Korea, Republic of
6	**NZL**	New Zealand

Local currency unit (LCU)		Exchange rate in 2015
Symbol	Name	(US dollars to LCUs)
RM	ringgit	3.91
฿	baht	35.3
Rp	rupiah	13,391
₱	peso	45.5
D	dong	22,365
KN	kip	8,164
KR	riel	4,127
MK	kyat	1,222
$	United States dollars	1

Notes

The abbreviations of country names in this table are ISO 3166-1 alpha-3 country codes. The exchange rates are estimates from the IMF.

Main Target Industries and Items in This Report

Target Industries for Input–Output Analysis

Production-related	
1	Agriculture
2	Fishing
3	Food and beverages
Distribution-related industries	
4	Wholesale
5	Retail
6	Hotels and restaurants

Target Items for the Analysis on Individual Agri-food Products

Item category level 1 (IC1)		Item category level 2 (IC2)
1	Vegetable products	Cereals; oil and sugar crops; vegetables; fruits and nuts; stimulants and spices
2	Livestock products	Meat; milk; eggs
3	Aquatic products	Freshwater fishes; marine fishes; crustaceans; molluscs; other meats; aquatic plants; fishes, nei
4	Processed food, nei	Sugar; fat and oils; food, nei; alcoholic beverages

Notes

See Appendix 2 for data classification, particularly table A2.2 for target industries and tables A2.3 and A2.6 for target items in more detail.

Overview

The agri-food market in Southeast Asia has been activated by the area's steady economic and population growth, and by its deepening regional and international economic integration. This report aims to foster a deeper understanding of the food value chain (FVC) in the member states of the Association of Southeast Asian Nations (ASEAN). It seeks to do this by providing basic information on six agri-food industries connected to the FVC: agriculture, fishing, food and beverages, wholesale trade, retail trade, and hotels and restaurants. These industries in eight Southeast Asian countries are looked at from four perspectives: social and economic conditions, linkages amongst the FVC-related industries, the supply–demand balance of agri-food products, and the competitiveness of each product in the ASEAN region.

Social and Economic Conditions

Projections of population growth by the level of the per capita gross domestic product (GDP) show rapid increases in the number of high-income people in 8 of the 10 ASEAN member states: Malaysia, Thailand, Indonesia, the Philippines, Viet Nam, the Lao People's Democratic Republic (Lao PDR), Cambodia, and Myanmar; with Brunei and Singapore excluded. There will have to be a system for supplying enough agri-food products to match the rising demand of the rapidly increasing upper-income brackets in these countries.

Interindustry transactions involving product flows from agriculture and fishing to the food-and-beverage industries increased in most of the ASEAN countries analysed in this report, with the exception of Viet Nam and Myanmar. The growth of intra-industry transactions within the agricultural and food-and-beverage sectors is observable in Malaysia, Thailand, Indonesia, and Cambodia. We can see that the FVC has grown steadily in these countries in terms of interindustry and intra-industry transactions. Meanwhile, intra-industry transactions have been stagnant or very limited in agriculture and fishing in the Philippines, Viet Nam, and Lao PDR; and in the food and beverage sector in Viet Nam and Lao PDR. In Myanmar, intra-industry transactions in the FVC have expanded rapidly, while inter-industry transactions have increased gently.

Linkages amongst FVC-related Industries

The increase in final demand in downstream sectors of the FVC, particularly in the food and beverage industries, has had certain impacts on the value added (VA) in upstream sectors in all the eight countries except Malaysia. This result suggests that interventions in the food and beverage industries do contribute to the development of agriculture. The effects of downstream industries on the VA of fishing is also notable in all the countries except the Philippines and Indonesia. Furthermore, it is suggested that, in all the countries but Thailand, the services provided by the wholesale/retail trade sectors are necessary, but alone not sufficient, to automatically drive the development of the FVC-related industries.

Production growth can accompany a rise in per capita compensation in many FVC-related industries, particularly agriculture in all the countries, as well as fisheries in Malaysia, Thailand, and the Philippines. The number of employees in the agricultural sector has decreased when per capita compensation increased in all the countries other than Malaysia. This suggests that the interindustry movement of labour may be strongly tied to the productivity and efficient development of agriculture.

Supply–Demand Balance of Agri-food Products

Most agri-food goods are produced and consumed mainly in the domestic market in Indonesia, the Philippines, Viet Nam, Lao PDR, Cambodia, and Myanmar. In addition to domestic production and consumption, many products are exported in large quantities by Thailand and Viet Nam, and imported by Malaysia. Cereals, vegetables, and oil and sugar crops are representative examples of domestically produced goods, in terms of quantity, in all countries except Malaysia. In Malaysia, the production of fat and oils has exceeded that of other products. Major export products in terms of quantity are cereals from Thailand, Viet Nam, Lao PDR, and Cambodia; vegetables from Thailand, Viet Nam, and Myanmar; fat and oils from Malaysia and Indonesia; and fruits and nuts from the Philippines.

The export prices for aquatic products have been remarkably high, particularly for raw or processed crustaceans, in all countries other than Lao PDR and Cambodia. It has been shown that the export and import prices of processed products tend to be higher than those for primary products, with the exception of some items such as several aquatic products, eggs, and sugar in all the countries other than the Philippines and Myanmar. The processing of agri-food products can lead to rising trade prices for many items, while the costs of primary products can raise the prices of some other items.

The Competitiveness of Each Product in the ASEAN Region

Various products in the vegetable, livestock, and aquatic categories, as well as processed foods produced by ASEAN member states are exported to other ASEAN states in significant quantities, considering their prices. These imports include vegetable products in the low- and mid-price ranges; livestock products (e.g. dairy products from Thailand and boneless cattle meat from Malaysia), various aquatic products, and processed food (e.g. prepared fat, molasses, and infant food from Malaysia; and refined sugar and short margarine from Thailand). It might be beneficial for the producing countries to seek out new export markets for these products. Furthermore, research on the causes of the strong demand for these imports would help identify ways to boost the exports of other products. Research conducted by each ASEAN country on the characteristics of the goods actively exported by the other ASEAN countries might trigger a reconsideration of production and marketing strategies for domestic products that could compete with goods produced by other states in the ASEAN region.

Notable vegetable products with high land productivity and comparative advantage include tomatoes in Malaysia; tea and pepper in Thailand; tropical fruits in Indonesia; minor nuts in the Philippines; grapes and grapefruit in Viet Nam; citrus fruits in Lao PDR; pepper in Cambodia; and garlic, onions, and minor fresh vegetables in Myanmar. Similarly, livestock products indicating high feed productivity and comparative advantage include sheep meat in Malaysia; cow's milk and pork in Thailand; buffalo and cattle meat in Indonesia; veal, turkey, and cow's milk in the Philippines; cow's milk and buffalo meat in Viet Nam; cow's milk and goose or guinea fowl in Lao PDR; pork and buffalo meat in Cambodia; and pork and hen eggs in Myanmar. Although the amount of harvested land or the number of producing animals for many products mentioned above were small, and not necessarily increasing, the potential of these products as exports to other ASEAN countries could be high if they became competitive with the same products from those other countries by means of greater physical productivity.[1]

Processed foods in Malaysia and Thailand tend to be non-price competitive. In those countries, the processing of agri-food products seems to contribute to the differentiation of the products, thus avoiding competition based on physical productivity. In Indonesia and the Philippines, the comparative advantages in terms of the physical productivity of non-price competitive agri-food products are low. Maintaining or increasing non-price competitiveness is critically important for the international competitiveness of those products. In the case of Viet Nam, Lao PDR, Cambodia, and Myanmar, which produce only a limited number of items that are non-price competitive, the competitiveness of their other products should be actively enhanced.

[1] Physical productivity is the quantity of output produced by one unit of production input within a given period; for example, the quantity of agricultural goods produced per unit of land area or feed input over a year.

Chapter 1

Introduction

1. Background

The agri-food market in Southeast Asia has been activated by the area's steady economic and population growth, and by its deepening regional and international economic integration. However, the agri-food sector in this region still has unresolved issues, such as the low incomes of small-scale farmers. There is plenty of scope for improvement in the food value chain (FVC)—which comprises the production, processing, circulation, and trade of agri-food products—from and institutional and technical perspective.

The Association of Southeast Asian Nations (ASEAN) has recognized poverty reduction and food security as critical issues that are highly related to the agri-food sector in this region. The ASEAN Economic Community Blueprint 2025 mentions that 'ASEAN cooperation on food, agriculture and forestry (FAF) plays a crucial role in the context of rising population, strong income growth and an expanding middle class' (ASEAN, 2015a: 25). The ASEAN Integrated Food Security Framework (AIFS) and Strategic Plan of Action on Food Security in the ASEAN Region (SPA-FS) 2015–2020 also emphasize the need to ensure food security and nutrition, and to improve the livelihoods of farmers, in line with the blueprint.[1] Similarly, it is stated that 'poverty alleviation is a central strategic objective of the ASEAN Community and is inextricably linked with the growth and development of the FAF sector' (ASEAN, 2015b: 7) in the 2016–2025 Vision and Strategic Plan for ASEAN Cooperation in Food, Agriculture and Forestry (VSP-FAF), which was endorsed by the 37th ASEAN Ministerial Meeting on Agriculture and Forestry (AMAF) in September 2015.

The improvement of FVCs will be an important step toward achieving poverty reduction and food security. To achieve the goals of the AIFS, the SPA-FS 2015–2020 uses the term 'FVC' in three of its nine strategic thrusts in the context of trade activation (ST2), the dissemination of new technologies and practices (ST4), and investments in food and agri-based industries (ST5).[2] Similar strategic thrusts are described in the VSP-FAF and in the strategic plans of action for ASEAN cooperation on crops (SPAC), livestock (SPAL), and fisheries (SPAF).[3] Strategic thrusts and further concrete action programmes under the strategic plans of action (SPAs) assume that the improvement of the value chain (VC) will contribute to food security, better nutrition, and equitable distribution (ST3, SPAC, SPAF). It is also expected that higher product standards a greater competitiveness of small-scale farmers and small and medium-sized enterprises (SMEs) will lead to poverty alleviation (ST4, SPAL).

[1] The AIFS and SPA-FS 2015–2020 were developed based on the AIFS and SPA-FS 2009–2013, which were adopted by the ASEAN Summit of 2009 to ensure long-term food security and to improve the livelihoods of farmers in the ASEAN member countries.

[2] The use of the term 'FVC' is not limited in documents issued by ASEAN. The AMAF Plus Three (ASEAN countries plus China, Japan, and Korea) in 2014 referred to the establishment of FVCs in ASEAN countries through the enhancement of the public–private partnerships (PPPs), which was supported by Japan. The G7 Niigata Agriculture Ministers' Meeting in 2016 emphasized the importance of local, regional, and international linkages through FVCs, as well as farmers' participation in FVCs, for revitalizing rural areas and increasing their incomes.

[3] The SPAs were developed for the implementation of the VSP-FAF, and were adopted by 38th AMAF, in October 2016.

There is a wide range of strategies for improving FVCs, even if the discussion has been limited to the domestic chains. Two representative action programmes targeting the SPAs will benefit small farmers and SMEs, and enhance FVCs. The first programme directly focuses on small producers and SMEs, assisting them 'by provision of better technology, inputs, finance and extension services, access to higher value markets, and by facilitating integration into modern value chains' (AP 5.1 in the SPAC and SPAF).[4] This programme set several activities and sub-activities, such as capacity development and training (5.1.1.1, SPAC; 5.1.1, SPAF); identification of the best practices regarding farmer groups, cooperatives, and contract farming (4.1.2, SPAL); and the promotion of cluster farming to comply with regional/international standards (5.1.1, SPAF). The second programme aims to 'encourage larger scale enterprises to perform a mentoring role for smallholders to foster adoption of innovations and participation in high value markets' (4.1.3, SPAL).[5] The promotion of public–private partnerships (PPPs) is stressed in this programme as a means of extending technology from larger enterprises to farmers and SMEs (1.6.1, SPAC; 5.2.1, SPAF).[6]

As is the case in ASEAN strategic papers, the concept of FVC encompasses a wide range of issues.[7] We thus had to confine the scope of this study to the main points of the discussion here.

2. Aim and Scope

This report aims to improve the understanding of issues regarding the FVC in the ASEAN member states by providing fundamental information on the agri-food industries in each country based on statistical data. The main focus will be on agri-food industries, consisting of the agriculture, fishing, and food-and-beverages industries—all of which produce edible products.[8] But the analysis will also include information on the wholesale and retail sectors, and on the hotel and restaurant industries.

The report looks at the agri-food industries mainly from two points of view. The first is the vertical relationship amongst industries, analysed based on input–output structures. Our report measures the social and economic effects of the linkages amongst industries within each country. It will therefore supplement the recent studies that emphasize the importance of intercountry linkages for efficient economic growth, such as Greenville et al. (2017a, 2017b) and Fujita (2017). The second is the competitiveness of each agri-food item produced by the ASEAN countries. The information provided in this report with regard to individual products will serve as a basis for resource allocation to improve production efficiency, given the level of progress toward regional integration.

This report uses a common framework to summarize the data from different ASEAN countries, thereby facilitating intercountry comparisons and enabling the characteristics of individual ASEAN countries

[4] Activity 4.1.2 in the SPAL, which emphasizes the access of small-scale producers to quality inputs and high-value markets for outputs, can be seen as pursuing the same objective.
[5] AP 5.2 in the SPAC and SPAF is similar to Activity 4.1.3 in the SPAL.
[6] Rankin et al. (2016) shows that PPPs aiming to develop agricultural VCs account for the largest share (57%) of 70 agricultural PPP case studies in 15 African, Asian, and Latin American countries.
[7] See Appendix 1 for the background of the FVC concept.
[8] See Appendix 2 for a more detailed discussion about target industries and products. Edible and inedible products cannot be strictly separated in several analyses. For example, although shares of production values are limited, the agricultural sector as classified under Eora26 (Eora, 2018) includes industries that produce inedible items such as tobacco and forestry products.

to emerge. There is a review of each of the eight countries in this report, and each review is composed of the following four parts:

Social and Economic Conditions

The current status and trends regarding social and economic conditions are summarized first. We note that the growing population and economy are major drivers of the growth in demand for agri-food products (Appendix 3.1). Then we describe the relevant characteristics of agri-food industries using data on value added (VA), production value, and input–output structures (Appendix 3.2).

Linkages amongst FVC-related Industries

Second, we focus on how the development of downstream sectors in the FVC, such as the hotel-and-restaurant and retail trade industries, induce growth in upstream sectors, estimating the effects that an increase in final demand will have on the demand for intermediate inputs and VA in FVC-related industries (Appendix 3.2). In addition, we measure the changes in the number of employees and in their per capita compensation against the growth rates of each industry (Appendix 3.3).

Production inducement, or the 'ripple effect', between one industry and another, especially when originating in downstream sectors, is an essential factor in the development of the FVC.[9] The ripple effect is also one (albeit indirect) answer to the question of how an increase in the demand for high-value agri-food products could affect the overall economy. We can interpret the value of an increase in demand for a product based on the extent to which final demand increases as a result, despite a constant or rising price.[10]

Supply–demand Balance of Agri-food Products

Next, the structure of agri-food production industries is best clarified by describing the balance between the supply of and demand for individual agri-food products, including vegetables, livestock, aquatic products, and processed food. We start with an overview of the quantity produced, the domestic supply, and the quantity that is imported and/or exported (Appendix 3.4). Then, the prices and volumes of both exported and imported products are summarized (Appendix 3.6).[11]

[9] Downstream industries in an FVC are thought to be key drivers for the development and modernisation of the chain. See Dolan, Humphrey, and Harris-Pascal (1999), Dolan and Humphrey (2000, 2004), and Reardon et al. (2012).

[10] This could be achieved by focusing on particular characteristics of products, such as their branding, safety, or functionality. High-value products can be defined in various ways. For instance, they can be defined as items that are produced in the input–output structure with high VA rates.

[11] Price and market shares of exported products are representative indexes for evaluating the upgrading of the global value chain (GVC) (Kaplinsky and Morris, 2001; Kaplinsky and Readman, 2005; Sturgeon and Gereffi, 2009; Gereffi and Frederick, 2010).

The Competitiveness of Each Product in the ASEAN Region

Finally, the competitiveness of individual agri-food products originating from the ASEAN region is estimated by using two different methods.[12] One is the measurement of non-price competitiveness, or the degree of differentiation, of products exported to the ASEAN market (Appendixes 3.5 and 3.6). The other is the evaluation of productivity, including land or feed productivity, to gauge the profitability for producers and comparative advantage; this, in turn, will indicate physical productivity relative to other ASEAN member countries (Appendix 3.7). Comparative advantage can be a meaningful indicator to use as a basis for improving the production efficiency of a country or region when the products in question cannot be differentiated from those made in other countries or regions.

The evaluation of individual products gave rise to the question of how to efficiently increase productivity in the context of a deepening economic integration in the region. Information on individual products may help determine which ones should receive the most production and sales resources.[13]

3. Target Countries

The countries targeted in this report include eight of the ten ASEAN member states (excluding Singapore and Brunei). However, Figure 1.1 includes all 10 ASEAN members, with Figure 1.1 A showing domestic per capita demand for agri-food production industries against per capita GDP, and Figure 1.1 B showing the VA of the agri-food production industries against per capita GDP. In both graphs, all the countries other than Viet Nam and the Lao People's Democratic Republic (Lao PDR) are listed in descending order based on their per capita GDPs. Broadly speaking, the higher a country's per capita GDP, the higher its per capita demand for agri-food products (Figure 1.1 A). Similarly, in Figure 1.1B, the pattern with per capita GDP and per capita VA in agri-food production industries is similar, though not as consistent.

In this report, Chapters 2 to 9 each present the relevant information for one of the targeted countries, in the following order: Malaysia, Thailand, Indonesia, Philippines, Viet Nam, Lao PDR, Cambodia, and Myanmar. Chapter 10 summarizes the findings of the research presented in the previous chapters. The Appendixes provide background information regarding the FVC concept, data, and methodology, as well as additional information on the competitiveness of individual products.

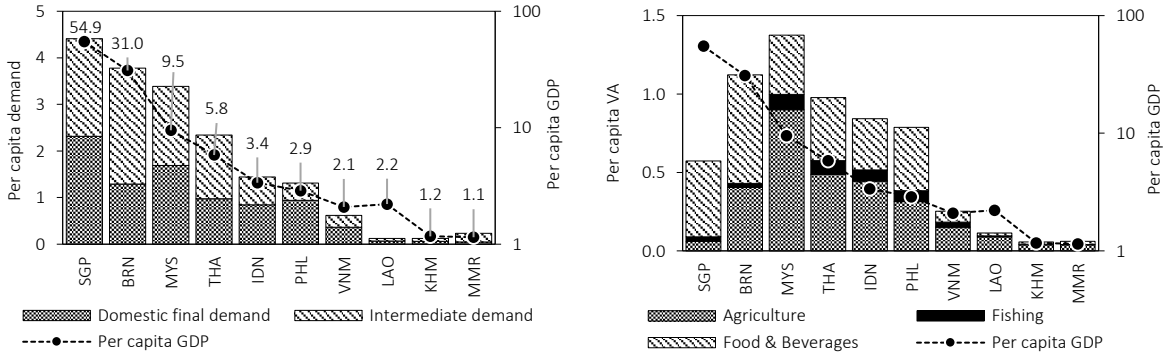
[12] There are various methods of developing FVCs. One is to improve the product mix by increasing the proportion of the more profitable products in a sector (which relates to the discussion in this report). Other methods include pursuing technical progress, with a view to stimulating demand, and increasing the number of steps in a production process, to induce further economic activities.

[13] For example, the selection of prioritized products is an important issue in the development plan for SMEs in Cambodia (Cambodia Industrial Development Policy 2015–2025, 2015). Cambodia's IDP 2015–2025 includes a study on the selection of priority products to be processed for export in the medium to long term.

Figure 1.1. Per Capita Demand and VA vs. Per Capita GDP in ASEAN Countries, 2015
($1,000/person)

A. Domestic Per Capita Demand for Agri-food Production Industries

B. Per Capita VA of Agri-food Production Industries



ASEAN = Association of Southeast Asian Nations, BRN = Brunei, GDP = gross domestic product, IDN = Indonesia, KHM = Cambodia, LAO = Lao People's Democratic Republic, MMR – Myanmar, MYS = Malaysia, PHL = Philippines, SGP = Singapore, THA = Thailand, VA = value added, VNM = Viet Nam.
Notes: Per capita demand is domestic. Both per capita demand and VA are divided by the total population in each country. The values for the agriculture, fishing, and food-and-beverage industries are based on data from Eora and the International Monetary Fund (IMF).
Sources: Estimates based on data from Eora (2018) and the IMF (2018).

Chapter 2

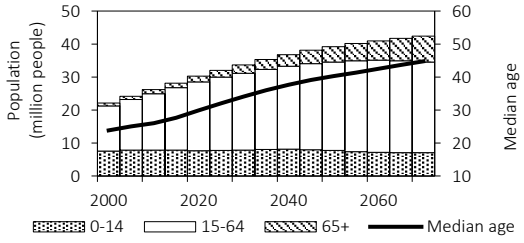
Malaysia

1. Social and Economic Conditions

Population and Per Capita GDP

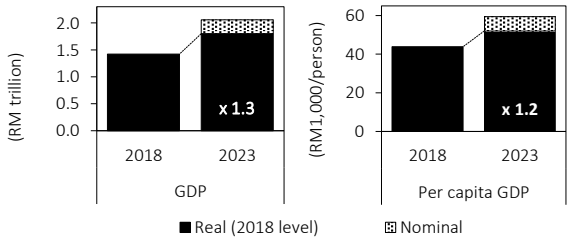
The population of Malaysia, 32 million people in 2018, accounts for 5% of the total population of the ASEAN region, placing it sixth amongst the ASEAN countries. It is expected to reach 42 million by 2050 (Figure 2.1). The working-age people, those between 15 and 65, are the majority of the country's population, and their numbers are expected to increase steadily until 2060. This trend may imply long-term economic growth. Although Malaysia's population is middling in size compared with the populations of the other ASEAN states, the country's strong prospect of population and economic growth suggests a high potential as a consumption market for agri-food products.

Figure 2.1. Population by Age Group, GDP, 2000–2060



Source: United Nations Department of Economic and Social Affairs (UN DESA, 2017).

Figure 2.2. Changes in GDP and Per Capita, 2018 and 2023

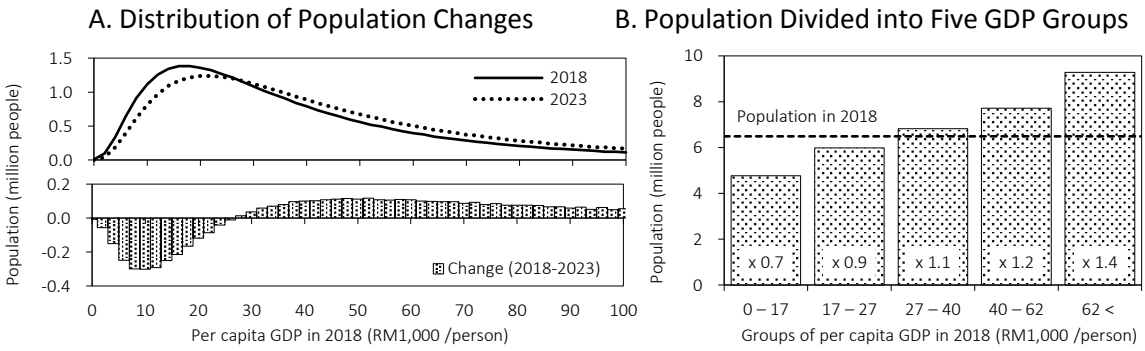


RM = ringgit (Malaysian currency).
GDP = gross domestic product.
Source: Estimates based on data from the International Monetary Fund (IMF, 2018).

Real GDP and per capita real GDP are expected to increase steadily by 1.3 times and 1.2 times, respectively, from 2018 to 2023 (Figure 2.2). According to a projection of Malaysia's population based on the level of per capita GDP (Figure 2.3, Appendix 3.1), as per capita GDP approaches RM28,000, a boundary is crossed whereby the number of people whose annual contributions to GDP are below that value will decrease. By contrast, the number of people with per capita GDP above RM28,000 will increase across a wide range of the distribution.

In particular, the population with per capita GDP above RM62,000 (i.e. the 80th percentile) will expand by 1.4 times by 2023. This projection implies a rapid increase in the number of high-income people. It will thus be necessary to establish a system for supplying agri-food products to match the demand from this rapidly growing upper-income bracket.

Figure 2.3. Estimated Population of Malaysia by Per Capita GDP, 2018 and 2023



RM = ringgit (Malaysian currency).
GDP = gross domestic product.
Note: The per capita GDP was calculated based on constant 2018 prices. The bars in Figure B show the estimated populations of the GDP groups in 2023. The numbers in the bars show the changes in these populations from 2018 to 2023.
Source: Appendix 3.1.

The VA of FVC-related Industries

The VA of the agricultural and wholesale/retail trade sectors has been a notable component of Malaysia's GDP; for instance, the VA of each accounted for about 8% of GDP in 2015 (Figure 2.4). Meanwhile, the VA of the other FVC-related industries was comparatively small.

The annual growth rates of real VA in FVC-related industries averaged around 6% during 2000–2015 (Figure 2.5). The average growth rates of the food-and-beverage and agricultural sectors were higher than the average GDP growth rate during this period, but the rates for other sectors were lower. While the proportion of GDP due to the VA of most FVC-related industries shrank, the proportion due to the VA of the agriculture and food-and-beverage industries gradually expanded.

Figure 2.4. The Proportion of VA in GDP, 2015

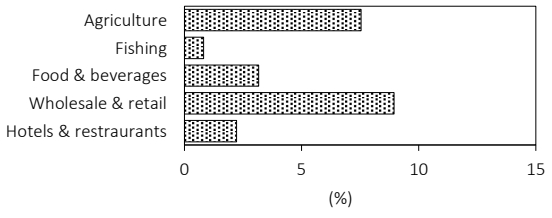
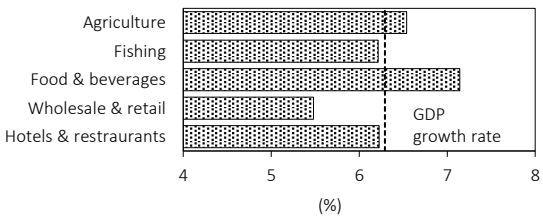


Figure 2.5. Average Annual Change in Real VA, 2000–2015

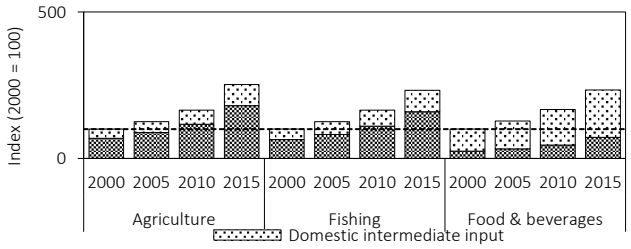


GDP = gross domestic product, VA = value added
Sources: Estimates based on data from Eora (2018) and the Internatioanl Monetary Fund (IMF, 2018).

The production values of the agriculture, fishing, and food-and-beverage industries increased consistently, more than doubling from 2000 to 2015 (Figure 2.6). The part of production value due to the VA (i.e. the VA rate) was large in the agriculture and fishing industries during that period, at around 70%, but smaller in the food and beverage sector, at around 30% (Figure 2.7). The food and beverage sector depended on intermediate inputs from within this sector, as well as from other, related sectors; and production in the food and beverage sector would generally induce more production within that sector, and in related sectors, than it would in agriculture and fishing.

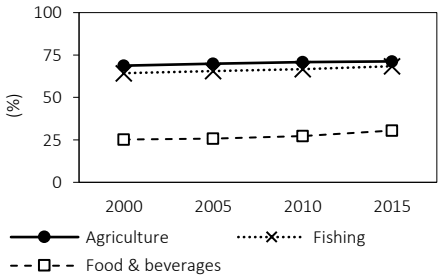
The growth trends in the VA rates of the agriculture, fishing, and food-and-beverage industries suggest a decrease in their use of intermediate inputs. Such a change may have been caused by an increase in the number of products with lower cost of sales to revenue ratios, an improvement in the efficiency of the product mix, and/or technical progress that resulted in savings on inputs.

Figure 2.6. Values of Domestic Production, 2000–2015



Note: The results in the figure are based on real values.
Sources: Estimates using data from Eora (2018) and the International Monetary Fund (IMF, 2018).

Figure 2.7. VA Rates, 2000–2015



VA = value added.
Sources: Estimates using data from Eora (2018).

Intermediate Inputs in Agri-food Industries

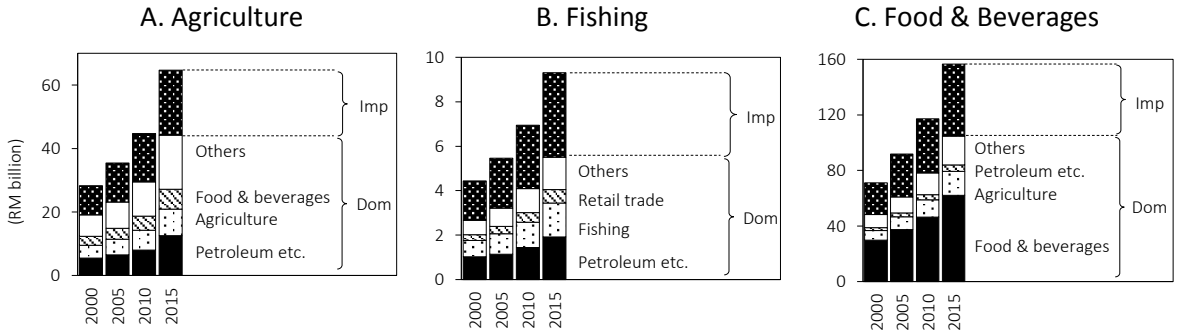
Figure 2.8 shows which industries contributed to the growth of the agriculture, fishing, and food-and-beverage industries from 2000 to 2015. Intermediate inputs into all three agri-food production sectors came largely from domestic sources, and steadily increased during that period. Simultaneously, a certain value of intermediate inputs was imported.

Intermediate inputs from the petroleum, chemical, and non-metallic mineral product ('petroleum etc.') industries accounted for the largest portion of inputs in agriculture, followed by inputs from agriculture itself and the food and beverage industries.[1] The largest domestic source of inputs in the fishing industry was petroleum etc., and the largest domestic source of inputs for the food and beverage industries were the food and beverage industries themselves.

[1] One major input from the petroleum etc. industry was fuel oil, which was needed for agriculture and for the production of chemical fertilizers.

It is notable that intermediate inputs into Malaysia's food and beverage industries came mostly from within those industries, whereas in most of the other ASEAN countries agriculture was the largest source. This suggests that the development of Malaysia's food and beverage industries was largely driven by the production of processed foods, rather than by the production of raw agricultural goods. However, the growth of the food and beverage industries in Malaysia induced a certain degree of agricultural development through the industries' demand for intermediate inputs.

Figure 2.8. Sources of Intermediate Inputs, 2000–2015

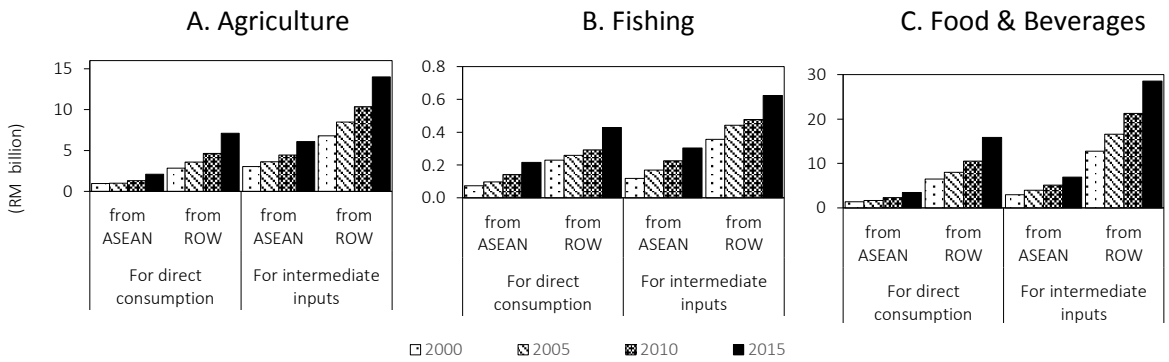


RM = ringgit (Malaysian currency).
Dom = domestic supply, Imp = imports.
Notes: The values in these graphs are based on constant 2015 prices. 'Petroleum etc.' refers to the petroleum, chemical, and non-metallic mineral product industries.
Sources: Estimates using data from Eora (2018) and the International Monetary Fund (IMF, 2018).

The value of imports from foreign agricultural, fishing, and food-and-beverage sectors steadily increased between 2000 and 2015, reaching levels comparable with the value of domestic production (Figure 2.9). The volume of imported agricultural, fishery, and food-and-beverage products for use as intermediate inputs was larger than that destined for direct consumption. In other words, Malaysia was more of an importer of raw materials than final goods.

Although the imports from ASEAN countries were smaller than those from the ROW, this is actually an indication of significant levels of value and growth. We can see from Figure 2.9 that, during 2000–2015, Malaysia gradually strengthened its linkages with both the other ASEAN countries and with the ROW as an importer.

Figure 2.9. Values of Imports, by Purpose, 2000–2015

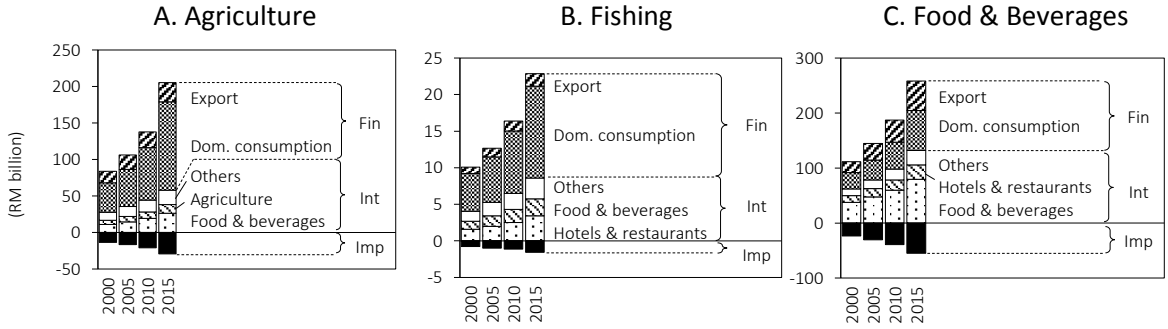


RM = ringgit (Malaysian currency).
ASEAN = Association of Southeast Asian Nations, ROW = rest of the world.
Notes: The values of imports shown in these graphs are based on constant 2015 prices. They include imports from foreign agricultural, fishing, and food-and-beverage sectors destined for domestic final consumption and for use as intermediate inputs in all domestic industries.
Sources: Estimates using data from Eora (2018) and the International Fund (IMF, 2018).

Destinations of Products of Agri-food Industries

Interindustry transactions involving flows of products from agriculture and fishing to the food-and-beverage industries increased during 2000–2015 (Figure 2.10). The flows from fishing to the hotel-and-restaurant industries, and from the food-and-beverage to the hotel-and-restaurant industries, gradually increased. The expansion of intra-industry transactions within agriculture and within the food and beverage industries is observable, as well. The FVC grew steadily in Malaysia with regard to both interindustry and intra-industry transactions.

Figure 2.10. Destinations of Domestically Produced and Imported Goods, 2000–2015

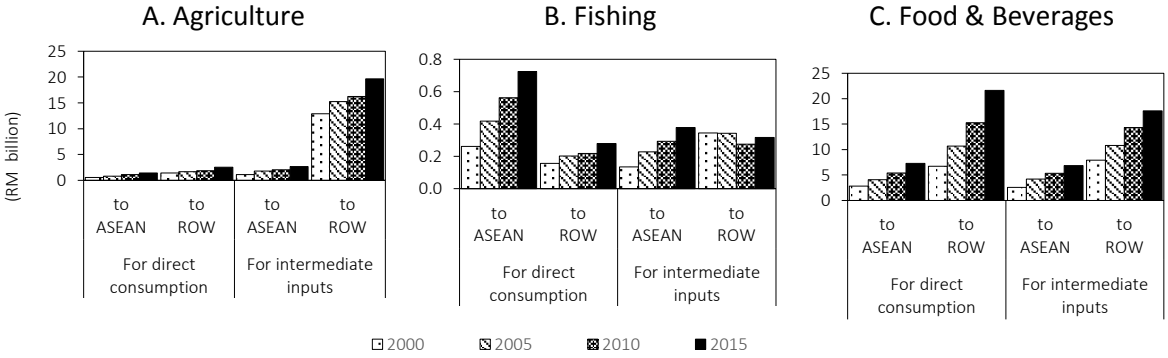


RM = ringgit (Malaysian currency).
Dom. = domestic.
Notes: The values in these graphs are based on constant 2015 prices. 'Fin' = final demand for domestic and imported goods, 'Int' = intermediate demand for domestic and imported goods, and 'Imp' = the imports of intermediate and final goods. Total demand = Fin + Int. Domestic production = Fin + Int - Imp.
Sources: Estimates using data from Eora (2018) and the International Monetary Fund (IMF, 2018).

Both final and intermediate demand grew in the agricultural, fishing, and food-and-beverage industries during 2000–2015. Exports gradually increased, accounting for a prominent share of final demand, especially in 2015. Figure 2.11 shows that, during this period, most of the agricultural products exported from Malaysia were consumed as intermediate goods. By contrast, a relatively large value of exported fishery products were directly consumed. The exports from the food and beverage industries were just about evenly divided between direct consumption and intermediate inputs.

The primary destination of exports from the agricultural and food-and-beverage sectors was the ROW. Regarding these two sectors, Malaysia deepened its linkages more with the ROW (as an exporter) than with the rest of the ASEAN region. There was a notable exception, however: Malaysia's exports from its fishing industry to the other ASEAN countries increased rapidly, especially goods intended for direct consumption, which greatly exceeded the industry's exports destined for direct consumption in the ROW.

Figure 2.11. Values of Exports, by Purpose, 2000–2015



RM = ringgit (Malaysian currency).
ASEAN = Association of Southeast Asian Nations, ROW = rest of the world.
Note: The values in these graphs are based on constant 2015 prices.
Sources: Estimates using data from Eora (2018) and the International Monetary Fund (IMF, 2018).

2. Linkages amongst FVC-related Industries

Final Demand in FVC-related Industries

First, let us see how final demand for domestic FVC-related industries induces the use of intermediate inputs and affects production and VA in each industry.

Table 2.1 shows the composition of final demand during 2000–2015. Final demand was strongest in agriculture, followed by the food-and-beverage and hotel-and-restaurant industries. The average value of annual growth of final demand in agriculture, RM6 billion, outstripped the average values for the other FVC-related industries. The next biggest annual growth was seen in the food and beverage industries. In agriculture, capital formation took the largest share of final demand, having grown rapidly. Household consumption accounted for a comparatively large part of the value of all FVC-related industries, growing steadily, by RM2 billion annually, in the food-and-beverage and hotel-and-restaurant industries. Food and

beverage exports to the rest of the ASEAN region and to the ROW exceeded domestic consumption, having grown by about RM3 billion annually.

Table 2.1. Final Demand for Products/Services of FVC-related Industries, 2000–2015
(RM billion)

Final demand as	Domestic production of: Agriculture Value	Agriculture Change	Fishing Value	Fishing Change	Food & beverages Value	Food & beverages Change	Wholesale trade Value	Wholesale trade Change	Retail trade Value	Retail trade Change	Hotels & restraurants Value	Hotels & restraurants Change
Domestic consupmtion												
Household consumption	19	1	12	0	48	2	3	0	6	0	59	2
Other consumption	0	0	0	0	0	0	0	0	0	0	0	0
Capital formation	92	4	0	0	5	0	2	0	4	0	0	0
Export												
Export to ASEAN	4	0	1	0	14	1	1	0	2	0	2	0
Export to ROW	22	0	1	0	39	2	5	0	10	0	11	0
Total	138	6	14	1	107	4	10	0	23	1	71	3
Annual change rate (%)		6.6		5.9		6.4		4.7		4.7		5.6

RM = ringgit (Malaysian currency).
ASEAN = Association of Southeast Asian Nations, FVC = food value chain, ROW = rest of the world.
Notes: The values in this table are based on constant 2015 prices. 'Change' refers to the average annual changes that were estimated using data for 2000–2015.
Source: Appendix 3.2.

Production and VA Induced by Final Demand

Table 2.2 shows sources of intermediate inputs during 2000–2015 that came from domestic and foreign industries and were destined for use in production by major FVC-related industries in Malaysia. The table indicates that 15% of intermediate inputs into the hotel and restaurant sector came from the domestic food and beverage sector, and that 8% of inputs into the food and beverage sector came from domestic agriculture. This suggests that the hotel-and-restaurant and food-and-beverage sectors can sequentially induce some agricultural production. The table also shows that the hotel-and-restaurant and food-and-beverage industries in Malaysia used a large value of inputs from foreign countries, unlike the same industries in most of the other ASEAN countries covered in this report.

The small increments of annual change in the shares of inputs shown in Table 2.2 indicate a stable input–output structure in Malaysia during 2000–2015. Even if the changing trends shown in the table continue for another 10 years, the structure will not radically change. However, there was a noticeable decrease in the share of inputs from the food and beverage industries back into that sector. This trend suggests a gradual weakening of intra-sector linkages in these industries.

Table 2.2. Sources of Intermediate Inputs in Major FVC-related Industries, 2000–2015

Input from		Domestic production of: Agriculture Share (%)	Agriculture Change	Fishing Share (%)	Fishing Change	Food & beverages Share (%)	Food & beverages Change	Wholesale trade Share (%)	Wholesale trade Change	Retail trade Share (%)	Retail trade Change	Hotels & restraurants Share (%)	Hotels & restraurants Change
Agriculture	Domestic	5	-0.06	0	0.00	8	0.05	0	0.00	0	0.00	4	0.01
	ASEAN	1	-0.01	0	0.00	1	-0.02	0	0.00	0	0.00	1	-0.01
	ROW	1	-0.02	0	0.00	4	0.00	0	0.00	0	0.00	3	0.00
Fishing	Domestic	0	0.00	7	-0.05	1	0.00	0	0.00	0	0.00	3	-0.01
	ASEAN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	ROW	0	0.00	1	-0.01	0	0.00	0	0.00	0	0.00	0	-0.01
Food & beverages	Domestic	4	-0.03	1	0.00	31	-0.24	0	0.00	0	0.00	15	-0.09
	ASEAN	0	0.00	0	0.00	2	0.01	0	0.00	0	0.00	3	-0.01
	ROW	0	0.01	0	0.00	7	-0.01	0	0.00	0	0.00	11	-0.05
Wholesale trade	Domestic	1	0.00	1	0.00	1	0.00	0	0.00	0	0.00	1	0.00
	ASEAN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	ROW	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Retail trade	Domestic	3	0.00	3	-0.01	1	0.00	0	0.00	0	0.00	2	0.00
	ASEAN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	ROW	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Hotels & restraurants	Domestic	0	0.00	0	0.00	0	0.00	3	-0.04	3	-0.04	1	-0.01
	ASEAN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	ROW	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

ASEAN = Association of Southeast Asian Nations, FVC = food value chain, ROW = rest of the world.
Notes: 'Share' refers to the intermediate inputs as a percentage of total inputs in 2015. 'Change' refers to the average annual changes in the shares as estimated using data for 2000–2015.
Source: Appendix 3.2.

Table 2.3 shows the VA directly and indirectly boosted by a 1% increase over the 2015 value of final demand for domestic products and services through an increase in domestic production and intermediate inputs. For example, a 1% increase in final demand in the food and beverage sector generated a RM0.09 billion increase in the VA of agriculture, as well as a RM0.35 billion increase in the VA of the food-and-beverage sector itself.

The impacts of final demand in downstream sectors of the FVC, such as the hotel-and-restaurant and food-and-beverage industries, on upstream sectors were limited in Malaysia. This result suggests that direct interventions to increase final demand in agriculture might be more effective than expecting a ripple effect from the hotel-and-restaurant and food-and-beverage sectors.

Final demand in downstream industries had a notable effect on the VA of fishing, as the size of the fishing market is limited. For instance, the amount of VA in the fishing sector induced by a 1% increase in final demand in the hotel and restaurant industries (RM0.02 billion) was large compared with that driven by the final demand in the fishing sector itself (RM0.08 billion). Similarly, final demand in the food and beverage industry can have a measurable effect on fishing. Increasing final demand in these downstream sectors can thus be an effective way to promote the development of the fishing sector.

Table 2.3 shows no inducement effects of final demand in the wholesale and retail trade sectors on any of the other four sectors discussed above. Meanwhile, Table 2.2 indicates that FVC-related industries, especially agriculture and fishing, did depend on inputs from the retail trade industry during 2000–2015. It is suggested that the services provided by the wholesale/retail trade sectors are necessary, but alone not sufficient, to automatically drive the development of the FVC-related industries.

Table 2.3. VA Induced by a 1% Increase in Final Demand, 2015

(RM billion)

Induced value added in	1% increase in final demand for					
	Agriculture	Fishing	Food & beverages	Wholesale trade	Retail trade	Hotels & restraurants
Agriculture	0.91	0.00	0.09	0.00	0.00	0.03
Fishing	0.00	0.08	0.01	0.00	0.00	0.02
Food & beverages	0.02	0.00	0.35	0.00	0.00	0.04
Wholesale trade	0.02	0.00	0.01	0.08	0.00	0.01
Retail trade	0.04	0.00	0.03	0.00	0.18	0.02
Hotels & restraurants	0.00	0.00	0.00	0.00	0.00	0.26

RM = ringgit (Malaysian currency).
VA = value added.
Source: Appendix 3.2.

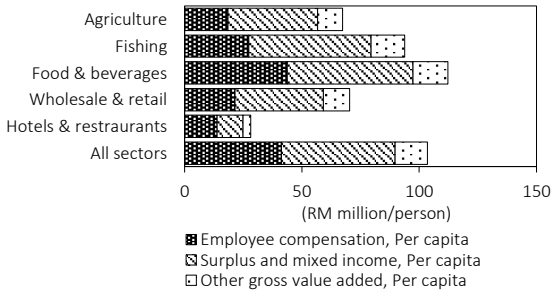
The Relationship amongst the Number of Employees, Per Capita Compensation, and Production

Now let us consider how an increase in production relates to changes in the number of employees and per capita employee compensation in an industry. According to figures 2.12 and 2.13, the agricultural sector in 2015 was characterized by a relatively large number of employees, a medium level of labour productivity, and slightly low per capita compensation compared with other FVC-related industries. By contrast, the food and beverage industries had a limited number of employees and slightly higher labour productivity and per capita compensation than the average values in Malaysia.

Figure 2.12. Number of Employees, by Sector, 2015

RM = ringgit (Malaysian currency).
Sources: International Labour Organization (ILO, 2019); Appendix 3.3.

Figure 2.13. Gross VA per Capita, by Sector, 2015



VA = value added.
Sources: Estimates based on data from Eora (2018) and the International Labour Organization (ILO, 2019); Appendix 3.3.

Figure 2.14 illustrates the relationship amongst the number of employees, per capita compensation, and production in each agri-food sector during 2000–2015. Figure 2.14A depicts the proportion of the average annual rate of change in production in each sector that was attributable to total employee compensation. In all the sectors, production growth averaged around 6%, including a contribution of 1% from the increase in the total value of the compensation.

The average annual rates of change in the total value of employee compensation were within the range of 5%–7% in all FVC-related sectors (Figure 2.14 B). Both the number of employees and per capita compensation, which together determine the growth of total compensation, steadily increased in all industries in Malaysia, while most of the other ASEAN member states covered in this report showed a decrease in the number of employees working in agriculture. In Malaysia's agricultural and fishing sectors, the increase in total compensation was mainly due to an increase in per capita compensation, whereas in the other industries it was mainly due to a rapid rise in the number of employees.

These results suggest that production growth can accompany a rise in per capita compensation and in the number of employees in all FVC-related industries, particularly in the agricultural and fishing sectors. The proportion of employees in the agricultural sector was smaller in Malaysia than in the other ASEAN countries analysed this report. Furthermore, labour productivity and per capita compensation were comparatively high in Malaysia. The increase in agricultural productivity, which can be confirmed by Figure 2.13, did not accompany a decrease in the size of the workforce, as has occurred in the other ASEAN countries. This would imply an absence of surplus labour in Malaysia's agricultural sector, contrary to the case in the other ASEAN countries analysed in this report (Ranis 2004).

Figure 2.14. Changes in Production and Employee Compensation, 2000–2015

A. Breakdown of the Average Annual Rates of Change in Production

B. Breakdown of the Average Annual Rates of Change in Employee Compensation

Notes: Other factors include changes in the value added (VA), other than from employee compensation, and changes in intermediate inputs. The data is from selected years during 2000–2015.
Source: Appendix 3.3.

3. Supply–Demand Balance of Agri-food Products

Supply–Demand Structure

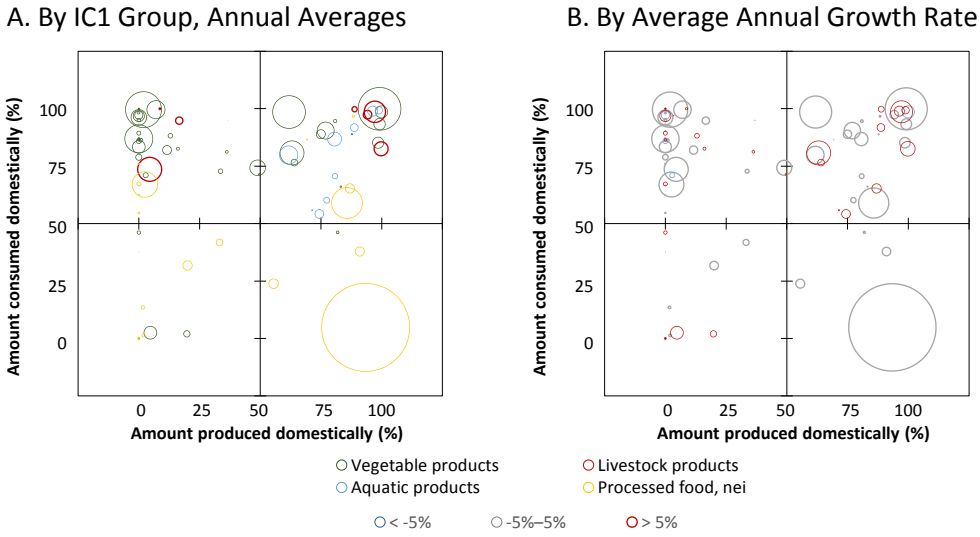
Figure 2.15 shows the structure of domestic commerce and foreign trade in 2004–2013. There are two graphs, each of which is divided into four quadrants defined by two criteria: whether agri-food goods were *produced* domestically or in foreign markets and whether they were *consumed* domestically or in foreign markets. In 2.15 A and 2.15 B, the circles are scattered across all four quadrants. The circles vary in size according to the volumes produced of the goods

they represent. The pattern of circles is the same in both graphs, but the circles in Figure 2.15 A are colour-coded to indicate the agri-food sector, whilst those in Figure 2.15 B are colour-coded to reflect growth rates.

The top side of each graph represents goods that were mostly or completely consumed domestically, and the right side represents goods that were mostly or completely produced domestically. Many medium-sized circles are found in the first and second quadrants, on the upper right and upper left, respectively. The first quadrant represents products made and consumed in the domestic market (i.e. domestic-oriented goods) and the second quadrant represents products imported from foreign markets and consumed domestically (i.e. import-oriented goods). There are some smaller circles in the third quadrant, on the lower left, which represents goods that were imported and then re-exported (i.e. trade-oriented goods). One large circle representing palm oil stands out in the fourth quadrant, on the lower right, which represents goods produced domestically and consumed in foreign markets (i.e. export-oriented goods).

This graph reveals three characteristics of Malaysia as an exporter and importer of agri-food products during 2004–2013. The first is that that Malaysia was highly dependent on agri-food imports, suggested by the presence of many items in the second quadrant. The next characteristic was that Malaysia imported a limited quantity of certain products for re-exportation (i.e. trade-oriented goods), indicated by the small circles found in the third (lower-left) quadrant. The last characteristic is that no products were completely produced and/or consumed domestically, as most of the medium-sized circles are nowhere near the levels at 100% domestic production or 100% domestic consumption. All three characteristics suggest that Malaysia was active in international trade of various agri-food products. A comparison with the corresponding figures in other chapters of this report will show that, during 2004–2013, Malaysia was indeed more active in this trade than the other ASEAN countries covered in this report.

Figure 2.15. Classification of Agri-food Products by Supply–Demand Balance, 2004–2013



IC1 = item category level 1, nei = not elsewhere included.
Notes: Each circle represents a Food Balance Sheet (FBS) product as designated by FAOSTAT. The sizes of the circles express the quantity of total supply, with the proportions estimated based on quantitative data. 'IC1' comprises the author's classifications of broad agri-food product categories (see Appendix 2.2). In these graphs, the percentage of goods not produced/consumed domestically are produced/consumed in foreign markets. Data classification: FBS items.
Sources: FAO (2019); Appendix 3.4.

Table 2.4 shows that, during 2004–2013, most agri-food products were actively produced and consumed in the domestic market, as well as imported. A large number of vegetable products, particularly cereals (11) and vegetables (13), were imported into Malaysia, [2] which is a peculiar feature that is not observed with the other IC2 (item category level 2) product categories for the other ASEAN countries covered in this report. [3] It is notable that they outstripped the production and exportation of fat and oils (42). Stimulants and spices (15) were mostly imported for re-export, which is also a special feature of Malaysia.

Annual change data indicates rapid growth in the production of fat and oils and a corresponding expansion of exports. The surging export demand for fat and oils seems to have induced a sharp increase in production. Vegetables were also conspicuous for their steep increase in domestic supply accompanied by growing production and imports. The production of cereals and oil and sugar crops (12) caused an increase, rather than a decrease, in the importation of these

[2] In this report, the names of products will sometimes be followed by numbers in parentheses. These are the numerical designations assigned to agri-food products by FAOSTAT, the statistical database of the Food and Agriculture Organization of the United Nations (FAO).
[3] In Table 2.4 and other tables in this report, the products and their FAOSTAT numbers are often listed in columns labelled 'IC2', while broader product categories are listed in columns labelled 'IC1' (item level category 1). These are designations established for this study to enable a consistent interpretation of agri-food data obtained from different sources. See Appendix 2.2.

products. By contrast, the growing imports of fruits and nuts (15) seem to have displaced domestic production of these goods.

Table 2.4. Supply–Demand Balance of Agri-food Products, 2004–2013

(1,000 metric tons)

IC1	IC2	2004–2013 average				Average annual change, 2004–2013			
		Production	Domestic supply	Import	Export	Production	Domestic supply	Import	Export
1 Vegetable products	11 Cereals	1,678	7,589	6,152	336	31	107	-71	12
	12 Oil and sugar crops	5,432	6,265	938	132	79	67	-24	2
	13 Vegetables	1,069	2,870	2,200	399	96	206	99	-11
	14 Fruits and nuts	1,033	1,451	743	326	-39	-3	35	-2
	15 Stimulants and spices	87	164	656	613	-4	4	27	40
2 Livestock products	21 Meat	1,500	1,692	223	33	65	70	10	5
	22 Milk	67	1,099	1,426	394	4	-28	-3	29
	23 Eggs	545	451	1	95	30	21	0	9
3 Aquatic products	31 Freshwater fishes	146	151	19	14	14	15	1	0
	32 Marine fishes	1,173	1,365	425	237	16	30	14	-2
	33 Crustaceans	155	113	53	95	11	14	1	-1
	34 Molluscs	149	123	40	66	-1	4	3	-3
	35 Aquatic animals, nei	6	5	2	4	1	0	0	1
	36 Aquatic plants	152	153	2	1	33	33	0	0
4 Processed food, nei	41 Sugar	84	1,123	1,726	600	-2	54	60	-7
	42 Fat and oils	19,401	2,516	1,941	18,943	609	86	170	625
	43 Food, nei	0	35	52	17	0	3	5	2
	44 Alcoholic beverages	203	161	58	101	19	21	7	5

IC1 = item category level 1, IC2 = item category level 2, nei = not elsewhere included.
Note: 'IC1' and 'IC2' comprise the author's classifications of broader product categories and more specific product groups, respectively (Appendix 2.2). This table is based on an aggregation of all the data available from FAOSTAT's Food Balance Sheet (FBS). Data classification: FBS items.
Sources: FAO (2019); Appendix 3.4.

Table 2.5 shows Food Balance Sheet (FBS) items (as designated by FAOSTAT) listed in descending order of total supply quantity within each category in 2004–2013, corresponding to the quadrants in Figure 2.15. Palm oil, represented by the large circle in Figure 2.15, is in the column for export-oriented products in Table 2.5. Most products are in the cells representing stable or expanding markets for domestic-, import-, or trade-oriented products.

'Other vegetables' (mainly onions, pulses, starchy roots, and leaf fruit vegetables aside from tomatoes) and poultry meat are identifiable as domestic-oriented products by their large quantities of supply undergoing rapid growth. Eggs, demersal fish, and beer are also notable for their accelerated growth. Potatoes and potato products show a stable increase in supply as import-oriented products. The cell representing the expanding market of trade-oriented products includes cocoa beans, coffee, and their products, which account for a large part of supply quantity in this category; in other words, the importation and re-exportation of these products have grown.

Table 2.5. Total Quantities of Supply for Product Categories, in Descending Order, 2004–2013

(1,000 metric tons)

Category			Domestic-oriented		Export-oriented		Import-oriented		Trade-oriented	
Provided by			Domestic market				Foreign market			
Consumed in			Domestic market		Foreign market		Domestic market		Foreign market	
Change		Rank	IC2 FBS items	Quantity	IC2 FBS items	Quantity	IC2 FBS items	Quantity	IC2 FBS items	Quantity
Annual change rate, 2004–2013 (%)	Expanding r > 5	1	13 Vegetables, other	1,416			13 Potatoes and products	326	15 Cocoa beans and products	424
		2	21 Poultry meat	1,203			15 Spices, other	68	15 Coffee and products	115
		3	23 Eggs	547			14 Grapes and products (excl wine)	52	11 Oats	40
		4	32 Demersal fish	269			43 Infant food	52	44 Beverages, alcoholic	17
		5	44 Beer	234			13 Roots, other	32	42 Cottonseed oil	4
	Stable -5 < r < 5	1	12 Palm kernels	4,387	42 Palm oil	18,304	11 Maize and products	3,122	42 Coconut oil	231
		2	11 Rice (milled equivalent)	2,595	42 Soyabean oil	247	11 Wheat and products	1,909	41 Sweeteners, other	126
		3	42 Palmkernel oil	2,308	42 Oilcrops oil, other	227	41 Sugar (raw equivalent)	1,597	42 Sunflowerseed oil	38
		4	32 Pelagic fish	836	15 Pepper	28	22 Milk - excluding butter	1,493	42 Rape and mustard oil	37
		5	12 Coconuts - incl copra	730			13 Cassava and products	825	21 Meat, other	0.6
	Shrinking r < -5	1	12 Sugar cane	384			11 Cereals, other	182		
		2	14 Citrus, other	9			15 Pimento	77		
		3					11 Barley and products	72		
		4					15 Cloves	1		
		5								

FBS = Food Balance Sheet (FAOSTAT), IC2 = item category level 2, r = average annual change rate .
Notes: The values in this table represent the averages for 2004–2013. Data classification: FBS items.
Sources: FAO (2019); Appendix 3.4.

Trade Prices and Volumes

The export prices of several categories of goods, such as aquatic products (particularly raw crustaceans [33] and processed molluscs [34]), stimulants and spices (15), and alcoholic beverages (44), were remarkably high during 2014–2016 (Table 2.6). Export values, as well as export prices, were relatively high for processed stimulants and spices. We can conclude that the processed stimulants and spices exported in large amounts had high enough values during this period to induce active trade.

The import prices of aquatic products, including raw freshwater fishes (31), raw aquatic plants (36), processed molluscs, and raw crustaceans, exceeded those of many other products. And the prices of raw eggs (23) and alcoholic beverages were also conspicuously high. The import values of most of these high-priced products were quite small, with the exception of alcoholic beverages. High-priced items that were largely imported, such as alcoholic beverages and processed food, nei (43), seem to have had high values for the Malaysian market. Overall, the export and import prices of processed products tended to be higher than those of primary products, except for some items such as eggs, sugar, and several aquatic products.

Table 2.6. Prices and Values of Exported/Imported Agri-food Products, 2014–2016

IC1	IC2	Price ($/kg)				Value ($ million)			
		Export		Import		Export		Import	
		Primary products	Processed products	Primary products	Processed products	Primary products	Processed products	Primary products	Processed products
1 Vegetable products	11 Cereals	0.5	1.9	0.3	0.7	2	1,190	363	1,130
	12 Oil and sugar crops	0.3	1.3	0.5	1.4	35	63	434	68
	13 Vegetables	0.7	1.6	0.6	1.1	182	91	824	222
	14 Fruits and nuts	0.6	2.0	1.0	1.7	131	106	568	187
	15 Stimulants and spices	3.8	3.5	2.5	3.7	385	1,017	1,246	454
2 Livestock products	21 Meat	—	3.1	—	3.1	0.0	141	0.0	865
	22 Milk	2.1	2.1	1.9	3.0	16	307	62	839
	23 Eggs	0.3	1.9	4.7	2.3	127	0.7	5	1
3 Aquatic products	31 Freshwater fishes	1.1	2.4	10.1	3.0	2	10	29	45
	32 Marine fishes	1.9	2.1	2.6	2.1	6	44	17	197
	33 Crustaceans	6.9	3.4	5.4	3.3	302	26	204	13
	34 Molluscs	2.3	5.4	3.0	7.7	78	18	97	22
	35 Aquatic animals, nei	3.5	2.4	5.0	2.0	10	129	6	96
	36 Aquatic plants	1.0	—	9.2	—	1	0.0	7	0.0
	38 Fishes, nei	2.0	2.1	1.2	2.2	45	159	161	171
4 Processed food, nei	41 Sugar	2.3	0.7	3.8	0.5	3	582	14	1,090
	42 Fat and oils	—	0.8	—	0.9	0.0	14,643	0.0	1,503
	43 Food, nei	—	2.8	—	3.5	0.0	880	0.0	965
	44 Alcoholic beverages	—	3.5	—	4.2	0.0	463	0.0	617

IC1 = item category level 1, IC2 = item category level 2, kg = kilogram, nei = not elsewhere included.
Notes: This table shows the averages for 2014–2016. The values indicated for exports are based on 'free on board' (FOB) prices, and those for imports are based on 'cost, insurance, and freight' (CIF) prices.
Data category: IC2 groups based on the Broad Economic Categories (BEC) classifications of primary products (11) and processed products (12).
Sources: UNSD (2017); Appendix 3.6.

4. The Competitiveness of Each Product in the ASEAN Region

Commodities Imported by ASEAN Countries

Tables 2.7 and 2.8 provide information about the agri-food products imported by ASEAN countries from Malaysia in 2014–2016. ASEAN countries imported many of these products from Malaysia more cheaply than they did from other ASEAN+6 countries (Table 2.7). [4] Roughly 70%–90% of items in the IC2 groups were imported as low-priced products. Malaysia exported notably more to Singapore than to the other ASEAN states; its next-largest exports went to countries with similar values, other than the CLM states: Cambodia, Lao PDR, and Myanmar (Table 2.8).

As shown in Table 2.7, many Malaysian products that were imported by other ASEAN countries in significantly larger quantities than estimated (based on approximate lines) were the low-price range. Examples of such products included stimulants and spices (15), freshwater fishes (31), and fishes, nei (not elsewhere included) (38). Similarly, aquatic animals, nei (35), and food, nei (43), were conspicuous in the mid-price range. Major products in the low-price range that were imported in smaller quantities than expected (based on their prices) included oil and sugar crops (12), vegetables (13), and fishes, nei.

[4] In addition to the ASEAN member states, the ASEAN+6 group includes: Australia, China, India, Japan, Republic of Korea, and New Zealand.

Table 2.7. Prices and Values of Products Imported by ASEAN Countries, by IC2 Group, 2014–2016

IC1	IC2	Price ($/kg)	Value ($ million)	Number of imported products by price ranges (%)			Number of products deviated from approx. lines (%)						Obs.
							Imported larger			Imported smaller			
				Price ranges			Price ranges			Price ranges			
				Low	Mid	High	Low	Mid	High	Low	Mid	High	
1 Vegetable products	11 Cereals	2.1	457	80	10	10	3	0	0	2	0	0	89
	12 Oil and sugar crops	1.5	184	73	13	14	2	2	0	6	0	0	63
	13 Vegetables	1.4	233	73	15	12	2	1	0	4	0	0	172
	14 Fruits and nuts	1.7	127	76	12	12	0	1	0	2	0	0	206
	15 Stimulants and spices	4.2	473	72	13	14	5	0	0	0	1	0	104
2 Livestock products	21 Meat	3.7	63	83	9	9	0	3	0	0	0	0	35
	22 Milk	2.2	126	79	11	9	0	0	0	0	0	0	53
	23 Eggs	2.6	117	75	0	25	0	0	0	0	0	0	4
3 Aquatic products	31 Freshwater fishes	3.7	5	73	12	15	4	0	0	0	0	0	26
	32 Marine fishes	2.7	36	78	7	15	2	0	0	2	0	0	55
	33 Crustaceans	5.3	62	91	3	6	0	0	0	0	0	0	33
	34 Molluscs	3.2	21	93	4	4	0	0	0	0	0	0	27
	35 Aquatic animals, nei	3.0	119	69	23	8	0	8	0	0	0	0	13
	36 Aquatic plants	10.3	0.0	0	67	33	0	0	0	0	0	0	3
	38 Fishes, nei	3.0	98	92	4	4	4	0	0	4	0	0	26
4 Processed food, nei	41 Sugar	1.3	325	78	10	12	2	0	0	2	0	0	60
	42 Fat and oils	1.4	1,204	79	13	8	1	1	0	0	0	0	98
	43 Food, nei	3.5	353	80	5	15	0	5	0	0	0	0	20
	44 Alcoholic beverages	1.9	45	56	25	19	0	0	0	0	0	0	16

ASEAN = Association of Southeast Asian Nations, IC1 = item category level 1, IC2 = item category level 2, kg = kilogram, nei = not elsewhere included.

Notes: The prices and values represent the averages for 2014–2016. 'Price' refers to the import price, including the cost, insurance, and freight (CIF), added to the tariff established by the ASEAN *Trade* in Goods Agreement (ATIGA). 'Value' refers to the imported value (CIF) without the tariff. See Appendix 3.6 for price ranges and approximate lines. The products for which the externally studentized residual was significantly large or small at the 10% level were counted. 'Obs.' refers to the number of detailed commodities classified according to the Broad Economic Categories (BEC) three-digit category numbers and used for applying approximation lines. Data category: FAOSTAT Commodity List (FCL) and adjusted groups of the International Standard Statistical Classification of Aquatic Animals and Plants (ISSCAAP) classified under BEC 111, 112, 121, and 122.

Sources: UNSD (2017); Appendix 3.6.

Table 2.8. Prices and Values of Products Imported into the ASEAN Region, by Country, 2014–2016

Importer	Price ($/kg)	Value ($ million)	Number of imported products by price ranges (%)			Number of products deviated from approx. lines (%)						Obs.
						Imported larger			Imported smaller			
			Price ranges			Price ranges			Price ranges			
			Low	Mid	High	Low	Mid	High	Low	Mid	High	
Singapore	2.2	1,688	87	9	3	4	1	0	0	0	0	260
Brunei	2.5	207	81	8	11	4	1	0	0	0	0	186
Malaysia	2.1	2	48	26	26	0	0	0	0	12	0	42
Thailand	2.6	395	81	10	9	0	0	0	0	5	0	172
Indonesia	1.6	479	86	8	6	1	0	0	0	2	0	116
Philippines	1.8	338	60	16	24	0	0	0	0	1	0	82
Viet Nam	2.6	618	65	18	18	0	2	0	0	6	0	51
Lao PDR	2.0	2	60	20	20	0	20	0	0	0	0	5
Camboodia	1.9	45	78	12	10	0	0	0	0	0	1	99
Myanmar	1.9	0.0	54	21	24	0	3	0	0	0	0	90

ASEAN = Association of Southeast Asian Nations, kg = kilogram, nei = not elsewhere included.

Notes: The prices and values represent the averages for 2014–2016. 'Price' refers to the import price, including cost, insurance, and freight (CIF), added to the tariff established by the ASEAN *Trade* in Goods Agreement (ATIGA). 'Value' refers to the imported value (CIF) without the tariff. See Appendix 3.6 for price ranges and approximate lines. The products for which the externally studentized residual was significantly large or small at the 10% level were counted. 'Obs.' refers to the number of detailed commodities classified according to the United Nations Broad Economic Categories (BEC) three-digit category numbers and used for applying approximation lines. Data category: FAOSTAT Commodity List (FCL) and adjusted groups of the International Standard Statistical Classification of Aquatic Animals and Plants (ISSCAAP) classified under BEC 111, 112, 121, and 122.

Sources: UNSD (2017); Appendix 3.6.

Goods Imported in Smaller/Larger Quantities than Estimated Based on Prices: Non-price Competitiveness in the ASEAN Region

Malaysian vegetable products in the low- and mid-price ranges—such as stimulants and spices (15), including coffee extracts and pepper; and cereals (11), including processed cereals for breakfast foods and pastries—tended to be imported in great quantities by other ASEAN countries in 2014–2016, considering their prices (Table 2.9). Regarding the aquatic category, products in various IC2 groups were imported in substantial amounts, including: miscellaneous aquatic products; fish and fish products, nei; tilapias and other cichlids; and herrings/sardines/anchovies. Similarly, products categorized as processed food, nei—such as prepared fat, nes (not elsewhere specified); molasses; infant food; and coconut oil—were imported in significantly larger quantities than had been estimated based on their import prices. It might be beneficial to seek opportunities to develop further export markets for these products. Moreover, research on the causes of such active import demand, including production and sales methods, would help identify pathways toward increasing the sales of other items.

Research on the characteristics of the goods actively exported by other countries to Malaysia might also trigger a reconsideration of production and marketing strategies for domestic products that could compete with goods produced by other states in the ASEAN region, for instance: fonio flour, salmons/trouts/smelts, and refined sugar from Thailand; crab, nei, sharks, rays, chimaeras, and oils from Indonesia; bananas and breakfast cereals from the Philippines, chilies, green peppers, and miscellaneous freshwater fishes from Viet Nam; and chocolate products, nes, beer, and distilled alcoholic beverages from Singapore.[5]

There were many products for which the import quantities were very small during 2014–2016, considering their prices, such as vegetable products in the low- and mid-price ranges; and aquatic products and processed food, nei, in the low- and high-price ranges. Although these products were certainly exported to other ASEAN countries, they might not have been as competitive as the same products from other ASEAN and +6 countries. If these items are to be promoted as export goods destined for other ASEAN countries, active and intensive product differentiation will be necessary.

[5] For reference, see tables 2.9 to 9.9. See also Table A4.2 on major exports from the +6 countries.

Table 2.9. Goods Imported by ASEAN Countries in Smaller/Larger Quantities than Estimated Based on Prices, in Ascending Order of P-values, 2014–2016

A. Larger Quantities of Exports than Estimated Based on Prices

IC1	Rank	Price ranges																					
		Low							Mid							High							
		Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value
1 Vegetable products	1	BRN	11	122	Cereals, breakfast	6.0	3	0.03	BRN	13	121	Flour, roots and tubers nes	2.1	0.2	0.04	PHL	13	122	Vegetables, preserved nes	4.1	1	0.12
	2	BRN	15	122	Coffee, extracts	5.6	5	0.03	MMR	12	122	Soya paste	3.4	36	0.04	IDN	14	112	Nuts, prepared (exc. groundnuts)	12.7	0.1	0.17
	3	BRN	11	122	Pastry	3.3	3	0.04	SGP	14	122	Juice, pineapple	0.9	1.0	0.06	IDN	15	111	Cocoa, beans	3.0	19	0.19
	4	SGP	12	111	Soybeans	0.7	1	0.05	SGP	14	122	Juice, lemon, concentrated	2.9	1	0.09							
	5	BRN	13	122	Vegetables, preserved, frozen	2.1	0.3	0.05	BRN	15	112	Pepper (piper spp.)	13.8	0.1	0.12							
2 Livestock products	1	BRN	22	122	Ice cream and edible ice	2.5	2	0.16	LAO	21	122	Meat, cattle, boneless (beef and veal)	8.2	2	0.06							
	2	BRN	22	112	Milk, skimmed cow	1.4	0.5	0.18	BRN	22	122	Milk, whole condensed	4.1	2	0.19							
	3	SGP	22	122	Ice cream and edible ice	1.8	12	0.18														
	4																					
	5																					
3 Aquatic products	1	BRN	38	112	Fish and fish products, nei	3.0	8	0.05	MMR	35	122	Miscellaneous aquatic products, food	3.4	36	0.04							
	2	SGP	31	112	Tilapias and other cichlids	1.9	0.9	0.08	IDN	32	122	Miscellaneous pelagic fishes	3.7	1	0.17							
	3	SGP	32	122	Herrings, sardines, anchovies	3.9	5	0.09	PHL	32	122	Herrings, sardines, anchovies	2.4	0.2	0.20							
	4	SGP	34	112	Squids, cuttlefishes, octopuses	1.8	5	0.12														
	5	BRN	32	122	Herrings, sardines, anchovies	4.0	2	0.14														
4 Processed food, nei	1	SGP	42	121	Fat, nes, prepared	1.3	26	0.06	MMR	43	122	Infant food	8.5	4	0.09							
	2	SGP	41	121	Molasses	0.3	0.5	0.06	VNM	42	121	Oil, coconut (copra)	1.6	2	0.10							
	3	THA	42	121	Fat, nes, prepared	1.3	35	0.11	BRN	41	122	Beverages, non alcoholic	0.8	20	0.13							
	4	SGP	43	121	Food preparations, nes	2.0	2	0.11	MMR	42	121	Fat, nes, prepared	1.4	137	0.16							
	5	SGP	42	122	Margarine, liquid	1.4	13	0.12														

B. Smaller Quantities of Exports than Estimated Based on Prices

IC1	Rank	Price ranges																			
		Low							Mid							High					
		Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value
1 Vegetable products	1	THA	12	111	Sesame seed	0.5	0.000	0.00	KHM	15	112	Chillies and peppers, dry	5.0	0.000	0.09	MYS	13	112	Cabbages and other brassicas	5.3	0.000	0.18
	2	MYS	13	112	Cucumbers and gherkins	0.8	0.000	0.02	MYS	13	122	Vegetables, preserved nes	3.2	0.001	0.10							
	3	MYS	14	122	Fruit, prepared nes	1.3	0.000	0.03	THA	13	112	Peas, green	4.7	0.000	0.13							
	4	THA	13	112	Vegetables, fresh nes	1.3	0.000	0.03	MYS	13	112	Vegetables, fresh nes	1.4	0.000	0.18							
	5	VNM	13	112	Beans, dry	1.2	0.006	0.03	KHM	12	122	Olives preserved	3.5	0.000	0.18							
2 Livestock products	1	PHL	22	122	Ice cream and edible ice	1.2	0.003	0.15														
	2																					
	3																					
	4																					
	5																					
3 Aquatic products	1	THA	32	122	Cods, hakes, haddocks	0.7	0.004	0.06								MYS	35	122	Miscellaneous aquatic products, food	4.0	0.002	0.12
	2	MYS	38	112	Fish and fish products, nei	5.5	0.000	0.08								THA	33	112	Lobsters, spiny-rock lobsters	28.1	0.001	0.18
	3	MYS	38	122	Fish and fish products, nei	2.1	0.007	0.12														
	4	MYS	32	122	Herrings, sardines, anchovies	1.1	0.005	0.12														
	5	VNM	32	122	Miscellaneous pelagic fishes	4.1	0.008	0.15														
4 Processed food, nei	1	MYS	41	122	Sugar confectionery	2.7	0.001	0.02	IDN	41	121	Lactose	4.2	0.001	0.13	MYS	43	121	Food preparations, nes	4.0	0.000	0.12
	2	PHL	44	122	Beer of barley	0.6	0.002	0.11								MMR	41	121	Sugar non-centrifugal	1.3	0.056	0.16
	3	SGP	42	121	Oil, cottonseed	1.5	0.056	0.13														
	4	MYS	42	121	Fat, nes, prepared	0.6	0.082	0.13														
	5	MYS	41	122	Beverages, non alcoholic	0.2	0.002	0.20														

BEC = Broad Economic Categories, United Nations Statistics Division (UNSD), BRN = Brunei, IC1 = item category level 1, IC2 = item category level 2, IDN = Indonesia, kg = kilogram, KHM = Cambodia, LAO = Lao People's Democratic Republic, MMR = Myanmar, MYS = Malaysia, nei = not elsewhere included, nes = not elsewhere specified, PHL = Philippines, SGP = Singapore, THA = Thailand, VNM = Viet Nam.

Notes: The values listed in this table represent the averages for 2014–2016. The top five agri-food products within each IC1 grouping are listed in ascending order of p-value < 0.2, under the BEC as follows: primary products mainly for industry (111), primary products mainly for household consumption (112), processed products mainly for industry (121), and processed products mainly for household consumption (122). 'Price' refers to the CIF (cost, insurance, and freight) import price added to the tariff set by the ASEAN *Trade* in Goods Agreement (ATIGA). 'Value' refers to the imported value (CIF) without the tariff. The expression 'p-value' refers to the p-value of the t-stat against the externally studentized residual. See Appendix 3.6. Data category: FAOSTAT Commodity List and adjusted groups of the International Standard Statistical Classification of Aquatic Animals and Plants (ISSCAAP) classified under BEC 111, 112, 121, and 122.

Sources: UNSD (2017); Appendix 3.6.

Inter-commodity and Inter-country Comparisons of Land/Feed Productivity

The median land productivity of vegetables (13) and of stimulants and spices (15) were the highest in 2011–2015 (Table 2.10). The ratios of the yield, an indicator of comparative advantage in the ASEAN region, were slightly higher for vegetables than for other IC2 groups in the category of vegetable products.

Table 2.10. Median Levels of Productivity and Resource Allocation in Each IC2 Group

IC1	IC2	Land productivity (RM1,000/ha)	Chg (%)	Ratio of the yield Index (Yi/Yi')	Chg (%)	Area harvested (1,000 ha)	Chg (%)	Obs.
1 Vegetable products	11 Cereals	4	7	1.3	1	332	-1	2
	12 Oil and sugar crops	15	10	1.2	1	93	-4	5
	13 Vegetables	30	5	1.7	0	3	7	12
	14 Fruits and nuts	19	5	0.8	0	7	0	13
	15 Stimulants and spices	30	5	1.0	0	2	-1	9
	Total	20	6	1.1	0	3	1	41
IC1	**IC2**	**Feed productivity (RM1,000/100 PU)**	**Chg (%)**	**Ratio of the yield Index (Yi/Yi')**	**Chg (%)**	**Producing animals (million PU)**	**Chg (%)**	**Obs.**
2 Livestock products	21 Meat	23	—	2.1	—	1	3	8
	22 Milk	7	—	0.5	—	2	1	1
	23 Eggs	10	—	1.2	—	25	5	2
	Total	21	—	1.7	—	2	3	11

RM = ringgit (Malaysian currency).

ha = hectare, IC1 = item category level 1, IC2 = item category level 2, PU = unit of pig feed requirements, Yi = yield in Malaysia, Yi' = average yield in other ASEAN countries.

Notes: Land/feed productivity, ratio of the yield, and area harvested/producing animals represent the average values for 2011–2015. 'Chg' refers to the average annual rates of change during 2006–2015 (%). 'Obs.' refers to the number of items in the FAOSTAT Commodity List (FCL). The data on land productivity was deflated to constant 2015 ringgit prices. The figures are estimates based on all the FAOSTAT data under the 'Production' rubric. Data category: FCL.

Sources: FAO (2019); Appendix 3.7.

Land productivity and ratios of the yield were both higher for tomatoes than for all other vegetables during the same period (Table 2.11). Those values for some other vegetables—such as chilies, green peppers, lettuce, chicory, and okra—were also relatively high. The land productivity and ratio of the yield of tomatoes increased sharply during these years. Furthermore, large quantities of tomatoes (considering the price) were imported by Singapore, signifying that they may have had high non-price competitiveness. Amongst the vegetable products, the land productivity and ratios of the yield of several stimulants and spices—such as tea, pepper, nutmeg/mace/cardamoms—outstripped those for other products. Similarly, sheep's meat had high feed productivity and ratio of the yield, compared with those values for other livestock products. Although the harvested areas or number of producing animals for the products mentioned above were small (with the exception of pepper), the potential of these products as exports to other ASEAN countries could be high if they became competitive with the same products from those other countries by means of greater physical productivity.

As shown in the second column from the right in Table 2.11, which lists examples of products imported by other ASEAN countries from Malaysia during 2014–2016 in greater quantities than expected based on their prices, many of these products apparently had non-price competitiveness or were differentiated from the same items produced in other ASEAN countries. Those products mainly included processed foods such as peanut butter; liquid margarine; pineapple, lemon, or orange juice; tea and coffee extracts; and cocoa paste. In Malaysia, the processing of agri-food products seemed to

contribute to product differentiation and the avoidance of competition dependent on physical productivity.

Table 2.11. Levels of Productivity and Resource Allocation for Individual Items

No.	IC2	FCL name	Land or feed productivity (RM1,000/ha or RM1,000/100 PU)	Chg (%)	Ratio of the yield Index (Yi/Yi')	Chg (%)	Area or producing animals (1,000 ha or million PU)	Chg (%)	Intpn. A	Intpn. B	Items imported larger or smaller compared with the price (p<0.2) Imported larger	in	Imported smaller	in
1	11	Maize	4	12	1.7	4	10	-1	iii	i				
2		Rice, paddy	3	2	0.8	-3	655	-1	iv	iv			Bran, rice	PHL
3	12	Sugar cane	40	17	0.6	1	2	-42	ii	ii	Sugar cane	SGP	Sugar non-centrifugal	MMR
4		Groundnuts, with shell	19	9	3.4	8	0	-8	iii	i	Peanut butter	SGP		
5		Oil, palm fruit	11	7	1.1	1	4,971	2	iii	iv	Margarine, liquid	SGP		
6		Coconuts	7	12	1.2	7	93	-4	iii	iii	Oil, coconut (copra)	VNM		
7		Oilseeds nes	—	—	1.7	0	153	1	—	—				
8	13	Tomatoes	152	18	4.6	12	2	7	i	i	Tomatoes	SGP		
9		Chillies and peppers, green	62	6	1.9	-2	3	3	i	i				
10		Vegetables, fresh nes	48	4	1.6	1	26	2	i	ii			Vegetables, fresh nes	THA
11		Lettuce and chicory	46	1	2.3	6	3	25	i	i				
12		Okra	42	7	1.8	3	3	11	i	i				
13		Cabbages and other brassicas	37	-5	1.5	-5	6	23	i	ii			Cabbages and other brassicas	MYS
14		Cucumbers and gherkins	23	2	2.1	3	5	7	i	iii			Cucumbers and gherkins	MYS
15		Sweet potatoes	20	8	1.6	-2	3	9	i	iv				
16		Spinach	19	6	3.8	4	4	1	iii	iii				
17		Cassava	17	5	0.9	-3	3	4	iv	iv	Cassava	SGP		
18		Pumpkins, squash and gourds	15	9	0.6	-2	2	24	iv	iv				
19		Roots and tubers, nes	8	-1	1.0	-3	0	-5	iv	iv	Flour, roots and tubers nes	BRN		
20	14	Areca nuts	51	11	1.6	10	0	-29	i	i				
21		Pineapples	31	2	0.8	-2	13	0	ii	ii	Juice, pineapple	SGP		
22		Fruit, citrus nes	30	—	0.9	—	1	—	ii	i				
23		Papayas	21	10	0.4	-3	2	-3	ii	ii	Papayas	SGP		
24		Lemons and limes	20	6	0.8	4	1	-3	ii	i	Juice, lemon, concentrated	SGP		
25		Mangoes, mangosteens, guavas	19	9	0.7	5	13	13	iv	ii				
26		Watermelons	18	4	0.9	-5	12	2	iv	iii	Watermelons	SGP		
27		Cashew nuts, with shell	17	4	1.3	0	7	1	iii	iii				
28		Grapefruit (inc. pomelos)	17	8	0.9	8	1	-5	iv	iii	Grapefruit (inc. pomelos)	BRN		
29		Bananas	15	4	0.4	-5	29	3	iv	iv				
30		Oranges	10	-14	0.3	-5	3	2	iv	iv	Juice, orange, concentrated	THA	Juice, orange, concentrated	MYS
31		Fruit, fresh nes	—	—	1.1	3	13	1	—	—				
32		Fruit, tropical fresh nes	—	—	0.7	-1	15	-5	—	—				
33	15	Ginger	58	10	0.7	0	1	0	ii	ii				
34		Tea	49	14	3.7	10	2	-3	i	i	Tea, mate extracts	BRN		
35		Pepper (piper spp.)	41	7	2.1	1	13	1	i	i	Pepper (piper spp.)	BRN		
36		Nutmeg, mace and cardamoms	37	15	11.0	18	0	-11	i	i				
37		Coffee, green	23	4	2.6	-1	4	-16	i	iii	Coffee, extracts	BRN		
38		Chillies and peppers, dry	8	1	0.4	-6	3	3	iv	iv			Chillies and peppers, dry	KHM
39		Cloves	3	2	1.0	0	1	0	iv	iii				
40		Cocoa, beans	1	-24	0.5	-19	16	-7	iv	iv	Cocoa, paste	SGP		
41		Spices, nes	—	—	0.9	—	0	—	—	—	Spices, nes	BRN		
42	21	Meat, pig	121	—	2.1	—	2	-1	i	i				
43		Meat, sheep	64	—	5.4	—	0	16	i	i				
44		Meat, cattle	45	—	2.0	—	2	3	i	ii	Meat, cattle, boneless (beef and veal)	LAO		
45		Meat, goat	24	—	1.6	—	0	12	ii	ii				
46		Meat, buffalo	21	—	1.7	—	0	4	i	iv	Meat, cattle, boneless (beef and veal)	LAO		
47		Meat, duck	21	—	5.3	—	6	2	i	iii				
48		Meat, chicken	10	—	3.0	—	99	3	iii	iii				
49		Meat, horse	8	—	0.9	—	0	-5	iv	iv				
50	22	Milk, whole fresh cow	7	—	0.5	—	2	1	iv	i	Ice cream and edible ice	BRN		
51	23	Eggs, other bird, in shell	12	—	1.3	—	1	5	iv	i				
52		Eggs, hen, in shell	8	—	1.1	—	49	6	iv	iv				

RM = ringgit (Malaysian currency).

BRN = Brunei, FCL = FAOSTAT Commodity List, ha = hectare, IC2 = item category level 2, Intpn. = interpretation, LAO = Lao People's Democratic Republic, MMR = Myanmar, MYS = Malaysia, nes = not elsewhere specified, p = p-value, PHL = Philippines, PU = unit of pig feed requirements, SGP = Singapore, THA = Thailand, VNM = Viet Nam, Yi = yield in Malaysia, Yi' = average yield in other ASEAN countries.

Notes: 'Area' refers to the total harvested area, and 'producing animals' refers to the number of producing animals. Land/feed productivity, ratio of the yield, and area harvested/producing animals represent the average values for 2011–2015. 'Chg' refers to the average annual rates of change during 2006–2015 (%). The data on land productivity was deflated to constant 2015 ringgit prices. The figures are estimates based on all the FAOSTAT data provided under the 'Production' rubric. In the 'Intpn' column, the codes are as follows: i = both productivity and ratio of the yield are high; ii = productivity is high, but the ratio of the yield is low; iii = productivity is low, but the ratio of the yield is high; and iv = both productivity and ratio of the yield are low. The codes under 'A' reflect the median of the broader product categories in IC1 (item category level 1), and those under 'B' reflect the median of the specific products in IC2 included here. Regarding the items imported in larger or smaller quantities compared with their prices (p<0.2), the names of the FCL items (corresponding to the United Nations' Broad Economic Categories) listed in the table are those with the smallest p-values < 0.2 estimated based on data from 2014–2016. Data category: FCL.

Source: Appendix 3.7.

Table 2.12 shows a positive correlation between the land productivity and ratios of the yield of vegetables (13) during 2011–2015. In other words, the profitability per unit area of FCL items under the category of vegetables tended to be high when they had a comparative advantage in terms of physical productivity within the ASEAN region. However, this was not true for products belonging to other IC2 groups.

Weak or non-existent correlations are observed between feed productivity or ratios of the yield and the extent of harvested areas or number of producing animals for all IC2 product groups. Such results show that most of the land and producing animals in Malaysia were simply not allocated to products characterized by high productivity or competitiveness.

Table 2.12. Correlation Matrix of Comparative Advantage, Productivity, and Resource Allocation, 2011–2015

	Land or feed productivity						Ratio of the yield					
IC2	11 Cereals	12 Oil and sugar crops	13 Vegetables	14 Fruits and nuts	15 Stimulants and spices	21 Meat	11 Cereals	12 Oil and sugar crops	13 Vegetables	14 Fruits and nuts	15 Stimulants and spices	21 Meat
Ratio of the yield	—	-0.40	0.65	0.44	0.43	0.33	—	—	—	—	—	—
Area or producing animals	—	-0.60	0.27	-0.49	-0.43	-0.07	—	-0.40	0.17	-0.48	-0.38	0.45
Obs.	2	4	12	11	8	8	2	4	12	11	8	8

IC2 = item category level 2.

Notes: This table uses Spearman's rank correlation coefficient of average values during 2011–2015. The values were estimated based on the data for items on the FAOSTAT Commodities List (FCL) relating to land/feed productivity, the ratio of the yield, and the number of producing animals and the land area they used. FCL items with correlation coefficients less than 4 were omitted. 'Obs.' refers to the number of FCL items. Data category: FCL.

Source: Author's calculations, see Appendix 3.7.

5. Summary

Social and Economic Conditions

- Although Malaysia's population is middling in size compared with the populations of the other ASEAN states, the country's strong prospect of population and economic growth suggests a high potential as a consumption market for agri-food products.
- The VA of the agricultural and wholesale/retail trade sectors was a notable component of Malaysia's GDP; for instance, the VA of each accounted for about 8% of GDP in 2015. While the proportion of GDP due to the VA of most of FVC-related industries shrank, that due to the VA of agriculture and the food and beverage industries gradually expanded.
- Interindustry transactions involving product flows from agriculture and fishing to the food and beverage industries increased. Transactions from fishing to the hotel and restaurant industries gradually increased, as did transactions from the food-and-beverage industries to the hotel-and-restaurant industries. The growth of intra-industry transactions within agriculture and within the food and beverage industries was observable, as well.

Linkages amongst FVC-related Industries

- The impacts of final demand in downstream sectors of the FVC, such as the hotel-and-restaurant and food-and-beverage industries, on upstream sectors were limited in Malaysia. This result suggests that direct interventions to increase final demand in agriculture might be more effective than expecting a ripple effect moving upstream from the hotel-and-restaurant and food-and-beverage sectors.
- The effects of downstream industries on the VA of fishing was notable, as the size of the fishing sector is limited. It is also suggested that the services provided by the wholesale/retail trade sectors are necessary, but alone not sufficient, to automatically drive the development of the FVC-related industries.
- Production growth can accompany a rise in per capita compensation and in the number of employees in all FVC-related industries, particularly agriculture and fishing.
- The structural characteristics of agricultural employment and labour productivity in Malaysia, which are the opposite of those in the other ASEAN countries, imply that there was no agricultural labour surplus in Malaysia.

Supply–Demand Balance of Agri-food Products

- Most agri-food products were actively produced and consumed in the domestic market, as well as imported. A large number of vegetable products, particularly cereals and vegetables, were imported, which is a peculiar feature that is not observed for other IC2 product groups in the ASEAN countries covered in this report. It is notable that the production and exportation of fat and oils largely outstripped those of the other products. Stimulants and spices were mostly imported for re-export, which is also a special feature of Malaysia.
- The export prices of several items—such as aquatic products, particularly raw crustaceans and processed molluscs; stimulants and spices; and alcoholic beverages—were remarkably high. We can conclude that processed stimulants and spices exported in large amounts had enough value to induce active trade. By contrast, high-priced items such as alcoholic beverages and processed food, nei, seem to be valuable imports for Malaysia.

The Competitiveness of Each Product in the ASEAN Region

- Malaysian vegetable products in the low- and mid-price ranges—such as stimulants and spices, including coffee extracts and pepper, and processed cereals for breakfast foods and pastries—tended to be imported in great quantities into other ASEAN countries, considering their prices. Aquatic products were largely imported; these included products in various IC2 groups, such as miscellaneous aquatic products; fish and fish products, nei; tilapias and other cichlids; and herrings/sardines/anchovies. Similarly, products categorized as processed food, nei—such as prepared fat, nes; molasses; infant food; and coconut oil—were imported in significantly larger quantities than had been estimated based on their import prices.
- Research on the characteristics of the goods actively exported from other ASEAN countries to Malaysia might trigger a reconsideration of production and marketing strategies for domestic products that could compete with goods produced by other ASEAN states, for instance: fonio

flour, salmons/trouts/smelts, and refined sugar from Thailand; crabs, nei, sharks/rays/chimaeras, and oils from Indonesia; bananas and breakfast cereals from the Philippines; chilies, green peppers, and miscellaneous freshwater fishes from Viet Nam; and chocolate products, nes, beer, and distilled alcoholic beverages from Singapore.

- The land productivity and ratio of the yield were higher for tomatoes than for all other vegetables. Those values for some other vegetables—such as chilies, green peppers, lettuce, chicory, and okra—were also relatively high. Amongst the vegetable products, the land productivity and ratios of the yield of several stimulants and spices—including tea, pepper, nutmeg/mace/cardamoms—outstripped those for other products. Similarly, sheep's meat had high feed productivity and a high ratio of the yield compared with those for other livestock products. The potential of these products as exports to other ASEAN countries could be high if they compete with the same items produced in other countries by physical productivity.

Chapter 3

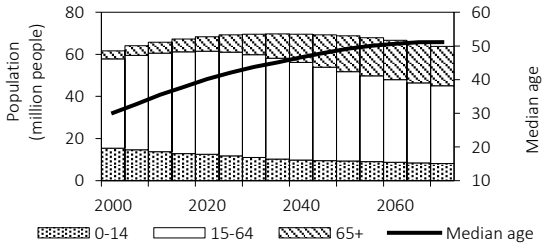
Thailand

1. Social and Economic Conditions

Population and Per Capita GDP

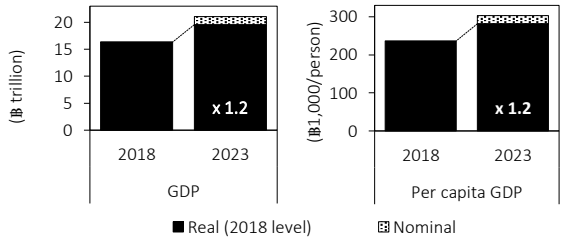
The population of Thailand, 69 million people in 2018, accounts for 11% of the total population of the ASEAN region, placing it fourth amongst the ASEAN countries. It is expected to reach 65 million people by 2040, and to start to decline after that (Figure 3.1). The working-age people, those between 15 and 65, are the majority of the country's population, and their numbers are expected to constantly decline from around 2020. This trend may imply the possibility of an economic slowdown in the long term. Although Thailand has a large population compared with those of other ASEAN countries, and shows a certain degree of strength as a consumption market, the country's poor prospect of population and economic growth suggests a growing importance of foreign markets as destinations for its agri-food products.

Figure 3.1. Population by Age Group, 2000–2060



Source: United Nations Department of Economic and Social Affairs (UN DESA, 2017).

Figure 3.2. Changes in GDP and Per Capita GDP, 2018 and 2023

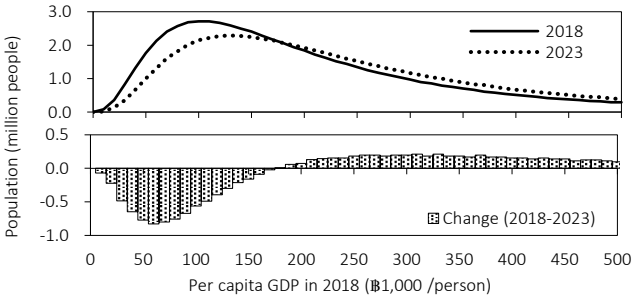


฿ = baht (Thai currency).
GDP = gross domestic product,
Source: Estimates based on data from the International Monetary Fund (IMF, 2018).

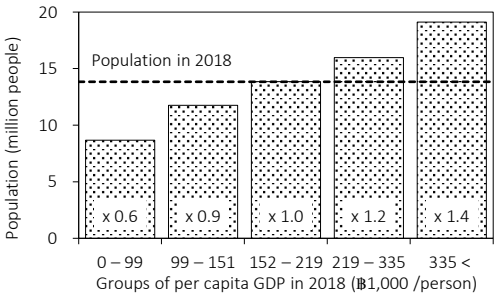
Real GDP and per capita real GDP are both expected to increase steadily by 1.2 times between 2018 and 2023 (Figure 3.2). According to a projection of Thailand's population based on the level of per capita GDP (Figure 3.3, Appendix 3.1), as per capita GDP approaches ฿180,000, a boundary is crossed whereby the number of people whose annual contributions to GDP are below that value will decrease. By contrast, the number of people with per capita GDP over ฿180,000 will increase across a wide range of the distribution. In particular, the population with personal incomes above ฿335,000 (i.e. the 80th percentile) will expand by 1.4 times by 2023. This projection implies a rapid increase in the number of high-income people. It will thus be necessary to establish a system for supplying agri-food products to match the demand from this rapidly growing upper-income bracket.

Figure 3.3. Estimated Population of Thailand by Per Capita GDP, 2018 and 2023

A. Distribution of Population Changes



B. Population Divided into Five GDP Groups



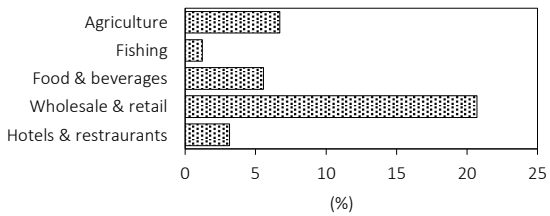
฿ = baht (Thai currency).
GDP = gross domestic product.
Note: The per capita GDP was calculated based on constant 2018 prices. The bars in Figure B show the estimated populations of the GDP groups in 2023. The numbers in the bars show the changes in these populations from 2018 to 2023.
Source: Appendix 3.1.

The VA of FVC-related Industries

The VA of the wholesale and retail trade sectors has been a major component of Thailand's GDP; for instance, it accounted for 21% of GDP in 2015 (Figure 3.4). Meanwhile, the VA of the other FVC-related industries, including agriculture, was comparatively small.

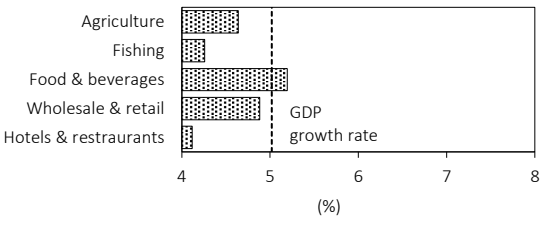
The annual growth rates of real VA in the FVC-related industries averaged 4%–5% during 2000–2015, lower than the average GDP rate, the one exception being the food and beverage industries, which averaged higher (Figure 3.5). While the proportion of GDP due to the VA of most of FVC-related industries shrank, that due to the VA of the food and beverage industries gradually expanded.

Figure 3.4. The Proportion of VA in GDP, 2015



GDP = gross domestic product, VA = value added.
Sources: Estimates based on data from Eora (2018).

Figure 3.5. Average Annual Change in Real VA, 2000–2015

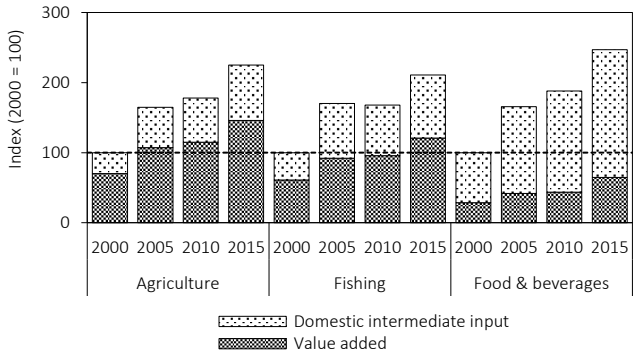


GDP = gross domestic product, VA = value added.
Sources: Estimates based on data from Eora (2018)and the International Monetary Fund (IMF, 2018).

The production values of the agriculture, fishing, and food-and-beverage industries increased consistently, more than doubling from 2000 to 2015 (Figure 3.6). The part of production value due to the VA, (i.e. the VA rate) was large in the agriculture and fishing industries during that period, at around 70%, but smaller in the food and beverage sector, at around 25% (Figure 3.7). The food and beverage sector depended on intermediate inputs from within this sector and from other, related sectors; and production in the food and beverage sector would generally induce more production within that sector, and in related sectors, than it would in agriculture and fishing.

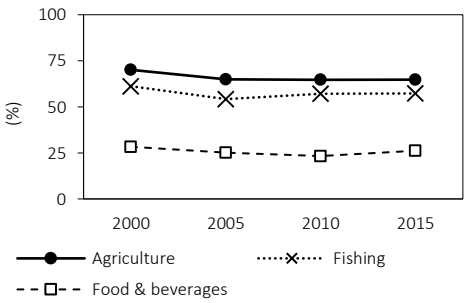
The VA rates of the agriculture, fishing, and food-and-beverage industries were almost flat between 2005 and 2015. This may reflect the fact that the production structure stayed the same in terms of the cost of sales to revenue ratios, the efficiency of the product mix, and/or the ability of technology to generate savings on inputs.

Figure 3.6. Values of Domestic Production, 2000–2015



VA = value added.
Note: The results shown in this graph is based on real values.
Sources: Estimates using data from Eora (2018) and the International Monetary Fund (IMF, 2018).

Figure 3.7. VA Rate, 2000–2015



Sources: Estimates using data from Eora (2018).

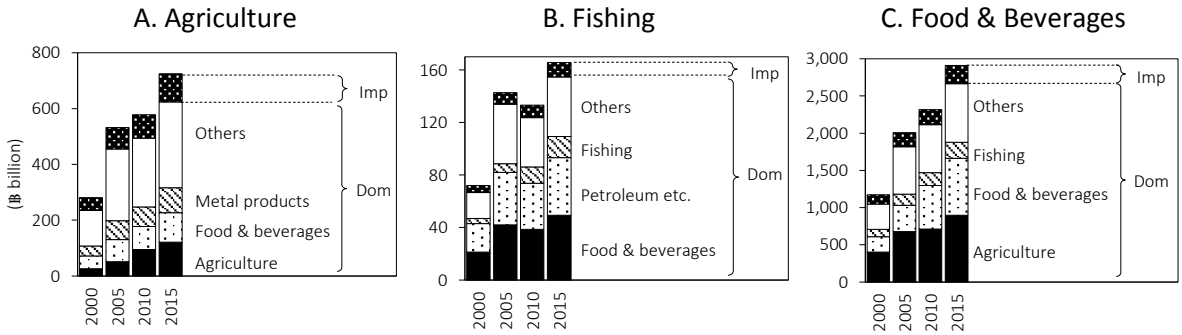
Intermediate Inputs in Agri-food Industries

Figure 3.8 shows which industries contributed to the growth of the agriculture, fishing, and food-and-beverage industries from 2000 to 2015. Intermediate inputs into all three agri-food production sectors mainly came from domestic sources. Inputs into agriculture and the food and beverage industries steadily increased from 2000, while inputs into the fishing industry stagnated from 2005.

The agricultural sector accounted for the largest portion of intermediate inputs into agriculture, followed by inputs from the food-and-beverage and metal-products industries. The largest sources of inputs for the fishing industry were the food and beverage industries, and the largest source of inputs in the food and beverage industries was agriculture. Feed for livestock and fish production can be considered examples of input goods from the food and beverage industries into agriculture and fishing.

The agriculture and food-and-beverage industries were major sources of intermediate inputs into the food and beverage industries. This implies that growth in the food and beverage sector was driven equally by the production of processed foods and of raw agricultural goods. The growth of the food and beverage industries in Thailand induced the development of agriculture through the industries' demand for intermediate inputs.

Figure 3.8. Sources of Intermediate Inputs, 2000–2015

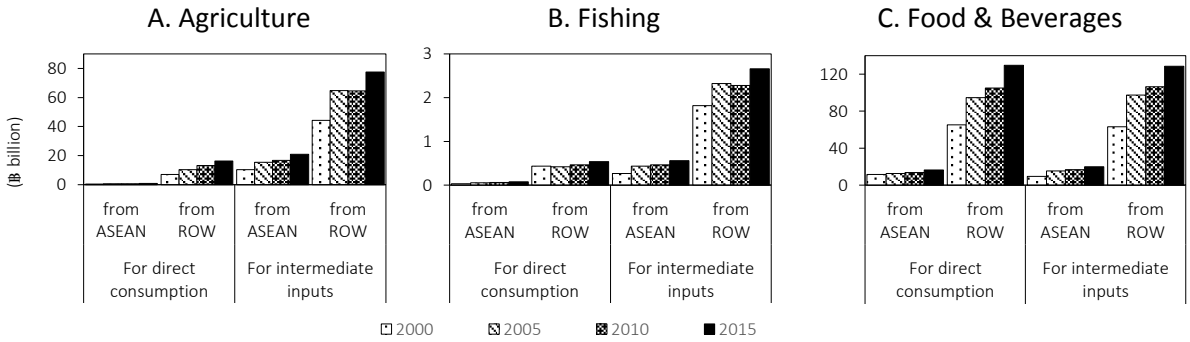


฿ = baht (Thai currency).
Dom = domestic supply, Imp = imports.
Notes: The values in these graphs are based on constant 2015 prices. 'Petroleum etc.' refers to the petroleum, chemical, and non-metallic mineral product industries.
Sources: Estimates using data from Eora (2018) and the International Monetary Fund (IMF, 2018).

The value of imports from foreign agricultural, fishing, and food-and-beverage sectors slightly increased between 2000 and 2015, though they remained limited compared with the value of products supplied by the domestic market (Figure 3.9). More agricultural and fishery products were imported for use as intermediate inputs than for direct consumption. By contrast, imported food and beverage products were divided equally between direct consumption and use as intermediate inputs. Put briefly, Thailand imported agricultural and fishery products mainly for processing, and food and beverage products both for processing and direct consumption.

Imports from the other ASEAN countries were small and were growing slowly compared with imports from the ROW. We can see from Figure 3.9 that Thailand gradually strengthened its linkages with the ROW as an importer, rather than deepening its integration into the ASEAN region.

Figure 3.9. Values of Imports, by Purpose, 2000–2015

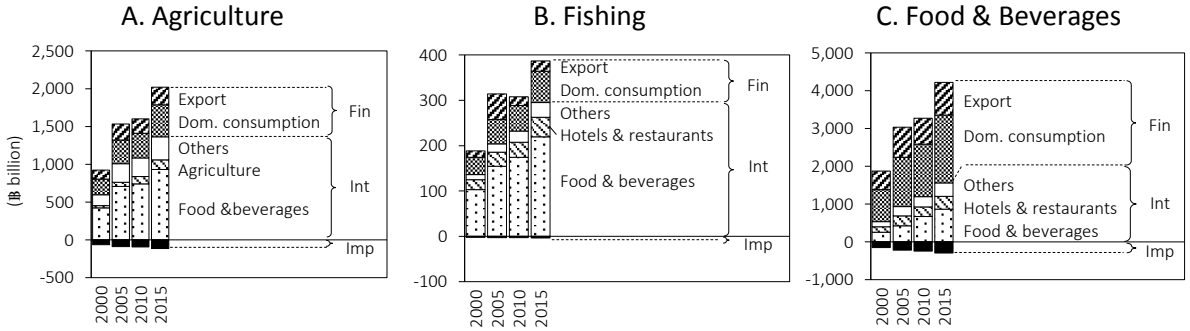


฿ = baht (Thai currency).
ASEAN = Association of Southeast Asian Nations, ROW = rest of the world.
Notes: The values of imports shown in these graphs are based on constant 2015 prices. They include imports from foreign agricultural, fishing, and food-and-beverage sectors destined for domestic final consumption and for use as intermediate inputs in all domestic industries.
Sources: Estimates using data from Eora (2018) and the International Fund (IMF, 2018).

Destinations of Products of Agri-food Industries

Interindustry transactions involving flows of products from agriculture and fishing to the food and beverage industries increased during 2000–2015 (Figure 3.10). The flows from fishing to the hotel and restaurant industries, and from the food-and-beverage industries to the hotel-and restaurant-industries, gradually increased. The expansion of intra-industry transactions within agriculture and within the food and beverage industries is observable, as well. The FVC grew steadily in Thailand with regard to both interindustry and intra-industry transactions.

Figure 3.10. Destinations of Domestically Produced and Imported Goods, 2000–2015

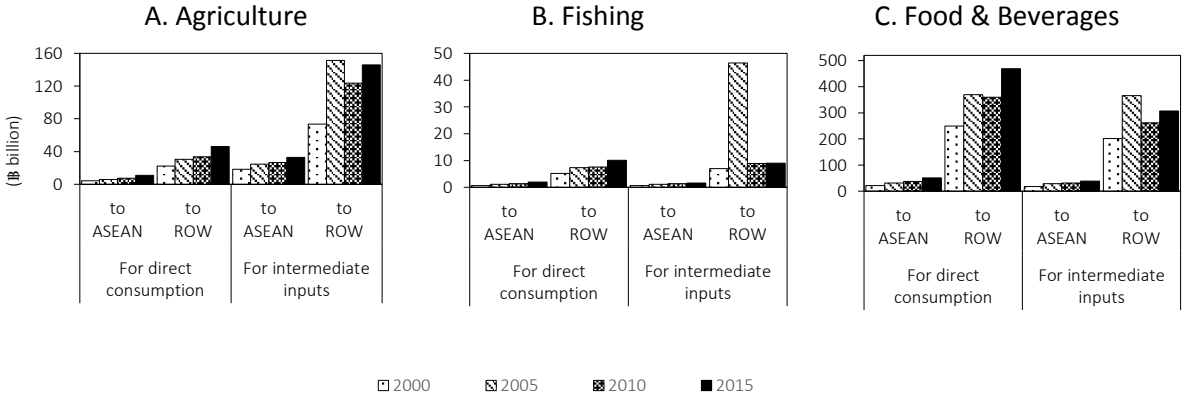


฿ = baht (Thai currency).
Dom. = domestic.
Notes: The values in these graphs are based on constant 2015 prices. 'Fin' = final demand for domestic and imported goods, 'Int' = intermediate demand for domestic and imported goods, and 'Imp' = the imports of final and intermediate goods. Total demand = Fin + Int. Domestic production = Fin + Int - Imp.
Sources: Estimates using data from Eora (2018) and the International Monetary Fund (IMF, 2018).

Final demand in the agriculture, fishing, and food-and-beverage industries seemed to grow more slowly than intermediate demand in 2000–2015. Exports increased slightly, though with fluctuations, and consistently accounted for a noticeable share of final demand. Figure 3.11 shows that, during this period, most of the agricultural products exported from Thailand were consumed as intermediate goods. Meanwhile, the exports from the fishing and food-and-beverage industries were almost evenly divided between direct consumption and intermediate inputs.[1]

The primary destination of exports from the agricultural, fishing, and food-and-beverage sectors was the ROW. Regarding these three sectors, Thailand deepened its linkages more with the ROW (as an exporter) than with the rest of the ASEAN region.

Figure 3.11. Values of Exports, by Purpose, 2000–2015



฿ = baht (Thai currency).
ASEAN = Association of Southeast Asian Nations, ROW = rest of the world.
Note: The values in these graphs are based on constant 2015 prices.
Sources: Estimates using data from Eora (2018) and the International Monetary Fund (IMF, 2018).

2. Linkages amongst FVC-related Industries

Final Demand in FVC-related Industries

First, let us see how final demand for domestic FVC-related industries induces the use of intermediate inputs and affects production and VA in each industry.

Table 3.1 shows the composition of final demand during 2000–2015. Final demand was particularly strong in the food and beverage industries, followed by three industries that were roughly at the same level: wholesale trade, retail trade, and hotels and restaurants. The average annual growth of final demand in the food and beverage industries, ฿75 billion, outstripped the average values for the other FVC-related industries. In the food and beverage sector, the values of household consumption, capital formation, and exports were close to each other. Household consumption and capital formation grew sharply, by ฿27 billion annually, followed by the

[1] This interpretation omits the spike in fishing-industry exports to the ROW in 2005 for use as intermediate inputs.

exports, which grew by ฿20 billion annually. It is notable that large values and rapid growth of household consumption also characterized retail trade and the hotel and restaurant industries.

Table 3.1. Final Demand for Products/Services of FVC-related Industries, 2000–2015

(฿ billion)

	Domestic production of											
	Agriculture		Fishing		Food & beverages		Wholesale trade		Retail trade		Hotels & restraurants	
Final demand as	Value	Change	Value	Change	Value	Change	Value	Change	Value	Change	Value	Change
Domestic consupmtion												
Household consumption	195	5	66	2	966	27	513	15	838	24	738	21
Other consumption	7	0	3	0	26	1	35	1	35	1	47	2
Capital formation	202	7	0	0	663	27	357	11	151	5	0	0
Export												
Export to ASEAN	44	1	3	0	89	3	115	6	12	0	47	2
Export to ROW	192	5	19	0	776	17	202	6	51	1	241	7
Total	640	19	91	2	2,521	75	1,222	39	1,087	33	1,072	31
Annual change rate (%)		4.3		2.7		4.2		4.6		4.4		4.1

฿ = baht (Thai currency).
ASEAN = Association of Southeast Asian Nations, FVC = food value chain, ROW = rest of the world.
Note: The values in these graphs are based on constant 2015 prices. 'Change' refers to the average annual changes that were estimated using data for 2000–2015.
Source: Appendix 3.2.

Production and VA Induced by Final Demand

Table 3.2 shows sources of intermediate inputs during 2000–2015 that came from domestic and foreign industries, and were destined for use in production by major FVC-related industries in Thailand. The table indicates that 22% of intermediate inputs into the hotel and restaurant sector came from the domestic food and beverage sector, and that 23% of inputs into the food and beverage sector came from domestic agriculture. This suggests that the hotel-and-restaurant and food-and-beverage sectors can sequentially induce a large amount of agricultural production. The table also shows that FVC-related industries in Thailand rarely used inputs from foreign countries, compared with inputs from domestic industries.

This table indicates stability in the structure of the inter-sector linkages. Meanwhile, intra-sector linkages can change substantially in the FVC-related domestic industries (except the hotel and beverage sector) in the medium to long term. In these industries, intermediate inputs provided and used by the same industry sharply increased, implying a strengthening of intra-sector linkages. If this structural change continues, the growth of final demand in each FVC-related industry will further drive the development the same industry in the future.

Table 3.2. Sources of Intermediate Inputs in Major FVC-related Industries, 2000–2015

Input from		Domestic production of: Agriculture Share (%)	Agriculture Change	Fishing Share (%)	Fishing Change	Food & beverages Share (%)	Food & beverages Change	Wholesale trade Share (%)	Wholesale trade Change	Retail trade Share (%)	Retail trade Change	Hotels & restraurants Share (%)	Hotels & restraurants Change
Agriculture	Domestic	7	0.26	0	0.00	23	-0.17	0	0.00	0	0.00	5	0.01
	ASEAN	0	-0.01	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	ROW	0	0.00	0	0.00	1	-0.02	0	0.00	0	0.00	0	0.00
Fishing	Domestic	0	0.00	4	0.17	6	-0.05	0	0.00	0	0.00	3	-0.01
	ASEAN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	ROW	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Food & beverages	Domestic	6	0.00	13	0.05	20	0.55	0	0.00	0	0.00	22	0.12
	ASEAN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	ROW	0	0.00	0	0.00	2	-0.03	0	0.00	0	0.00	2	0.00
Wholesale trade	Domestic	3	-0.01	2	-0.01	5	-0.07	7	0.45	0	0.00	4	0.00
	ASEAN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	ROW	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Retail trade	Domestic	3	-0.01	3	0.00	3	-0.02	0	0.00	6	0.42	5	0.02
	ASEAN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	ROW	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Hotels & restraurants	Domestic	0	0.01	0	0.00	0	0.00	3	0.01	3	0.01	0	0.02
	ASEAN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	ROW	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

ASEAN = Association of Southeast Asian Nations, FVC = food value chain, ROW = rest of the world.
Notes: 'Share' refers to the intermediate inputs as a percentage of total inputs in 2015. 'Change' refers to the average annual changes in the shares as estimated using data for 2000–2015.
Source: Appendix 3.2.

Table 3.3 shows the VA directly and indirectly boosted by a 1% increase over the 2015 value of final demand for domestic products through an increase in domestic production and intermediate inputs. For example, a 1% increase in final demand in the food and beverage sector generated a ฿5 billion increase in the VA of agriculture, as well as a ฿8 billion increase in the VA of the food-and-beverage sector itself.

Increases in final demand in downstream FVC-related sectors, particularly the food and beverage industries, had an impact on the VA of upstream sectors. This result suggests that interventions in the food and beverage industries do contribute to the development of agriculture.

Downstream industries had a notable effect on the VA of fishing, as the size of the fishing market is limited. For instance, the amount of VA in the fishing sector induced by a 1% increase in final demand over the 2015 value in the food and beverage industries (฿1.1 billion) was very large, exceeding the VA driven by the final demand in the fishing sector itself (฿0.5 billion). Similarly, final demand in the hotel and restaurant industries can have a measurable effect on fishing. Increasing final demand in these downstream sectors can thus be an effective way to promote the development of the fishing sector.

Wholesale and retail trade had relatively significant effects on the VA of the hotel and restaurant sector in 2015, as can be seen from Table 3.3. Meanwhile, Table 3.2 indicates that FVC-related industries depended on inputs from wholesale and resale trade during 2000–2015. It is suggested that services from the wholesale and retail trade industries are essential for the FVC-related industries, and that they could induce the development of the hotel and restaurant sector. In fact, the development of wholesale and retail trade could sequentially affect the FVC-related production industries in Thailand. It is also worth noting that the hotel and restaurant industries significantly affected the VA of every other sector in 2015, as can be seen in Table 3.3.

Table 3.3. VA Induced by a 1% Increase in Final Demand, 2015

(฿ billion)

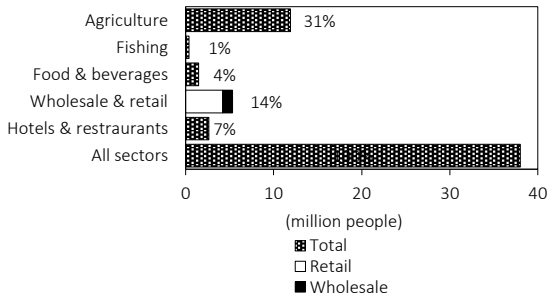
Induced value added in	1% increase in final demand for					
	Agriculture	Fishing	Food & beverages	Wholesale trade	Retail trade	Hotels & restraurants
Agriculture	4.29	0.03	5.03	0.06	0.05	0.89
Fishing	0.03	0.54	1.09	0.02	0.01	0.31
Food & beverages	0.13	0.04	8.00	0.05	0.04	0.81
Wholesale trade	0.23	0.03	1.69	9.67	0.11	0.59
Retail trade	0.21	0.03	1.15	0.13	8.89	0.64
Hotels & restraurants	0.02	0.00	0.11	0.19	0.14	4.28

฿ = baht (Thai currency).
VA = value added.
Source: Appendix 3.2.

The Relationship amongst the Number of Employees, Per Capita Compensation, and Production

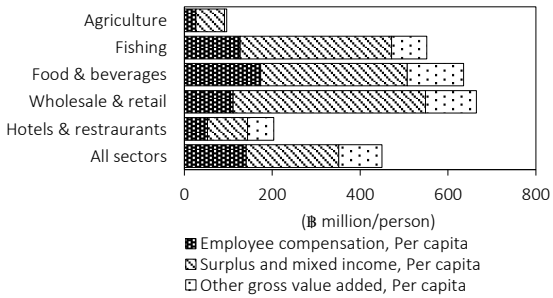
Now let us consider how an increase in production relates to changes in the number of employees and per capita employee compensation in an industry. According to figures 3.12 and 3.13, the agricultural sector in 2015 was characterized by a large number of employees, low labour productivity, and low per capita compensation compared with other FVC-related industries. By contrast, the food and beverage industries had a limited number of employees and slightly higher labour productivity and per capita compensation than the average values in Thailand.

Figure 3.12. Number of Employees, by Sector, 2015



฿ = baht (Thai currency).
VA = value added.
Sources: International Labour Organization (ILO, 2019); Appendix 3.3.

Figure 3.13. Gross VA per Capita, by Sector, 2015



Sources: Estimates based on data from Eora (2018) and the International Labour Organization (ILO, 2019); Appendix 3.3.

Figure 3.14 illustrates the relationship amongst the number of employees, per capita compensation, and production in each agri-food sector during 2000–2015. Figure 3.14A depicts the proportion of the average annual rate of change in production in each sector that was attributable to total employee compensation. In all the sectors, production growth averaged around 5%, including a contribution of 0.5% from the increase in the total value of the compensation.

The average annual rates of change in the total value of employee compensation were within the range of 4%–5% in all FVC-related sectors (Figure 3.14B). Two factors determine the total value of employee compensation: the number of employees and per capita compensation. In the agricultural and fishing sectors, the numbers of employees decreased, and this trend was accompanied by increases in per capita compensation. Although the growth rates in total compensation were similar to those in other industries, per capita compensation grew faster. Conversely, the food and beverage industries showed a reduction in per capita compensation accompanied by an increase in the number of employees. In other sectors, both per capita compensation and the number of employees, especially the former, steadily increased.

Those results suggest that production growth can accompany a rise in per capita compensation in many FVC-related industries, particularly in the agricultural and fishing sectors. An especially notable trend was the decline in the number of employees in the agricultural sector. A large number of employees, low labour productivity, and low per capita compensation, together with a steep growth in per capita compensation and a decrease in the number of employees, imply the existence of surplus labour. Any interindustry movement of labourers would be deeply connected to the productivity and efficient development of agriculture. Food and beverages, which had a higher per capita compensation than other FVC-related industries, as well as a sharp increase in the number of employees, seems to have been an attractive sector in terms of labour absorption, although the number of employees was actually very limited.

Figure 3.14. Changes in Production and Employee Compensation, 2000–2015

A. Breakdown of the Average Annual Rates of Change in Production

B. Breakdown of the Average Annual Rates of Change in Employee Compensation

Notes: Other factors include changes in the value added (VA), other than from employee compensation, and changes in intermediate inputs. The data is from selected years during 2000–2015.
Source: Appendix 3.3.

3. Supply–Demand Balance of Agri-food Products

Supply–Demand Structure

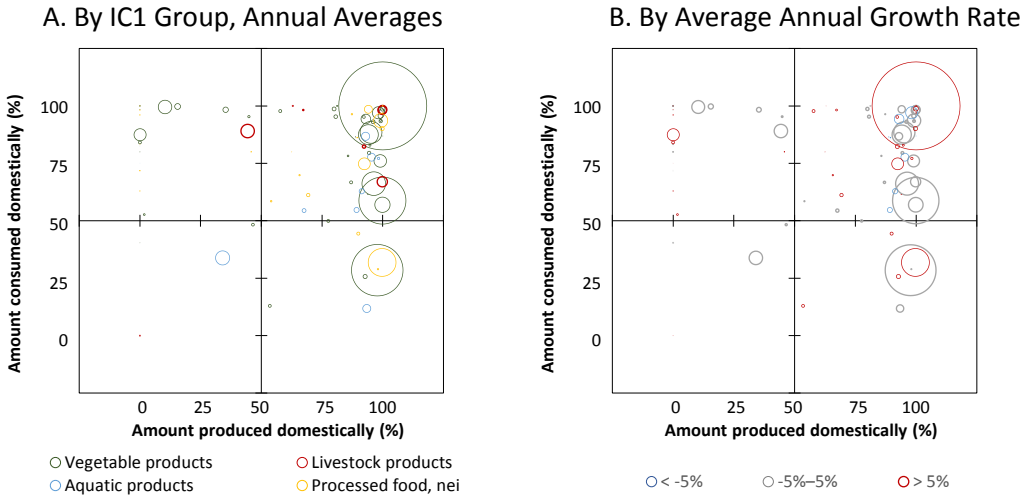
Figure 3.15 shows the structure of domestic commerce and foreign trade in 2004–2013. There are two graphs, each of which is divided into four quadrants defined by two criteria: whether agri-food goods were *produced* domestically or in foreign markets and whether they were *consumed* in domestically or in foreign markets. In 3.15 A and 3.15 B, the circles are scattered across all four quadrants. The circles vary in size according to the volumes produced of the goods they represent. The pattern of circles is the same in both graphs, but the circles in Figure 3.15 A are colour-coded to indicate the agri-food sector, whilst those in Figure 3.15 B are colour-coded to reflect growth rates.

The right side of each graph represents agro-goods that were mostly or completely produced domestically, with the first (upper-right) quadrant representing goods consumed domestically (i.e. domestic-oriented goods) and the fourth (lower-right) quadrant representing goods consumed in foreign markets (i.e. export-oriented goods). There are three large circles, of which two (for sugar cane and rice) fall within the first quadrant and one (cassava) falls within the fourth. On the right side, there are many circles of various sizes clustered at the 100% level of domestic production. This means that many products completely produced in Thailand were consumed both domestically and internationally.

Similarly, in the top side of each graph, which represents goods that were mostly or completely consumed domestically, we can observe a lot of small circles falling along the 100% level of domestic consumption in the first and second quadrants, the latter representing goods produced in foreign markets but consumed domestically (i.e. import-oriented). This means that products completely consumed in Thailand came from both domestic and international sources. Some very small circles are found in all four quadrants, particularly in the first quadrant and along the 100% level of goods produced in foreign markets. Only a few small circles are in the third quadrant (lower left), which represents products that were imported for re-exportation (i.e. trade-oriented goods). Although Thailand actively traded many item groupings similar to Malaysia's (Figure 2.15), they are less noticeable than those represented by the three large circles.[2]

[2] In other words, Thailand's agri-food industry depends heavily on the production of those three goods.

Figure 3.15. Classification of Agri-food Products by Supply–Demand Balance, 2004–2013



IC1 = item category level 1, nei = not elsewhere included.
Notes: Each circle represents a Food Balance Sheet (FBS) product as designated by FAOSTAT. The sizes of the circles express the quantities of total supply, with the proportions estimated based on quantitative data. 'IC1' comprises the author's classifications of broad agri-food product categories (see Appendix 2.2). In these graphs, the percentage of goods not produced/consumed domestically are produced/consumed in foreign markets. Data classification: FBS items.
Sources: FAO (2019); Appendix 3.4.

Table 3.4 shows that, during 2004–2013, the agri-food industry in Thailand was characterized by a large amount of domestic production and consumption, as well as exports. Marine fishes (32) are a representative example of this balanced supply–demand structure. Oil and sugar crops (12), vegetables (13), and cereals (11) were mainly produced in and supplied to the domestic market. Oil and sugar crops (12), consisting mainly of sugar cane, were mostly supplied for processing and exported as sugar (41). Meanwhile, a significant quantity of vegetables (13) and cereals (11) were produced domestically directly for export.

Annual change data indicates rapid growth in the domestic production of oil and sugar crops (12) and a corresponding expansion of supply during this period. A similar trend is observed with cereals (11). The production, import, domestic supply, and export of vegetables (12) increased substantially. Sugar (41) was conspicuous for the rapid growth of its production and export. However, the production and consumption of marine fishes (32), freshwater fishes (31), and molluscs (34) gradually decreased.

Table 3.4. Supply–Demand Balance of Agri-food Products, 2004–2013

(1,000 metric tons)

IC1	IC2	2004–2013 average				Average annual change, 2004–2013			
		Production	Domestic supply	Import	Export	Production	Domestic supply	Import	Export
1 Vegetable products	11 Cereals	26,716	18,433	2,186	9,618	790	610	187	-128
	12 Oil and sugar crops	75,288	76,987	1,785	88	5,381	5,453	70	-2
	13 Vegetables	29,230	11,689	1,157	18,698	941	413	243	770
	14 Fruits and nuts	10,730	7,848	495	3,427	57	-101	56	214
	15 Stimulants and spices	429	427	152	177	4	9	11	13
2 Livestock products	21 Meat	2,369	1,946	41	479	53	12	9	57
	22 Milk	890	1,805	1,116	222	28	44	9	-16
	23 Eggs	912	897	2	17	39	39	0	1
3 Aquatic products	31 Freshwater fishes	672	628	51	96	-16	-19	1	4
	32 Marine fishes	1,624	1,390	1,405	1,639	-131	-117	41	30
	33 Crustaceans	652	83	46	616	21	-2	1	25
	34 Molluscs	431	312	92	211	-26	-10	6	-10
	35 Aquatic animals, nei	85	67	2	20	8	7	0	1
	36 Aquatic plants	0	2	3	1	0	0	0	0
4 Processed food, nei	41 Sugar	7,743	2,495	68	5,195	496	56	9	393
	42 Fat and oils	1,854	1,529	202	529	150	123	17	45
	43 Food, nei	0	11	16	4	0	0	1	1
	44 Alcoholic beverages	2,745	2,594	76	146	29	38	-1	20

IC1 = item category level 1, IC2 = item category level 2, nei = not elsewhere included.

Note: 'IC1' and 'IC2' comprise the author's classifications of broader product categories and more specific groups, respectively (Appendix 2.2). This table is based on an aggregation of all the data available from FAOSTAT's Food Balance Sheet (FBS) of FAOSTAT. Data classification: FBS items.

Sources: FAO (2019); Appendix 3.4.

Table 3.5 shows FBS items (as designated by FAOSTAT) listed in descending order of total supply quantity within each category in 2004–2013, corresponding to the quadrants in Figure 3.15. Sugar cane and rice, both of which existed in large quantities during this period, are in the column for domestic-oriented products. Cassava and sugar, which also existed in large quantities, are classified as export-oriented products. Most products are in the cells representing stable or expanding markets of domestic-, export-, or import-oriented products; while several products, such as coconuts, are in the cell for domestic-oriented goods whose markets were shrinking.

Sugar cane, which is used for sugar production, is identifiable as a domestic-oriented product by the large quantity of supply undergoing rapid growth. Fat and oils (42) such as palm oil and soybean oil, as well as palm kernels and bovine meat, are also remarkable for the speed of their growth. Sugar is the major export-oriented item, with a rapid increase in supply. In contrast, 'wheat and products' are examples of growing import-oriented products. Although their supply is shown as comparatively stable, pelagic fish is conspicuous for its large quantity of supply, as seen in the column for trade-oriented products.

Table 3.5. Total Quantities of Supply for Product Categories, in Descending Order, 2004–2013

(1,000 metric tons)

Category		Domestic-oriented			Export-oriented			Import-oriented			Trade-oriented		
Provided by		Domestic market			Domestic market			Foreign market			Foreign market		
Consumed in		Domestic market			Foreign market			Domestic market			Foreign market		
Change	Rank	IC2	FBS items	Quantity	IC2	FBS items	Quantity	IC2	FBS items	Quantity	IC2	FBS items	Quantity
Annual change rate, 2004–2013 (%) r > 5 Expanding	1	12	Sugar cane	73,018	41	Sugar (raw equivalent)	7,535	11	Wheat and products	1,515	21	Meat, other	1
	2	42	Palm oil	1,456	11	Cereals, other	217	14	Apples and products	120			
	3	12	Palm kernels	289	42	Palmkernel oil	131	15	Cocoa beans and products	56			
	4	42	Soyabean oil	225	15	Coffee and products	118	42	Fish, body oil	16			
	5	21	Bovine meat	206				42	Sunflowerseed oil	13			
-5 < r < 5 Stable	1	11	Rice (milled equivalent)	21,139	13	Cassava and products	25,280	22	Milk - excluding butter	2,027	32	Pelagic fish	2,032
	2	14	Fruits, other	5,473	33	Crustaceans	699	12	Soyabeans	1,882	13	Onions	112
	3	11	Maize and products	4,723	14	Nuts and products	123	11	Barley and products	392	11	Millet and products	5
	4	13	Vegetables, other	3,925	42	Ricebran oil	41	13	Potatoes and products	345			
	5	14	Pineapples and products	2,367				12	Groundnuts (shelled eq)	83			
r < -5 Shrinking	1	12	Coconuts - incl copra	1,516				12	Rape and mustardseed	4			
	2	14	Oranges, mandarines	985									
	3	32	Marine fish, other	685									
	4	34	Molluscs, other	326									
	5	32	Demersal fish	312									

FBS = Food Balance Sheet (FAOSTAT), IC2 = item category level 2, r = average annual change rate.
Notes: The values in this table represent the averages for 2004–2013. Data classification: FBS items.
Sources: FAO (2019); Appendix 3.4.

Trade Prices and Volumes

The export prices of aquatic products—such as raw and processed crustaceans (33), processed aquatic animals, nei (35), molluscs (34), and processed freshwater fishes (31)—were remarkably high during 2014–2016 (Table 3.6). Export values, as well as export prices, were relatively high for both raw and processed crustaceans. We can conclude from this that raw and processed crustaceans exported in large amounts had high enough values during this period to induce active trade.

The import prices of aquatic products, including raw aquatic plants (36), raw freshwater fishes, and processed aquatic animals, nei, exceeded those of many other products. Also conspicuous were the high prices of eggs (23) and food, nei (43). The import values of most of these high-priced products were quite small, except in the case of food, nei (41). High-priced items that were largely imported, such as processed food, nei (41), seem to have had high import values for Thailand. Overall, the export and import prices of processed products tended to be higher than those of primary products, except for some items such as eggs, sugar, and a few aquatic products.

Table 3.6. Prices and Values of Exported/Imported Agri-food Products, 2014–2016

IC1	IC2	Price ($/kg)				Value ($ million)			
		Export		Import		Export		Import	
		Primary products	Processed products	Primary products	Processed products	Primary products	Processed products	Primary products	Processed products
1 Vegetable products	11 Cereals	0.6	0.6	0.3	1.2	92	5,591	807	702
	12 Oil and sugar crops	0.8	2.1	0.5	3.1	77	623	1,230	82
	13 Vegetables	0.2	1.0	0.2	2.0	1,633	358	442	210
	14 Fruits and nuts	0.9	1.3	1.2	1.5	1,280	1,819	746	165
	15 Stimulants and spices	1.3	2.7	1.8	5.6	62	249	267	282
2 Livestock products	21 Meat	—	3.9	—	1.9	0.0	2,915	0.0	169
	22 Milk	1.2	1.8	3.1	2.7	121	126	63	513
	23 Eggs	1.6	2.7	10.0	6.2	24	12	13	7
3 Aquatic products	31 Freshwater fishes	2.1	5.7	8.3	4.0	2	241	41	276
	32 Marine fishes	3.4	3.7	1.9	1.6	27	2,574	36	1,523
	33 Crustaceans	9.5	11.5	5.1	2.0	959	1,113	142	11
	34 Molluscs	5.6	5.8	2.1	4.6	396	69	352	29
	35 Aquatic animals, nei	2.8	8.1	5.5	6.1	18	1	4	0.2
	36 Aquatic plants	9.1	—	10.9	—	4	0.0	40	0.0
	38 Fishes, nei	1.0	2.9	0.5	1.2	128	555	38	376
4 Processed food, nei	41 Sugar	2.3	0.4	1.8	0.5	34	3,853	28	186
	42 Fat and oils	—	1.1	—	1.4	0.0	430	0.0	311
	43 Food, nei	—	2.2	—	6.3	0.0	1,485	0.0	798
	44 Alcoholic beverages	—	1.3	—	5.0	0.0	389	0.0	342

IC1 = item category level 1, IC2 = item category level 2, kg = kilogram, nei = not elsewhere included.
Notes: This table shows the averages for 2014–2016. The values indicated for exports are based on 'free on board' (FOB) prices, and those for imports are based on 'cost, insurance, and freight' (CIF) prices. Data category: IC2 groups based on the Broad Economic Categories (BEC) classifications of primary products (11) and processed products (12).
Sources: UNSD (2017); Appendix 3.6.

4. The Competitiveness of Each Product in the ASEAN Region

Commodities Imported by ASEAN Countries

Tables 3.7 and 3.8 provide information about the agri-food products imported by ASEAN countries from Thailand in 2014–2016. ASEAN countries imported many of these products from Thailand more cheaply than they did from other ASEAN+6 countries (Table 3.7). Roughly 70%–80% of items in the IC2 groups were imported as low-priced products. Thailand exported notably more goods to Indonesia and Malaysia than to the other ASEAN countries; its next-largest exports in terms of value went to countries with similar values, other than Brunei and the CLM states (Table 3.8).

As shown in Table 3.7, many Thai products that were imported by other ASEAN countries in significantly larger quantities than estimated (based on approximate lines) were in the low-price range. Examples of such products included milk (22) and sugar (41). Similarly, fishes, nei (38), meat (21), and marine fishes (32) were conspicuous in the mid-price range. Major products that were imported in lesser quantities than estimated (based on their prices) included crustaceans (33) in the low-price range, alcoholic beverages (44) in low- and mid-price ranges, and milk (22) in all price ranges.

Table 3.7. Prices and Values of Products Imported by ASEAN Countries, by IC2 Group, 2014–2016

IC1	IC2	Price ($/kg)	Value ($ million)	Number of imported products by price ranges (%)			Number of products deviated from approx. lines (%)						Obs.
							Imported larger			Imported smaller			
				Price ranges			Price ranges			Price ranges			
				Low	Mid	High	Low	Mid	High	Low	Mid	High	
1 Vegetable products	11 Cereals	1.4	971	76	17	7	3	0	0	1	0	0	107
	12 Oil and sugar crops	1.9	142	71	19	10	0	0	1	0	0	0	68
	13 Vegetables	1.4	129	73	13	14	1	0	0	0	0	0	204
	14 Fruits and nuts	1.8	496	70	16	14	2	0	0	1	0	0	243
	15 Stimulants and spices	4.3	66	66	16	17	2	1	0	0	0	0	98
2 Livestock products	21 Meat	4.6	134	67	13	20	2	2	0	0	0	0	45
	22 Milk	2.0	157	73	9	18	5	0	0	2	2	2	56
	23 Eggs	2.6	0.3	50	0	50	0	0	0	0	0	0	6
3 Aquatic products	31 Freshwater fishes	4.2	7	75	13	13	3	0	0	0	0	0	32
	32 Marine fishes	2.9	63	81	11	8	0	2	0	2	0	0	64
	33 Crustaceans	7.2	47	73	11	16	0	0	0	5	0	0	44
	34 Molluscs	4.7	10	81	11	8	0	0	0	0	0	0	36
	35 Aquatic animals, nei	2.7	123	79	14	7	0	0	0	0	0	0	14
	36 Aquatic plants	12.3	1	60	40	0	0	0	0	0	0	0	5
	38 Fishes, nei	3.4	96	76	9	15	0	3	0	0	0	0	34
4 Processed food, nei	41 Sugar	1.1	1,724	91	3	6	4	0	0	0	0	0	70
	42 Fat and oils	1.6	113	58	17	25	1	0	0	1	1	0	77
	43 Food, nei	3.1	327	70	20	10	0	0	0	0	0	0	20
	44 Alcoholic beverages	2.1	21	71	10	19	0	0	0	5	5	0	21

ASEAN = Association of Southeast Asian Nations, IC1 = item category level 1, IC2 = item category level 2, kg = kilogram, nei = not elsewhere included.

Notes: The prices and values represent the averages for 2014–2016. 'Price' refers to the import price, including cost, insurance, and freight (CIF) added to the tariff established by the ASEAN *Trade* in Goods Agreement (ATIGA). 'Value' refers to the imported value (CIF) without the tariff. See Appendix 3.6 for price ranges and approximate lines. The products for which the externally studentized residual was significantly large or small at the 10% level were counted. 'Obs.' refers to the number of detailed commodities classified according to the Broad Economic Categories (BEC) three-digit category numbers and used for applying approximation lines. Data category: FAOSTAT Commodity List (FCL) and adjusted groups under the International Standard Statistical Classification of Aquatic Animals and Plants (ISSCAAP), classified under BEC 111, 112, 121, and 122.

Sources: UNSD (2017); Appendix 3.6.

Table 3.8. Prices and Values of Products Imported into the ASEAN Region, by Country, 2014–2016

Importer	Price ($/kg)	Value ($ million)	Number of imported products by price ranges (%)			Number of products deviated from approx. lines (%)						Obs.
						Imported larger			Imported smaller			
			Price ranges			Price ranges			Price ranges			
			Low	Mid	High	Low	Mid	High	Low	Mid	High	
Singapore	2.4	562	83	11	7	0	0	0	0	3	0	223
Brunei	3.0	50	59	17	25	0	1	0	1	1	1	138
Malaysia	1.4	1,057	80	14	6	3	0	0	0	0	0	239
Thailand	2.7	44	80	9	12	0	0	0	0	2	0	147
Indonesia	1.8	1,172	76	6	18	1	0	0	0	0	0	88
Philippines	1.8	472	56	18	27	4	0	1	0	0	1	108
Viet Nam	2.5	589	71	23	5	2	0	0	0	0	0	56
Lao PDR	2.5	164	65	18	18	0	0	0	0	0	6	17
Camboodia	1.7	148	72	15	13	7	2	0	0	1	0	115
Myanmar	1.9	0.0	59	18	23	0	0	0	0	0	0	113

ASEAN = Association of Southeast Asian Nations, kg = kilogram, nei = not elsewhere included.

Notes: The prices and values represent the averages for 2014–2016. 'Price' refers to the import price, including cost, insurance, and freight (CIF) added to the tariff established by the ASEAN *Trade* in Goods Agreement (ATIGA). 'Value' refers to the imported value (CIF) without the tariff. See Appendix 3.6 for price ranges and approximate lines. The products for which the externally studentized residual was significantly large or small at the 10% level were counted. 'Obs.' refers to the number of detailed commodities classified according to the Broad Economic Categories (BEC) three-digit category numbers and used for applying approximation lines. Data category: FAOSTAT Commodity List (FCL) and adjusted groups under the International Standard Statistical Classification of Aquatic Animals and Plants (ISSCAAP), classified under BEC 111, 112, 121, and 122.

Sources: UNSD (2017); Appendix 3.6.

Goods Imported in Smaller/Larger Quantities than Estimated Based on Prices: Non-price Competitiveness in the ASEAN Region

Thai vegetable products in the low- and mid-price ranges—such as fruits and nuts (14), including dried fruits and stone fruits, nes—tended to be imported in great quantities by other ASEAN countries in 2014–2016, considering their prices (Table 3.9). Livestock products, including dairy products such as whole fresh cow's milk and yogurt (22), were imported in substantial amounts. Similarly, products categorized as aquatic products and processed food, nei, including salmons/trouts/smelts, tunas/bonitos/billfishes, refined sugar, and short margarine, were imported in significantly larger quantities than had been estimated based on their import prices. It might be beneficial to seek opportunities to develop further export markets for these products. Moreover, research on the causes of such active import demand, including production and sales methods, would help identify pathways toward increasing the sales of other items.

Research on the characteristics of the goods actively exported by other countries to Thailand might also trigger a reconsideration of production and marketing strategies for domestic products that could compete with goods produced by other states in the ASEAN region, for instance: cinnamon and coconuts from Indonesia; pepper and miscellaneous freshwater fishes from Viet Nam; pearled barley from Lao PDR; soybeans from Cambodia; and fructose, syrup, and homogenized prepared meat from Singapore.[3]

There were also many products for which the import quantities were significantly smaller during 2014–2016, considering their prices, such as vegetable products in the low- and mid-price ranges; and livestock and aquatic products, and processed food, nei, in the low-price range. Although these products were certainly exported to other ASEAN countries, they might not have been as competitive as the same products from other ASEAN and +6 countries. If these items are to be promoted as export goods destined for other ASEAN countries, active and intensive product differentiation will be necessary.

[3] For reference, see tables 2.9 to 9.9. See also Table A4.2 on major exports from the +6 countries.

Table 3.9. Goods Imported by ASEAN Countries in Smaller/Larger Quantities than Estimated Based on Prices, in Ascending Order of P-values, 2014–2016

A. Larger Quantities of Exports than Estimated Based on Prices

IC1	Rank	Price ranges																			
		Low							Mid							High					
		Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value
1 Vegetable products	1	MYS	11	121	Flour, fonio	1.0	19	0.02	KHM	15	112	Tea	7.0	0.1	0.05	PHL	12	122	Soya paste	3.6	53	0.09
	2	PHL	14	112	Fruit, dried nes	14.7	1	0.03	BRN	14	112	Fruit, stone nes	3.6	0.9	0.06							
	3	IDN	14	112	Fruit, stone nes	1.3	78	0.03	VNM	11	122	Cereals, breakfast	3.4	3	0.11							
	4	MYS	13	121	Flour, roots and tubers nes	0.4	14	0.04	KHM	14	122	Juice, orange, concentrated	1.0	0.4	0.12							
	5	VNM	14	112	Fruit, dried nes	6.5	60	0.04	MMR	11	122	Cereals, breakfast	4.0	3	0.12							
2 Livestock products	1	KHM	21	122	Meat, beef and veal sausages	5.6	1	0.03	KHM	21	122	Meat, pig, preparations	8.2	0.2	0.07							
	2	KHM	22	112	Milk, whole fresh cow	1.0	4	0.07														
	3	PHL	22	112	Yoghurt	0.9	17	0.09														
	4	KHM	22	112	Buttermilk, curdled, acidified milk	1.5	3	0.10														
	5	KHM	22	121	Milk, skimmed dried	2.3	1	0.10														
3 Aquatic products	1	MYS	31	122	Salmons, trouts, smelts	5.6	0.3	0.08	BRN	38	122	Fish and fish products, nei	8.3	0.2	0.05	MYS	33	112	Lobsters, spiny-rock lobsters	22.7	0.5	0.16
	2	PHL	31	122	River eels	1.1	0.4	0.15	MYS	32	122	Tunas, bonitos, billfishes	5.2	11	0.09							
	3	KHM	38	122	Fish and fish products, nei	2.7	0.7	0.15	IDN	32	122	Tunas, bonitos, billfishes	4.4	3	0.16							
	4	THA	33	122	Shrimps, prawns	15.5	3	0.19	KHM	32	122	Tunas, bonitos, billfishes	6.4	0.2	0.19							
	5	KHM	32	122	Herrings, sardines, anchovies	0.9	0.5	0.20														
4 Processed food, nei	1	MYS	41	122	Sugar refined	0.5	60	0.03	MYS	43	122	Infant food	13.5	23	0.19	KHM	42	122	Oil, soybean	0.7	0.3	0.14
	2	KHM	42	122	Margarine, short	2.0	0.4	0.04														
	3	KHM	41	122	Sugar refined	0.3	20	0.08														
	4	MYS	41	121	Molasses	1.1	2	0.10														
	5	KHM	41	122	Beverages, non alcoholic	0.8	44	0.12														

B. Smaller Quantities of Exports than Estimated Based on Prices

IC1	Rank	Price ranges																			
		Low							Mid							High					
		Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value
1 Vegetable products	1	KHM	14	112	Grapes	1.3	0.000	0.04	BRN	15	112	Cinnamon (canella)	3.6	0.001	0.12	SGP	14	112	Fruit, prepared nes	8.8	0.000	0.12
	2	THA	11	121	Flour, wheat	0.7	0.008	0.04	MMR	11	122	Oats rolled	1.1	0.001	0.13							
	3	BRN	14	112	Lemons and limes	2.4	0.000	0.05	MYS	13	121	Flour, pulses	2.4	0.002	0.14							
	4	SGP	13	112	Potatoes, frozen	1.4	0.000	0.05	PHL	15	112	Pepper (piper spp.)	5.7	0.006	0.17							
	5	SGP	14	112	Nuts, nes	2.0	0.000	0.08														
2 Livestock products	1	SGP	22	121	Whey, condensed	1.0	0.000	0.02	BRN	22	122	Milk, whole condensed	3.3	0.000	0.02	BRN	22	122	Cheese, whole cow milk	7.5	0.000	0.08
	2	MMR	21	122	Meat, cattle	4.3	0.003	0.12	BRN	21	122	Meat, pig, preparations	5.5	0.000	0.14							
	3	KHM	22	122	Milk, whole dried	2.1	0.001	0.15														
	4	THA	22	122	Ice cream and edible ice	1.4	0.021	0.16														
	5																					
3 Aquatic products	1	THA	33	112	Crabs, nei	6.5	0.000	0.00														
	2	SGP	33	112	Crabs, nei	5.8	0.015	0.07														
	3	SGP	32	122	Herrings, sardines, anchovies	1.0	0.000	0.09														
	4	SGP	34	112	Clams, cockles, arkshells	3.5	0.000	0.11														
	5	IDN	32	122	Miscellaneous pelagic fishes	0.9	0.033	0.15														
4 Processed food, nei	1	THA	44	122	Beverages, distilled alcoholic	11.6	0.000	0.02	PHL	42	121	Fat, pigs	0.9	0.000	0.07							
	2	SGP	42	122	Oil, olive, virgin	4.6	0.000	0.06	LAO	44	122	Beverages, fermented rice	1.5	0.000	0.10							
	3	BRN	42	121	Oil, cottonseed	3.7	0.000	0.13														
	4	VNM	42	122	Margarine, short	1.4	0.038	0.14														
	5	PHL	42	121	Oil, coconut (copra)	0.4	0.000	0.19														

BEC = Broad Economic Categories, United Nations Statistics Division (UNSD), BRN = Brunei, IC1 = item category level 1, IC2 = item category level 2, IDN = Indonesia, kg = kilogram, KHM = Cambodia, LAO = Lao People's Democratic Republic, MMR = Myanmar, MYS = Malaysia, nei = not elsewhere included, nes = not elsewhere specified, PHL = Philippines, SGP = Singapore, THA = Thailand, VNM = Viet Nam.

Notes: The values listed in this table represent the averages for 2014–2016. The top five agri-food products within each IC1 grouping are listed in ascending order of p-value < 0.2, under the BEC as follows: primary products mainly for industry (111), primary products mainly for household consumption (112), processed products mainly for industry (121), and processed products mainly for household consumption (122). 'Price' refers to the CIF (cost, insurance, and freight) import price added to the tariff set by the ASEAN *Trade* in Goods Agreement (ATIGA). 'Value' refers to the imported value (CIF) without the tariff. The expression 'p-value' refers to the p-value of the t-stat against the externally studentized residual. See Appendix 3.6. Data category: FAOSTAT Commodity List and the adjusted groups under the International Standard Statistical Classification of Aquatic Animals and Plants (ISSCAAP) classified under BEC 111, 112, 121, and 122.

Sources: UNSD (2017); Appendix 3.6.

Inter-commodity and Inter-country Comparisons of Land/Feed Productivity

The median land productivity of stimulants and spices (15) was the highest, followed by that of vegetables (13) and fruits and nuts (14), in 2011–2015 (Table 3.10). The ratios of the yield, an indicator of comparative advantage in the ASEAN region, were also high for stimulants and spices, exceeding those of other IC2 groups in the category of vegetable products.

Table 3.10. Median Levels of Productivity and Resource Allocation in Each IC2 Group

IC1	IC2	Land productivity (฿1,000/ha)	Chg (%)	Ratio of the yield Index (Yi/Yi')	Chg (%)	Area harvested (1,000 ha)	Chg (%)	Obs.
1 Vegetable products	11 Cereals	13	2	1.0	-1	88	0	5
	12 Oil and sugar crops	32	5	1.1	0	37	-4	10
	13 Vegetables	238	4	1.0	-1	9	-1	23
	14 Fruits and nuts	232	7	1.0	1	19	-2	16
	15 Stimulants and spices	582	5	2.6	2	10	-6	7
	Total	159	5	1.0	0	17	-2	61
IC1	**IC2**	**Feed productivity (฿1,000/100 PU)**	**Chg (%)**	**Ratio of the yield Index (Yi/Yi')**	**Chg (%)**	**Producing animals (million PU)**	**Chg (%)**	**Obs.**
2 Livestock products	21 Meat	93	—	1.5	—	5	0	8
	22 Milk	437	—	4.4	—	4	-2	1
	23 Eggs	94	—	1.1	—	36	3	2
	Total	106	—	1.4	—	7	1	11

฿ = baht (Thai currency).
ha = hectare, IC1 = item category level 1, IC2 = item category level 2, PU = unit of pig feed requirements, Yi = yield in Thailand, Yi' = average yield in other ASEAN countries.
Notes: Land/feed productivity, ratio of the yield, and area harvested/producing animals represent the average values for 2011–2015. 'Chg' refers to the average annual rates of change during 2006–2015 (%). 'Obs.' refers to the number of items in the FAOSTAT Commodity List (FCL). The data on land productivity was deflated to constant 2015 baht prices. The figures are estimates based on all the FAOSTAT data under the 'Production' rubric. Data category: FCL.
Sources: FAO (2019); Appendix 3.7.

In the category of stimulants and spices, tea and pepper had relatively high land productivity and ratios of the yield during the same period (Table 3.11). While tea's productivity and ratio of the yield both increased sharply, these trends were accompanied by a rapid shrinkage of the land area used for tea production. Similarly, while the productivity of pepper rose steadily, the comparative advantage and production area decreased. All this implies that a shrinkage of the production area results in an improvement of productivity in the land area that remains. Tea was exported in large quantities to Cambodia, considering its price, so it may had had high non-price competitiveness. Among the vegetable products, the productivity and the ratios of the yield of several vegetables (13), such as green peas, eggplant, and dried onions, outstripped those of other products. Similarly, fresh whole cow's milk and pork showed high feed productivity and ratios of the yield compared with other livestock products. Although the harvested areas or number of producing animals were small for the products mentioned above (except tea and pork), and were not necessarily increasing, the potential of these products as exports to other ASEAN countries could be high if they became competitive with the same products from those other countries by means of greater physical productivity.

As shown in the second column from the right in in Table 3.11, which lists examples of products imported by other ASEAN countries from Thailand during 2014–2016 in greater quantities than expected based on their prices, many of these products apparently had non-price competitiveness or were differentiated from the same items produced in other ASEAN countries. Such products mainly contained processed foods such as short margarine; refined sugar; soya paste; roots/tubers; flour, nes; potatoes; tapioca; prepared/preserved sweet corn; orange or other citrus juices; canned

pineapples; prepared nuts; and extracted coffee. In Thailand, the processing of agri-food products seemed to contribute to the differentiation of products and the avoidance of competition dependent on physical productivity.

Table 3.11. Levels of Productivity and Resource Allocation for Individual Items

No.	IC2	FCL name	Land or feed productivity (฿1,000/ha or ฿1,000/100 PU)	Chg (%)	Ratio of the yield Index (Yi/Yi')	Chg (%)	Area or producing animals (1,000 ha or million PU)	Chg (%)	Intpn. A	Intpn. B	Items imported larger or smaller compared with the price (p<0.2) Imported larger	in	Imported smaller	in
1	**11**	Maize	34	2	1.0	-3	1,142	2	iii	i				
2		Rice, paddy	28	-3	0.7	-1	11,196	0	iv	ii	Rice, husked	SGP		
3		Sorghum	13	2	1.9	0	26	-4	iii	i				
4		Wheat	10	4	0.6	2	1	0	iv	iv	Cereals, breakfast	VNM		
5		Cereals, nes	9	0	3.8	-6	88	6	iii	iii	Flour, fonio	MYS	Flour, fonio	IDN
6	**12**	Oil, palm fruit	105	4	1.1	2	612	6	iii	i	Margarine, short	KHM	Margarine, short	VNM
7		Sugar cane	69	5	1.3	4	1,323	5	iii	i	Sugar refined	MYS		
8		Groundnuts, with shell	63	13	1.0	2	26	-5	iv	ii				
9		Coconuts	39	2	0.9	-4	207	-3	iv	ii			Oil, coconut (copra)	PHL
10		Sesame seed	38	11	1.2	-1	49	-6	iii	i				
11		Soybeans	25	0	1.0	-1	48	-17	iv	iv	Soya paste	PHL		
12		Castor oil seed	20	10	1.2	-1	4	-34	iii	iii				
13		Sunflower seed	18	10	1.1	8	18	-15	iii	iv				
14		Seed cotton	12	-22	0.2	—	9	2	iv	iv			Oil, cottonseed	BRN
15		Kapok fruit	6	-4	2.7	0	25	-4	iii	iii				
16	**13**	Asparagus	803	21	1.0	25	2	-30	ii	ii				
17		Peas, green	560	5	3.8	2	0	-7	i	i				
18		Eggplants (aubergines)	402	20	2.6	11	1	-13	i	i	Eggplants (aubergines)	MYS		
19		Chillies and peppers, green	388	-1	1.9	-4	1	3	i	i				
20		Garlic	313	9	0.9	-3	13	0	ii	ii				
21		Tomatoes	289	-2	1.2	-5	5	-2	i	i				
22		Cauliflowers and broccoli	282	-2	1.0	0	2	-14	i	i				
23		Onions, shallots, green	275	8	1.6	1	12	-7	i	i				
24		Cabbages and other brassicas	258	11	0.8	6	18	-15	ii	ii	Cabbages and other brassicas	MMR		
25		Onions, dry	254	-3	2.8	-3	2	0	i	i				
26		Pumpkins, squash and gourds	245	16	0.7	4	8	-13	ii	ii				
27		Taro (cocoyam)	238	3	1.4	-3	9	4	i	i	Flour, roots and tubers nes	MYS		
28		Vegetables, fresh nes	201	9	0.9	3	97	-4	ii	iv				
29		Vegetables, leguminous nes	196	0	0.9	-1	0	4	ii	iv				
30		Lettuce and chicory	190	-1	0.5	-6	4	0	ii	iv				
31		Potatoes	183	3	1.0	-1	8	-1	ii	iv	Tapioca, potatoes	PHL		
32		Maize, green	159	2	1.9	-2	30	0	i	iii	Sweet corn prep or preserved	MYS		
33		Roots and tubers, nes	135	5	2.8	2	16	3	iii	iii	Flour, roots and tubers nes	MYS		
34		Cucumbers and gherkins	129	4	0.9	-3	20	-3	iv	iv				
35		Cassava	49	5	1.1	-3	1,333	3	iii	iii				
36		Beans, green	38	4	0.3	-3	170	1	iv	iv	Beans, green	MYS		
37		Pulses, nes	32	5	1.4	0	97	3	iii	iii				
38		Beans, dry	20	2	0.5	-4	121	-3	iv	iv				
39	**14**	Grapes	706	-1	1.0	-2	4	1	ii	i				
40		Fruit, fresh nes	546	4	2.5	3	34	8	i	i				
41		Oranges	535	11	1.0	2	22	1	ii	i	Juice, orange, concentrated	KHM		
42		Lemons and limes	488	7	1.3	-4	15	-1	i	i				
43		Tangerines, mandarins, clementines, satsumas	400	8	3.0	-3	14	-18	i	i				
44		Fruit, citrus nes	362	20	0.5	4	3	2	ii	ii	Juice, citrus, single strength	MYS		
45		Grapefruit (inc. pomelos)	259	22	0.8	-2	28	-2	ii	ii				
46		Watermelons	234	21	1.0	2	13	-24	ii	ii				
47		Bananas	230	16	0.9	11	58	-15	ii	iv				
48		Pineapples	155	7	0.6	-3	86	-3	iv	iv	Pineapples canned	THA		
49		Mangoes, mangosteens, guavas	152	-1	1.0	0	392	5	iv	iii				
50		Papayas	149	19	0.6	9	6	-11	iv	iv				
51		Areca nuts	114	4	1.2	1	21	1	iii	iii				
52		Nuts, nes	107	4	2.4	0	13	-5	iii	iii	Nuts, prepared (exc. groundnuts)	MYS	Nuts, nes	SGP
53		Cashew nuts, with shell	63	4	1.0	-2	17	-7	iv	iv				
54		Fruit, tropical fresh nes	39	5	0.5	2	463	0	iv	iv				
55	**15**	Tea	1,465	13	3.6	8	11	-10	i	i	Tea	KHM		
56		Pepper (piper spp.)	717	5	3.1	-5	1	-23	i	i			Pepper (piper spp.)	PHL
57		Spices, nes	697	17	0.1	1	2	0	ii	ii	Spices, nes	KHM	Spices, nes	MMR
58		Ginger	582	8	1.2	2	10	1	i	ii				
59		Chillies and peppers, dry	278	4	2.6	5	83	3	i	iii				
60		Cocoa, beans	139	5	6.3	12	0	-27	iii	iii				
61		Coffee, green	57	3	0.7	-2	46	-6	iv	iv	Coffee, extracts	KHM		
62	**21**	Meat, pig	686	—	1.3	—	13	0	ii	ii	Meat, pig, preparations	KHM		
63		Meat, buffalo	280	—	1.5	—	2	1	i	i	Meat, beef and veal sausages	KHM		
64		Meat, cattle	115	—	0.8	—	17	9	ii	ii				
65		Meat, goose and guinea fowl	106	—	1.6	—	0	-2	i	i				
66		Meat, goat	80	—	2.0	—	0	4	iii	iii				
67		Meat, duck	70	—	1.5	—	7	-10	iii	iii				
68		Meat, sheep	49	—	1.4	—	0	-1	iii	iv				
69		Meat, chicken	31	—	1.2	—	274	5	iv	iv				
70	**22**	Milk, whole fresh cow	437	—	4.4	—	4	-2	i	i	Milk, whole fresh cow	KHM		
71	**23**	Eggs, other bird, in shell	124	—	1.1	—	21	4	ii	i				
72		Eggs, hen, in shell	64	—	1.1	—	50	2	iv	iv				

฿ = baht (Thai currency).

BRN = Brunei, FCL = FAOSTAT Commodity List, ha = hectare, IC2 = item category level 2, IDN = Indonesia, Intpn. = interpretation, KHM = Cambodia, MMR = Myanmar, MYS = Malaysia, nes = not elsewhere specified, p = p-value, PHL = Philippines, PU = unit of pig feed requirements, SGP = Singapore, THA = Thailand, VNM = Viet Nam, Yi = yield in Thailand, Yi' = average yield in other ASEAN countries.

Notes: 'Area' refers to the total harvested area, and 'producing animals' refers to the number of producing animals. Land/feed productivity, ratio of the yield, and area harvested/producing animals represent the average values for 2011–2015. 'Chg' refers to the average annual rates of change during 2006–2015 (%). The data on land productivity was deflated to constant 2015 baht prices. The figures are estimates based on all the FAOSTAT data provided under the 'Production' rubric. In the 'Intpn' column, the codes are as follows: i = both productivity and ratio of the yield are high; ii = productivity is high, but the ratio of the yield is low; iii = productivity is low, but the ratio of the yield is high; and iv = both productivity and ratio of the yield are low. The codes under 'A' reflect the median of the broader product categories in IC1 (item category level 1), and those under 'B' reflect

the median of the specific products in IC2 included here. Regarding the items imported in larger or smaller quantities compared with their prices (p<0.2), the names of the FCL items (classified according to the Broad Economic Categories) listed in the table are those with the smallest p-value < 0.2 estimated based on data during 2014–2016. Data category: FCL.
Source: Appendix 3.7.

Table 3.12 shows weak or non-existent correlations between the land/feed productivity and ratios of the yield of the FCL items in each IC2 grouping during 2011–2015. In other words, the profitability per unit area of FCL items was not necessarily high, even when they had a comparative advantage in terms of physical productivity within the ASEAN region.

Negative or non-existent correlations are observed between land/feed productivity or ratios of the yield and the extent of harvested areas or number of producing animals for all IC2 items other than oil and sugar crops (12). These results show that most of the land and producing animals in Thailand were simply not allocated to products that were characterized by high productivity or competitiveness.

Table 3.12. Correlation Matrix of Comparative Advantage, Productivity, and Resource Allocation, 2011–2015

	Land or feed productivity						Ratio of the yield					
IC2	11 Cereals	12 Oil and sugar crops	13 Vegetables	14 Fruits and nuts	15 Stimulants and spices	21 Meat	11 Cereals	12 Oil and sugar crops	13 Vegetables	14 Fruits and nuts	15 Stimulants and spices	21 Meat
Ratio of the yield	-0.30	0.01	0.39	0.38	0.04	0.05	—	—	—	—	—	—
Area or producing animals	0.60	0.83	-0.74	-0.25	-0.14	0.07	0.10	0.19	-0.35	-0.12	-0.36	-0.71
Obs.	5	10	23	16	7	8	5	10	23	16	7	8

IC2 = item category level 2.
Notes: 'Area' refers to the total harvested area, and 'producing animals' refers to the number of producing animals. This table uses Spearman's rank correlation coefficient of average values during 2011–2015. The values were estimated based on the data for items on the FAOSTAT Commodities List (FCL) relating to land/feed productivity, the ratio of the yield, and the number of producing animals and the land area they used. FCL items with correlation coefficients less than 4 were omitted. 'Obs.' refers to the number of FCL items. Data category: FCL.
Source: Author's calculations, see Appendix 3.7.

5. Summary

Social and Economic Conditions

- Although Thailand's population is large compared with those of the other ASEAN states, and the country show some strength as a consumer market, its poor prospect of population and economic growth suggests that foreign markets will become more important as destinations for its agri-food products.
- The VA of the wholesale and retail trade sectors has been a major component of Thailand's GDP; for instance, their total VA accounted for 21% of GDP in 2015. While the proportion of GDP due to the VA of most FVC-related industries shrunk for most of those industries, that due to the VA of the food and beverage industries gradually expanded.
- Interindustry transactions involving product flows from agriculture and fishing to the food and beverage industries increased. Transactions from fishing to the hotel and restaurant industries gradually increased, as did transactions from the food and beverage industries to the hotel and restaurant industries. The growth of intra-industry transactions within agriculture and within the food and beverage industries was observable, as well.

Linkages amongst FVC-related Industries

- Increases in final demand in downstream sectors of the FVC, particularly in the food and beverage industries, had some impact on the VA of upstream sectors. This result suggests that interventions to increase final demand in the food and beverage industries will contribute to the development of agriculture.
- The effects of downstream industries on the VA of fishing is notable, given that the size of the fishing sector is limited. Services from the wholesale and retail trade sectors are apparently essential for the FVC-related industries, and could induce to a significant degree the development of the hotel and restaurant industries. The development of wholesale and retail trade could thus sequentially affect production sectors of the FVC in Thailand.
- Production growth can accompany a rise in per capita employee compensation in many FVC-related industries, especially in the agricultural and fishing sectors.
- The food and beverage industries, which offered a higher per capita compensation than other FVC-related industries, and saw a sharp increase in the number of employees, seemed to be amongst the more attractive sectors with regard to labour absorption, although the size of their workforce was actually very limited.

Supply–Demand Balance of Agri-food Products

- The agri-food industry in Thailand was characterized by a large amount of domestic production and consumption, as well as exports. Oil and sugar crops, vegetables, and cereals were largely produced by and supplied to the domestic market. Oil and sugar crops (mainly sugar cane) were imported for processing and mostly exported as sugar. Meanwhile, a significant amount of vegetables and cereals were directly exported.
- The export prices of aquatic products—such as raw and processed crustaceans; processed aquatic animals, nei; molluscs; and processed freshwater fishes—were remarkably high. We can conclude

that raw and processed crustaceans exported in large amounts had enough value to induce active trade. By contrast, high-price processed food, nei, seemed to be a valuable import for Thailand.

The Competitiveness of Each Product in the ASEAN region

- Thai vegetable products in the low- and mid-price ranges—such as fruits and nuts, including dried fruits and stone fruits, nes—tended to be imported in great quantities into the ASEAN region, considering their prices. In the livestock products category, dairy products such as fresh whole cow's milk and yogurt were imported in large quantities. Similarly, aquatic products and processed food, nei—including salmons/trouts/smelts, tunas/bonitos/billfishes, refined sugar, and short margarine—were imported in significantly larger quantities than expected based on their import prices.
- Research on the characteristics of the goods actively exported by other ASEAN countries to Thailand might trigger a reconsideration of production marketing strategies for domestic products that could compete with goods produced by other states in the ASEAN region, for instance: cinnamon and coconuts from Indonesia; pepper and miscellaneous freshwater fishes from Viet Nam; pearled barley from Lao PDR; soybeans from Cambodia; and fructose, syrup, and homogenized and other prepared meats from Singapore.
- In the category of stimulants and spices, tea and pepper had comparatively high land productivity and ratios of the yield. In the vegetable products category, productivity and the ratios of the yield of several vegetables—such as green peas, eggplants, and dried onions—outstripped those of the other products. Similarly, fresh whole cow's milk and pork had higher feed productivity and ratios of the yield than the other livestock products. The potential of these products as exports to other ASEAN countries could be high if they became competitive with the same products from those other countries by means of greater physical productivity.

Chapter 4

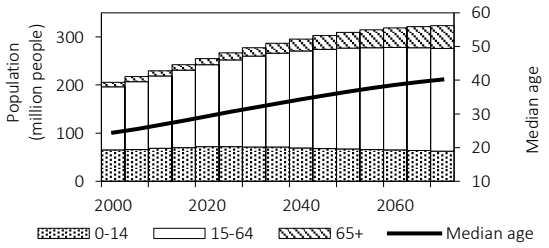
Indonesia

1. Social and Economic Conditions

Population and Per Capita GDP

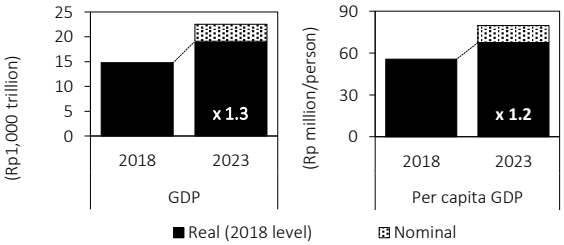
The population of Indonesia, 267 million people in 2018, accounts for 41% of the total population of the ASEAN region, placing it first amongst the ASEAN countries. It is expected to reach 322 million by 2050 (Figure 4.1). The working-age people, those between 15 and 65, are the majority of the country's population, and their numbers are expected to increase steadily until 2060. This trend may imply long-term economic growth. Indonesia's overwhelmingly large population and its strong prospect of population and economic growth suggest that the country has a high potential as a consumption market for agri-food products.

Figure 4.1. Population by Age Group, 2060



Source: United Nations Department of Economic and Social Affairs (UN DESA, 2017).

Figure 4.2. Changes in GDP and Per 2000 Capita GDP, 2018 and 2023

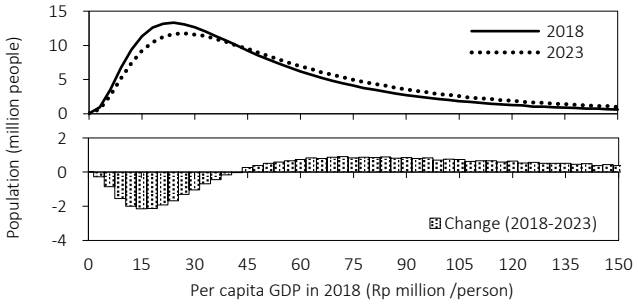


Rp = rupiah (Indonesian currency).
GDP = gross domestic product,
Source: Estimates based on data from the International Monetary Fund (IMF, 2018).

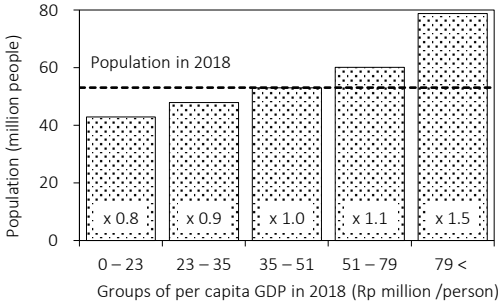
Real GDP and per capita real GDP are expected to increase steadily by 1.3 times and 1.2 times, respectively, from 2018 to 2023 (Figure 4.2). According to a projection of Indonesia's population based the level of per capita GDP (Figure 4.3, Appendix 3.1), as per capita GDP approaches Rp45 million, a boundary is crossed whereby the number of people whose annual contributions to GDP are below that value will decrease. By contrast, the number of people with per capita GDP over Rp45 million will increase across the wide range of the distribution. In particular, the population with personal incomes above Rp79 million (i.e. the 80th percentile) will expand by 1.5 times by 2023. This projection implies a rapid increase in the number of high-income people. It will thus be necessary to establish a system for supplying agri-food products to match the demand from this rapidly growing upper-income bracket.

Figure 4.3. Estimated Population of Indonesia by Per Capita GDP, 2018 and 2023

A. Distribution of Population Changes



B. Population Divided into Five GDP Groups



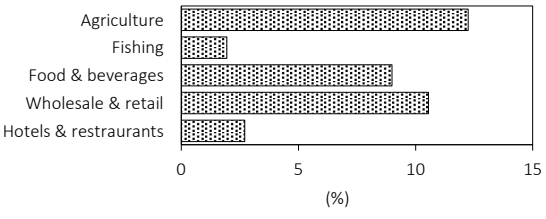
Rp = rupiah (Indonesian currency).
GDP = gross domestic product.
Note: The per capita GDP is based on constant 2018 prices. The bars in Figure B show the estimated populations of the GDP groups in 2023. The numbers in the bars show the changes in these populations from 2018 to 2023.
Source: Appendix 3.1.

The VA of FVC-related Industries

The VA of the agriculture, food-and-beverage, and wholesale and retail trade industries has been a major component of Indonesia's GDP; for instance, the VA of each amounted to about 10% of GDP in 2015 (Figure 4.4). Meanwhile, the VA of the fishing and hotel-and-restaurant industries was very limited.

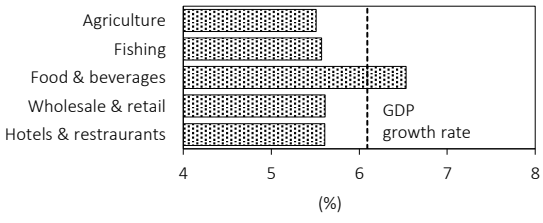
The annual growth rates of real VA in the FVC-related industries averaged around 5.5% during 2000–2015, which was lower than the average GDP growth rate; the one exception was the average rate for the food and beverage industries, which was 6.5% (Figure 4.5). While the proportion of GDP due to the VA of most FVC-related industries shrank, that due to the VA of the food and beverage industries gradually expanded.

Figure 4.4. The Proportion of VA in GDP, 2015



GDP = gross domestic product, VA = value added.
Sources: Estimates based on data from Eora (2018) and the Internatioanl Monetary Fund (IMF, 2018).

Figure 4.5. Average Annual Change in Real VA, 2000–2015

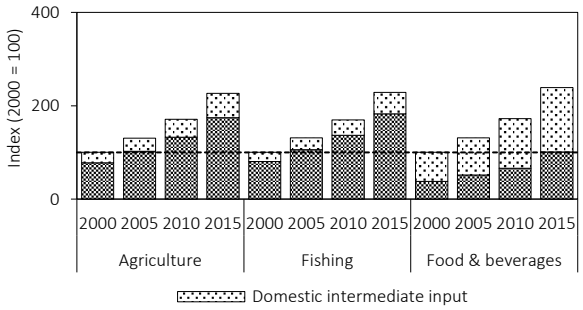


GDP = gross domestic product, VA = value added.
Sources: Estimates based on data from Eora (2018).

The production values of the agriculture, fishing, and food-and-beverage industries increased consistently, more than doubling from 2000 to 2015 (Figure 4.6). The part of production value due to the VA (i.e. the VA rate) was large in the agriculture and fishing industries, at around 80%, but smaller in the food and beverage industries, at around 40% (Figure 4.7). The food and beverage sector depended on intermediate inputs from within this sector and from other, related sectors; and production in the food and beverage sector would generally induce more production within that sector, and in related sectors, than it would in agriculture and fishing.

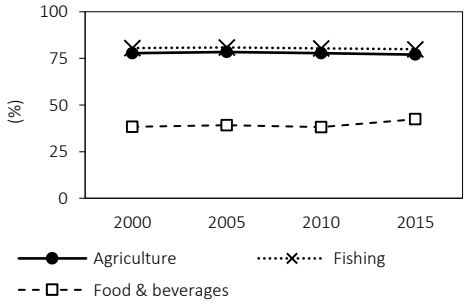
The VA rates of the agriculture, fishing, and food-and-beverage industries remained almost flat between 2000 and 2015. This may reflect the fact that the production structure stayed the same in terms of the sales-cost rates of products, the efficiency of the product mix, and/or the ability of technology to generate savings on inputs.

Figure 4.6. Values of Domestic Production, 2000–2015



Note: The results in the figure are based on real values.
Sources: Estimates based on Eora (2018) and the International Monetary Fund (IMF, 2018).

Figure 4.7. VA Rates, 2000–2015



VA = value added.
Sources: Estimates based on data from Eora (2018).

Intermediate Inputs in Agri-food Industries

Figure 4.8 shows which industries contributed to the growth of the agriculture, fishing, and food-and-beverage industries from 2000 to 2015. Intermediate inputs into all three agri-food production sectors came largely from domestic industries, and steadily increased during that period. Simultaneously, a certain value of intermediate inputs into the fishing industry was imported.

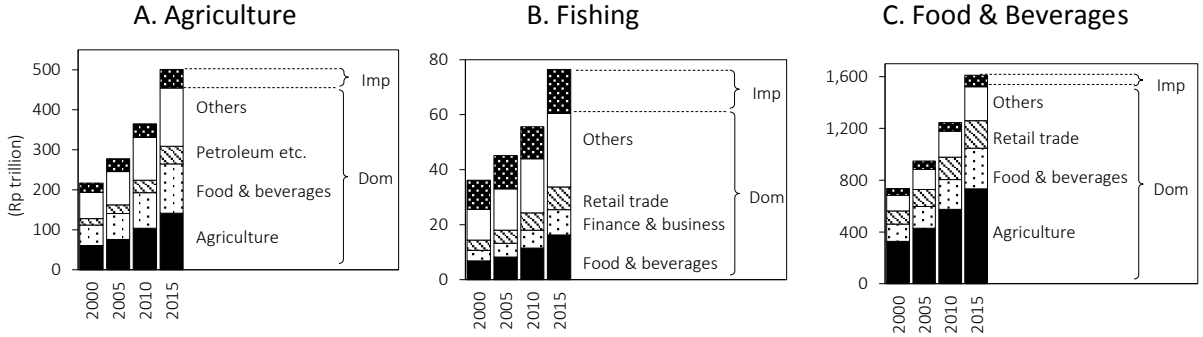
Intermediate inputs from agriculture accounted for the largest portion of inputs into agriculture, followed by inputs from the food-and-beverage and petroleum, chemical, and non-metallic mineral products ('petroleum etc.') industries.[1] The largest sources of inputs for the fishing industry were the food and beverage industries, and the largest source of inputs in the food and

[1] Table A2.1, in Appendix 2, shows the industry classifications mentioned in this section, including 'petroleum etc.' One major input from the petroleum etc. industry was fuel oil, which was needed for agriculture and for the production of chemical fertilizers.

beverage industries was agriculture. Feed for livestock and fish production can be considered an example of input goods from the food and beverage industries into agriculture and fishing.

Agriculture was by far the largest source of intermediate inputs into the food and beverage industries, especially by 2015 (Figure 4.8 C). This implies that growth in the food and beverage industries was mainly driven by the production of raw agricultural products, not by the production of processed foods. The growth of the food and beverage industries in Indonesia induced the development of agriculture through the industries' demand for intermediate inputs.

Figure 4.8. Sources of Intermediate Inputs, 2000–2015

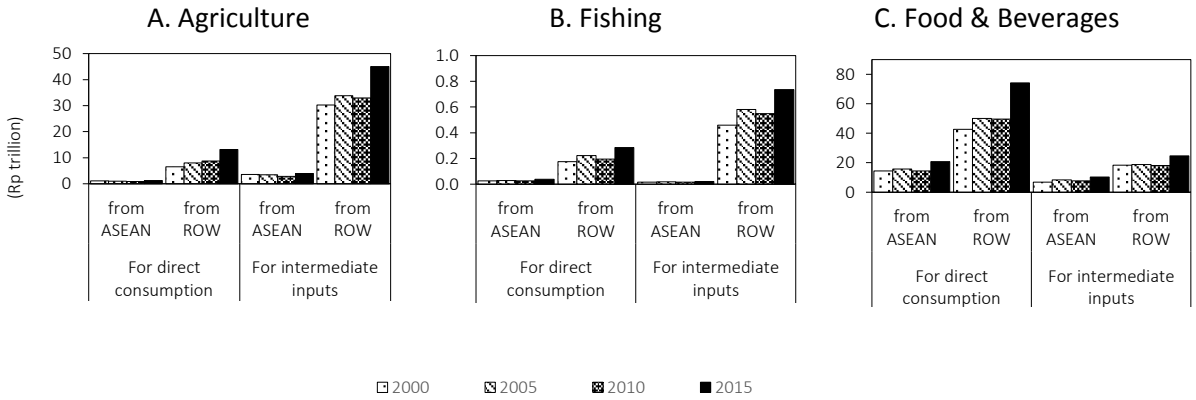


Rp = rupiah (Indonesian currency).
Dom = domestic supply, Imp = imports.
Notes: The values in these graphs are based on constant 2015 prices. 'Petroleum etc.' refers to the petroleum, chemical, and non-metallic mineral product industries.
Sources: Estimates using data from Eora (2018) and the International Monetary Fund (IMF, 2018).

The value of imports from foreign agricultural, fishing, and food-and-beverage sectors slightly increased between 2000 and 2015, though they remained limited compared with the value of products supplied by the domestic market (Figure 4.9). The volume of imported agricultural and fishery products for use as intermediate inputs was larger than that destined for direct consumption. Conversely, imported food-and-beverage products were generally destined for direct consumption. Put briefly, Indonesia imported agricultural and fishery products mainly for processing, and food and beverage products mainly for direct consumption.

Imports from other ASEAN countries were small and stagnant compared with those from the ROW. We can see from Figure 4.9 that, during 2000–2015, Indonesia gradually strengthened its linkages with the ROW as an importer, rather than deepening its integration into the ASEAN region.

Figure 4.9. Values of Imports, by Purpose, 2000–2015

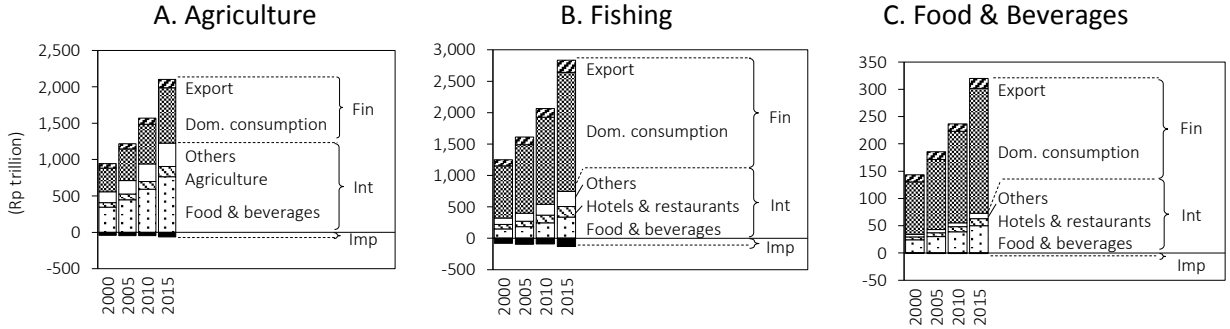


Rp = rupiah (Indonesian currency).
ASEAN = Association of Southeast Asian Nations, ROW = rest of the world.
Notes: The values of imports shown in these graphs are based on constant 2015 prices. They include imports from foreign agricultural, fishing, and food-and-beverage sectors destined for domestic final consumption and for use as intermediate inputs in all domestic industries.
Sources: Estimates based on data from Eora (2018) and the International Fund (IMF, 2018).

Destinations of Products of Agri-food Industries

Interindustry transactions involving flows of products from agriculture and fishing to the food and beverage industries increased during 2000–2015 (Figure 4.10). The flows from fishing to the hotel and restaurant industries, and from the food-and-beverage industries to the hotel-and-restaurant industries, gradually increased. The expansion of intra-industry transactions within agriculture and within the food and beverage industries is observable, as well. The FVC grew steadily in Indonesia with regard to both interindustry and intra-industry transactions.

Figure 4.10. Destinations of Domestically Produced and Imported Goods, 2000–2015

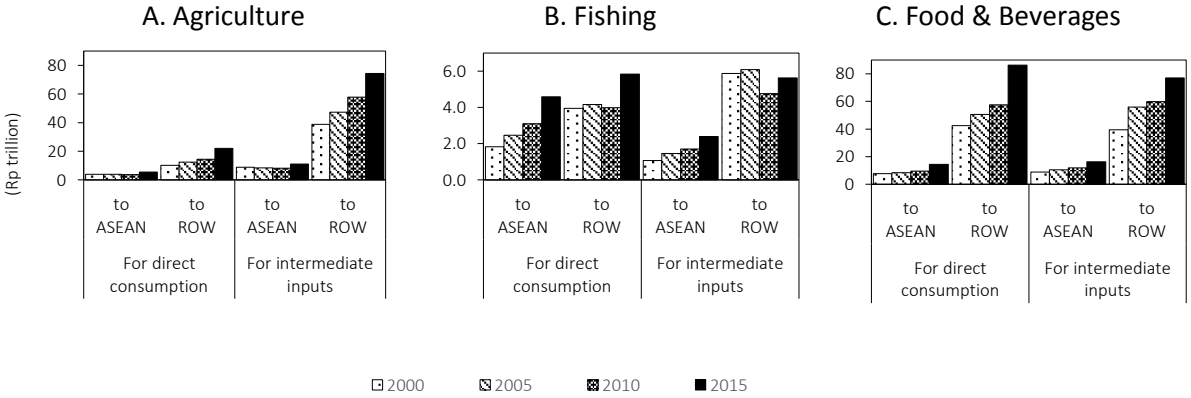


Rp = rupiah (Indonesian currency).
Dom. = domestic.
Notes: The values in these graphs are based on constant 2015 prices. 'Fin' = final demand for domestic and imported goods, 'Int' = intermediate demand for domestic and imported goods, and 'Imp' = the imports of final and intermediate goods. Total demand = Fin + Int. Domestic production = Fin + Int - Imp.
Sources: Estimates based on data from Eora (2018) and the International Monetary Fund (IMF, 2018).

Both final and intermediate demand grew in the agriculture, fishing, and food-and-beverage industries during 2000–2015. Exports gradually increased, although their share of final demand remained small. Figure 4.11 shows that, during this period, most of the agricultural products exported from Indonesia were consumed as intermediate goods. Meanwhile, the exports from the fishing and food-and-beverage industries were almost evenly divided between direct consumption and intermediate inputs.

The primary destination of exports from the agricultural and food-and-beverage sectors was the ROW. Regarding these two sectors, Indonesia deepened its linkages more with the ROW (as an exporter) than with the rest of the ASEAN region. There was a notable exception, however: Indonesia's exports from its fishing industry to the other ASEAN countries increased rapidly, especially goods intended for direct consumption, which were approaching the level of the industry's exports to the ROW.

Figure 4.11. Values of Exports, by Purpose, 2000–2015



Rp = rupiah (Indonesian currency).
ASEAN = Association of Southeast Asian Nations, ROW = rest of the world.
Note: The values in these graphs are based on constant 2015 prices.
Sources: Estimates based on data from Eora (2018) and the International Monetary Fund (IMF, 2018).

2. Linkages amongst FVC-related Industries

Final Demand in FVC-related Industries

First, let us see how final demand for domestic FVC-related industries induces the use of intermediate inputs and affects production and VA in each industry.

Table 4.1 shows the composition of final demand during 2000–2015. Final demand was particularly strong in the food-and-beverage industries, followed by the agriculture and hotel-and-restaurant industries. The average annual growth of final demand in the food and beverage industries, Rp74 trillion, outstripped the average values for the other FVC-related industries, with household consumption accounting for most of that growth. In fact, household consumption grew sharply during this period, by Rp62 trillion annually. It should be noted that

the agriculture and hotel-and-restaurant industries also experienced large values and rapid growth of household consumption.

Table 4.1. Final Demand for Products/Services of FVC-related Industries, 2000–2015

(Rp trillion)

Final demand as	Domestic production of: Agriculture Value	Agriculture Change	Fishing Value	Fishing Change	Food & beverages Value	Food & beverages Change	Wholesale trade Value	Wholesale trade Change	Retail trade Value	Retail trade Change	Hotels & restraurants Value	Hotels & restraurants Change
Domestic consupmtion												
Household consumption	655	25	211	8	1,658	62	116	4	258	10	518	20
Other consumption	56	2	18	1	141	5	10	0	22	1	44	2
Capital formation	37	1	0	0	3	0	31	1	70	3	0	0
Export												
Export to ASEAN	17	0	7	0	31	1	7	0	15	1	8	0
Export to ROW	96	3	11	0	163	5	37	1	83	2	74	2
Total	861	31	247	9	1,996	74	201	7	448	16	645	23
Annual change rate (%)		5.5		5.5		5.6		5.5		5.5		5.5

Rp = rupiah (Indonesian currency).
ASEAN = Association of Southeast Asian Nations, FVC = food value chain, ROW = rest of the world.
Notes: The values in this table are in constant 2015 prices. 'Change' refers to the average annual changes estimated based on data for 2000–2015.
Source: Appendix 3.2.

Production and VA Induced by Final Demand

Table 4.2 shows sources of intermediate inputs during 2000–2015 that came from domestic and foreign industries, and were destined for use in production by major FVC-related industries in Indonesia. The table indicates that 21% of intermediate inputs into the hotel and restaurant industries came from the domestic food and beverage sector, and that 27% of inputs into the food and beverage sector came from domestic agriculture. This suggests that hotel-and-restaurant and food-and-beverage sectors can sequentially induce a large amount of agricultural production. The table also shows that the FVC-related industries in Indonesia rarely used inputs from foreign countries, compared with domestically sourced inputs.

The small increments of annual change in the shares of inputs shown in Table 4.2 indicate a stable input–output structure in Indonesia during 2000–2015. Even if the changing trends shown in the table continue for another 10 years, the structure will not radically change. However, a decrease in the share of inputs from agriculture in the food and beverage industries, and in the share of inputs from the food-and beverage industries in the hotel-and-restaurant industries, are relatively noticeable. These trends suggest a slow weakening of linkages between the food and beverage industries and upstream sectors, and a strengthening of linkages between the hotel and restaurant industries and upstream sectors.

Table 4.2. Sources of Intermediate Inputs in Major FVC-related Industries, 2000–2015

Input from		Domestic production of: Agriculture Share (%)	Agriculture Change	Fishing Share (%)	Fishing Change	Food & beverages Share (%)	Food & beverages Change	Wholesale trade Share (%)	Wholesale trade Change	Retail trade Share (%)	Retail trade Change	Hotels & restraurants Share (%)	Hotels & restraurants Change
Agriculture	Domestic	7	0.02	0	0.00	27	-0.07	0	0.00	0	0.00	9	0.02
	ASEAN	0	0.00	0	0.00	0	-0.01	0	0.00	0	0.00	0	0.00
	ROW	0	0.00	0	0.00	1	-0.02	0	0.00	0	0.00	0	0.00
Fishing	Domestic	0	0.00	2	0.01	2	-0.02	0	0.00	0	0.00	2	0.00
	ASEAN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	ROW	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Food & beverages	Domestic	6	0.03	5	0.03	11	0.01	0	0.00	0	0.00	21	0.09
	ASEAN	0	0.00	0	0.00	0	-0.01	0	0.00	0	0.00	0	0.00
	ROW	0	-0.01	0	0.00	1	-0.03	0	0.00	0	0.00	0	-0.01
Wholesale trade	Domestic	1	0.00	1	0.00	4	-0.02	0	0.00	0	0.00	6	0.00
	ASEAN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	ROW	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Retail trade	Domestic	2	0.00	3	0.00	8	-0.05	1	0.00	1	0.00	14	-0.01
	ASEAN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	ROW	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Hotels & restraurants	Domestic	0	0.00	0	0.00	0	0.00	2	0.00	2	0.00	0	0.00
	ASEAN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	ROW	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

ASEAN = Association of Southeast Asian Nations, FVC = food value chain, ROW = rest of the world.
Notes: 'Share' refers to the intermediate inputs as a percentage of total inputs in 2015. 'Change' refers to the average annual changes in the shares as estimated based on data for 2000–2015.
Source: Appendix 3.2.

Table 4.3 shows the VA directly and indirectly boosted by a 1% increase over the 2015 value of final demand for domestic products and services due to an increase in domestic production and intermediate inputs. For example, a 1% increase in final demand in the food and beverage sector generated a Rp5.1 trillion increase in the VA of agriculture, as well as a Rp9.5 trillion increase in the VA of the food-and-beverage sector itself.

Increases in final demand in downstream sectors of the FVC, particularly in the food and beverage industries, had some impacts on the VA of upstream sectors. This result suggests that interventions in the food and beverage industry do contribute to the development of agriculture.

Final demand in downstream industries had only a limited effect on the VA of fishing, compared with their effect on the VA of agriculture. Increases in final demand in the downstream sectors did not necessarily translate into sequential growth in the fishing industry. In the short term, interventions to directly stimulate final demand in the fishing industry may be an efficient way for to boost growth in that industry. In the long term, it can also be an effective strategy for strengthening inter-sector linkages, by increasing the use of aquatic products in downstream sectors and making the input–output structure more conductive to the beneficial ripple effects.

The inducement effect of final demand in the wholesale and retail trade sectors on the other four sectors discussed above was very small in 2015, as is shown in Table 4.3. Meanwhile, Table 4.2 indicates that FVC-related industries, especially the hotel-and-restaurant and food-and-beverage sectors, indeed depended on inputs from the wholesale and retail trade sectors in 2000–2015. It is suggested that the services provided by the wholesale/retail trade sectors are necessary, but alone not sufficient, to automatically drive the development of the FVC-related industries.

Table 4.3. VA Induced by 1% Increase in Final Demand, 2015

(Rp trillion)

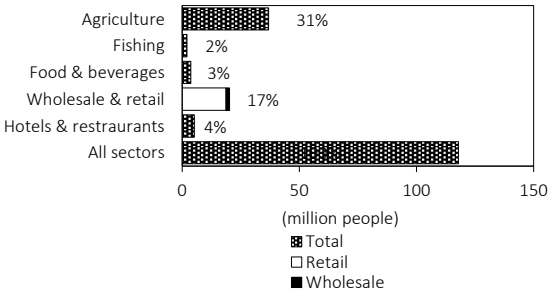
Induced value added in	1% increase in final demand for					
	Agriculture	Fishing	Food & beverages	Wholesale trade	Retail trade	Hotels & restraurants
Agriculture	7.12	0.04	5.07	0.01	0.03	0.85
Fishing	0.01	1.92	0.33	0.00	0.00	0.10
Food & beverages	0.27	0.06	9.46	0.01	0.02	0.67
Wholesale trade	0.07	0.03	0.64	1.40	0.03	0.35
Retail trade	0.17	0.06	1.41	0.03	3.15	0.77
Hotels & restraurants	0.01	0.00	0.04	0.02	0.04	2.76

Rp = rupiah (Indonesian currency).
VA = value added.
Source: Appendix 3.2.

The Relationship amongst the Number of Employees, Per Capita Compensation, and Production

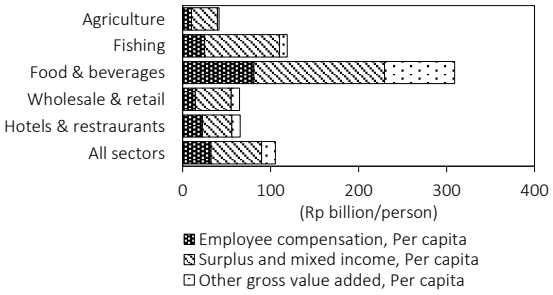
Now let us consider how an increase in production relates to changes in the number of employees and per capita employee compensation in an industry. According to figures 4.12 and 4.13, the agricultural sector in 2015 was characterized by a large number of employees, low labour productivity, and low per capita compensation compared with other FVC-related industries. By contrast, the food and beverage industries had a very limited number of employees, but much higher labour productivity and per capita compensation than the average values in Indonesia.

Figure 4.12. Number of Employees, by Sector, 2015



Rp = rupiah (Indonesian currency).
VA = value added.
Sources: International Labour Organization (ILO, 2019), Appendix 3.3

Figure 4.13. Gross VA per Capita, by Sector, 2015



Sources: Estimates based on data from Eora (2018)

Figure 4.14 illustrates the relationship amongst the number of employees, per capita compensation, and production in each agri-food sector during 2000–2015. Figure 4.14 A depicts the proportion of the average annual rate of change in production in each sector that was attributable to total employee compensation. In all the sectors, production growth averaged 5.5%, including a contribution of 1% from the increase in the total value of the compensation.

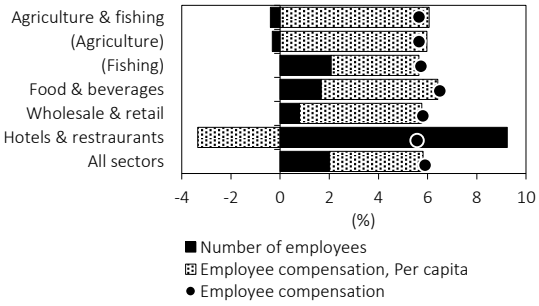
The annual rates of change in the total value of employee compensation averaged around 6% in all FVC-related sectors (Figure 4.14 B). Two factors determine the total value of employee compensation: the number of employees and per capita compensation. In the agricultural sector, the number of employees decreased, while there was an increase in per capita compensation. Although the growth rate of total compensation was similar to that of other industries, per capita compensation grew faster, accompanied by the decrease in the number of employees. Conversely, the hotel and restaurant industries showed a reduction in per capita compensation and a rise in the number of employees. In other sectors, both the per capita compensation and the number of employees, especially the former, steadily increased.

Those results suggest that production growth can accompany a rise in per capita compensation in many FVC-related industries, particularly in the agricultural sector. A particularly notable point is the decline in the number of employees in agriculture. The number of employees was still large; and that plus the sector's low labour productivity, low per capita compensation, and steep growth in per capita compensation, together with the decrease the size of the workforce, imply the existence of a labour surplus in the agricultural sector. Any interindustry movement of labourers would be deeply connected to the productivity and efficient development of agriculture. The food and beverage sector, which had a remarkably high per capita compensation, seems to have been an attractive sector in terms of labour absorption, although the number of employees was actually very limited and was increasing only slowly.

Figure 4.14. Changes in Production and Employee Compensation, 2000–2015

A. Breakdown of the Average Annual Rates of Change in Production

B. Breakdown of the Average Annual Rates of Change in Employee Compensation



Notes: Other factors include changes in the value added (VA), other than from employee compensation, and changes in intermediate inputs. The data is from selected years during 2000–2015.
Source: Appendix 3.3.

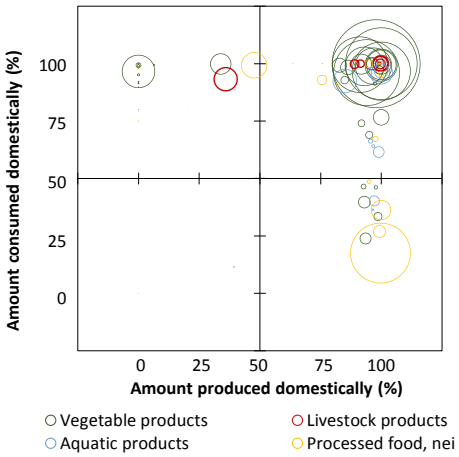
3. Supply–Demand Balance of Agri-food Products

Supply–Demand Structure

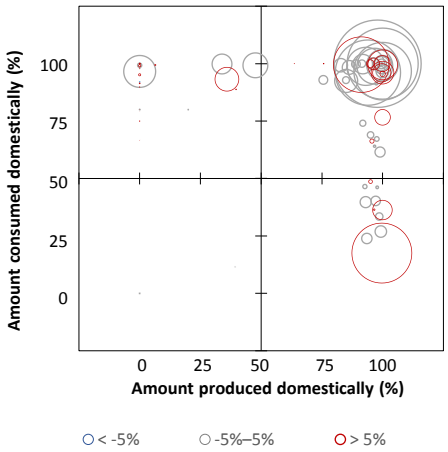
Figure 4.15 shows the structure of domestic commerce and foreign trade in 2004–2013. There are two graphs, each of which is divided into four quadrants defined by two criteria: whether agri-food goods were *produced* domestically or in foreign markets and whether they were *consumed* domestically or in foreign markets. In 4.15 A and 4.15 B, the circles are scattered across three of the four quadrants. The circles vary in size according to the volumes produced of the goods they represent. The pattern of circles is the same in both graphs, but the circles in Figure 4.15 A are colour-coded to indicate the agri-food sector, whilst those in Figure 4.15 B are colour-coded to reflect growth rates.

Figure 4.15. Classification of Agri-food Products, by Supply–Demand Balance, 2004–2013

A. By IC1 Group, Annual Averages



B. By Average Annual Growth Rate



IC1 = item category level 1, nei = not elsewhere included.
Notes: Each circle represents a Food Balance Sheet (FBS) item as designated by FAOSTAT. The sizes of the circles express the quantity of total supply, with the proportions estimated based on quantitative data. 'IC1' comprises the author's classifications of broad agri-food product categories (see Appendix 2.2). In these graphs, the percentage of goods not produced/consumed domestically are produced/consumed in foreign markets. Data classification: FBS items.
Sources: FAO (2019); Appendix 3.4.

The top side of each graph represents goods that were mostly or completely consumed domestically, and the right side represents goods that were mostly or completely produced domestically. Most of the agri-food products are concentrated in the first quadrant, on the upper right, representing goods that ere both produced and consumed in the domestic market (i.e. domestic-oriented goods). There are also large and medium circles in the second quadrant (upper-left), representing goods produced in foreign markets but consumed domestically (i.e. import-oriented goods), and in the fourth quadrant (lower right), representing goods produced domestically but consumed in foreign markets (i.e. export-oriented goods). There is one arely observable circle in the third quadrant (lower left), representing imported livestock products that are destined for re-exportation (i.e. trade-oriented goods). Unlike the corresponding figures

for Malaysia (Figure 2.15) and Thailand (Figure 3.15), Figure 4.15 has large circles concentrated mostly in the first quadrant. In addition, there are more products in the second and fourth quadrants than are seen in the same quadrants of the corresponding figures for Lao PDR (Figure 7.15), Cambodia (Figure 8.15), and Myanmar (Figure 9.15). The supply–demand structure of Indonesia's agri-food sector is similar to that in the Philippines, but with more products falling into the fourth (export-oriented) quadrant than seen in the corresponding graph for the Philippines (Figure 5.15).

Table 4.4 shows that, during 2004–2013, most agri-food products, in particular, cereals (11), oil and sugar crops (12), and vegetables (13), were produced and consumed mainly in the domestic market. A comparatively large amount of cereals was imported, followed by vegetables, sugar (41), and milk (22). Exports of fat and oils (42), mainly consisting of palm oil, were relatively large. The second largest exports were stimulants and spices (15), and the third, vegetables. One of the characteristics of Indonesia was the large production and domestic supply of cereals and marine fishes (32), exceeding those of all the other ASEAN countries featured in this report.

Annual change data indicates a rapid expansion in the production and importation of cereals and a corresponding growth in domestic supply. A similar structure is observed for oil and sugar crops and vegetables. Aquatic plants (36) are conspicuous for their steep increase in production and domestic supply. Fat and oils accounted for the large part of the increase in exports of agri-food products. The surging export demand for fat and oils seems to have spurred the sharp increase in agri-food production.

Table 4.4. Supply–Demand Balance of Agri-food Products, 2004–2013

(1,000 metric tons)

IC1	IC2	2004–2013 average				Average annual change, 2004–2013			
		Production	Domestic supply	Import	Export	Production	Domestic supply	Import	Export
1 Vegetable products	11 Cereals	56,805	63,568	8,324	289	2,376	2,629	624	5
	12 Oil and sugar crops	52,634	53,758	1,797	738	809	855	110	45
	13 Vegetables	34,889	36,177	2,288	1,077	996	1,335	276	-105
	14 Fruits and nuts	16,527	16,473	664	718	275	316	46	5
	15 Stimulants and spices	2,024	918	159	1,259	12	13	16	37
2 Livestock products	21 Meat	3,068	3,163	102	9	137	139	2	0
	22 Milk	1,132	2,938	2,020	214	73	191	100	-17
	23 Eggs	1,296	1,301	5	0	39	40	0	0
3 Aquatic products	31 Freshwater fishes	1,880	1,811	7	75	206	208	0	-2
	32 Marine fishes	4,274	4,125	487	636	107	131	48	24
	33 Crustaceans	684	425	7	266	26	19	0	7
	34 Molluscs	188	128	8	68	10	1	1	9
	35 Aquatic animals, nei	25	9	1	16	5	3	0	1
	36 Aquatic plants	2,881	2,769	2	113	606	594	0	12
4 Processed food, nei	41 Sugar	2,344	4,064	2,266	64	3	84	179	6
	42 Fat and oils	22,925	5,019	130	18,060	1,974	414	12	1,580
	43 Food, nei	0	5	8	2	0	0	1	0
	44 Alcoholic beverages	235	228	3	10	16	17	0	-1

IC1 = item category level 1, IC2 = item category level 2, nei = not elsewhere included.

Note: 'IC1' and 'IC2' comprise the author's classifications of broader product categories and more specific groups, respectively (Appendix 2.2). This table is based on an aggregation of all the data available from FAOSTAT's Food Balance Sheet (FBS). Data classification: FBS items.

Sources: FAO (2019); Appendix 3.4.

Table 4.5 shows FBS items (as designated by FAOSTAT) listed in descending order of total supply quantity within each category in 2004–2013, corresponding to the quadrants in Figure 4.15. The products existing in large quantities—such as rice, sugar cane, and cassava—are concentrated in the column for domestic-oriented products. Most products are in the cells representing stable or expanding markets for domestic-, export-, or import-oriented products.

Maize and products, used for animal feed, are identifiable as domestic-oriented products by their large quantities of supply undergoing rapid growth. Palm kernels, aquatic products (such as aquatic plants and freshwater fishes), and poultry meat are also remarkable by the accelerated growth of their supplies. Palm oil and palm kernel oil are major export-oriented items, with rapid increases in supply. By contrast, milk is an example of an import-oriented product. Although their markets were comparatively stable, wheat and products, sugar, and soybeans (all import-oriented items) are conspicuous for their large quantities of supply.

Table 4.5. Total Quantities of Supply for Product Categories, in Descending Order, 2004–2013
(1,000 metric tons)

Category		Domestic-oriented			Export-oriented			Import-oriented			Trade-oriented		
Provided by		Domestic market			Domestic market			Foreign market					
Consumed in		Domestic market			Foreign market			Domestic market			Foreign market		
Change	Rank	IC2	FBS items	Quantity	IC2	FBS items	Quantity	IC2	FBS items	Quantity	IC2	FBS items	Quantity
Annual change rate, 2004–2013 (%) r > 5 Expanding	1	11	Maize and products	16,638	42	Palm oil	19,319	22	Milk - excluding butter	3,152			
	2	12	Palm kernels	4,864	42	Palmkernel oil	2,156	14	Grapes and products (excl wine)	44			
	3	36	Aquatic plants	2,882	42	Fats, animals, raw	104	11	Barley and products	43			
	4	31	Freshwater fish	1,886	35	Aquatic animals, others	26	13	Pulses, other and products	17			
	5	21	Poultry meat	1,472	12	Cottonseed	2	14	Dates	17			
-5 < r < 5 Stable	1	11	Rice (milled equivalent)	41,332	42	Coconut oil	868	11	Wheat and products	5,813	21	Meat, other	5
	2	12	Sugar cane	27,545	15	Cocoa beans and products	814	41	Sugar (raw equivalent)	3,594	44	Wine	0.2
	3	13	Cassava and products	23,329	15	Coffee and products	722	12	Soyabeans	2,363			
	4	12	Coconuts - incl copra	18,233	32	Marine fish, other	614	14	Apples and products	167			
	5	13	Vegetables, other	8,167	14	Nuts and products	401	42	Butter, ghee	14			
r < -5 Shrinking	1	44	Beverages, fermented	2				11	Cereals, other	13			
	2												
	3												
	4												
	5												

FBS = Food Balance Sheet (FAOSTAT), IC2 = item category level 2, r = average annual change rate.
Notes: The values in this table represent the averages for 2004–2013. Data classification: FBS items.
Sources: FAO (2019); Appendix 3.4.

Trade Prices and Volumes

The export prices of several categories of goods, such as aquatic products, particularly raw and processed crustaceans (33), and processed meat (21), were remarkably high during 2014–2016 (Table 4.6). Export values, as well as export prices, were relatively high for raw crustaceans. We can conclude that the raw crustaceans exported in large amounts had high enough values during this period to induce active trade.

The import prices of aquatic products, including raw freshwater fishes (31), raw marine fishes (32), raw and processed crustaceans (33), and raw aquatic plants (36), exceeded those of many other products. The high prices of raw eggs (23) and alcoholic beverages (44) were also conspicuous. The import values of most of these high-priced products were quite small. Overall, the export and import prices of processed products tended to be higher than those of primary products, except for some items such as eggs, sugar, and several aquatic products.

Table 4.6. Prices and Values of Exported/Imported Agri-food Products, 2014–2016

IC1	IC2	Price ($/kg)				Value ($ million)			
		Export		Import		Export		Import	
		Primary products	Processed products	Primary products	Processed products	Primary products	Processed products	Primary products	Processed products
1 Vegetable products	11 Cereals	0.4	2.0	0.3	0.6	2	550	2,358	723
	12 Oil and sugar crops	0.4	1.8	0.6	1.6	240	27	1,341	48
	13 Vegetables	0.5	1.2	0.8	1.4	107	23	601	113
	14 Fruits and nuts	1.1	1.2	1.5	1.5	437	225	742	72
	15 Stimulants and spices	2.8	2.8	2.2	4.7	2,176	770	353	240
2 Livestock products	21 Meat	—	4.1	—	4.0	0.0	30	0.0	407
	22 Milk	1.1	2.4	2.9	2.8	27	59	29	990
	23 Eggs	—	—	10.0	5.4	0.0	0.0	1	8
3 Aquatic products	31 Freshwater fishes	1.8	3.4	8.5	4.7	49	127	10	9
	32 Marine fishes	5.1	3.0	9.2	1.1	73	644	1	116
	33 Crustaceans	9.8	11.0	8.8	6.4	1,531	617	63	3
	34 Molluscs	2.3	3.5	1.6	2.1	224	15	7	0.2
	35 Aquatic animals, nei	1.8	3.5	—	2.5	18	106	0.2	44
	36 Aquatic plants	0.9	—	10.7	—	106	0.0	2	0.0
	38 Fishes, nei	2.2	1.8	5.8	1.5	108	455	0.5	28
4 Processed food, nei	41 Sugar	0.3	0.4	3.6	0.5	9	309	8	1,948
	42 Fat and oils	—	0.7	—	2.1	0.0	19,798	0.0	264
	43 Food, nei	—	2.6	—	3.7	0.0	673	0.0	559
	44 Alcoholic beverages	—	1.8	—	6.4	0.0	21	0.0	14

IC1 = item category level 1, IC2 = item category level 2, kg = kilogram, nei = not elsewhere included.
Notes: This table shows the averages for 2014–2016. The values indicated for exports are based on 'free on board' (FOB) prices, and those for imports are based on 'cost, insurance, and freight' (CIF) prices. Data category: IC2 groups based on the Broad Economic Categories (BEC) classifications of primary products (11) and processed products (12).
Sources: UNSD (2017); Appendix 3.6.

4. The Competitiveness of Each Product in the ASEAN Region

Commodities Imported by ASEAN Countries

Tables 4.7 and 4.8 provide information about the agri-food products imported by ASEAN countries from Indonesia in 2014–2016. ASEAN countries imported many of these products from Indonesia more cheaply than they did from other ASEAN+6 countries (Table 4.7). Roughly 60%–80% of items in the IC2 groups were imported as low-price products. Indonesia exported notably more goods to Malaysia than to the other ASEAN countries; its next-largest exports went to countries with similar values, other than Brunei and the CLM states (Table 4.8).

As shown in Table 4.7, Indonesian products that were imported by other ASEAN countries in significantly larger quantities than had been estimated (based on approximate lines) were concentrated in the low-price range. Examples of such products included crustaceans (33), stimulants and spices (15), and fishes, nei (38). Meanwhile, major products that were imported in lesser quantities than estimated (based on their prices) included cereals (11) in the low- and mid-price ranges; and food nei (43), fat and oils (43), and fruits and nuts (14) in the low-price range.

Table 4.7. Prices and Values of Products Imported by ASEAN Countries, by IC2 Group, 2014–2016

IC1	IC2	Price ($/kg)	Value ($ million)	Number of imported products by price ranges (%)			Number of products deviated from approx. lines (%)						Obs.
							Imported larger			Imported smaller			
				Price ranges			Price ranges			Price ranges			
				Low	Mid	High	Low	Mid	High	Low	Mid	High	
1 Vegetable products	11 Cereals	2.0	269	73	14	14	0	1	0	4	3	0	74
	12 Oil and sugar crops	1.9	135	63	20	16	2	0	0	2	0	0	49
	13 Vegetables	1.4	44	74	11	15	0	0	0	2	0	0	137
	14 Fruits and nuts	1.5	237	80	8	12	1	0	0	3	1	0	142
	15 Stimulants and spices	3.4	1,075	85	11	4	4	0	0	1	0	0	117
2 Livestock products	21 Meat	4.8	0.4	60	30	10	0	0	0	0	0	0	20
	22 Milk	2.1	36	65	20	15	2	0	0	0	0	0	46
	23 Eggs	1.4	0.1	67	0	33	0	0	0	0	0	0	3
3 Aquatic products	31 Freshwater fishes	6.0	3	62	12	27	0	0	0	0	0	0	26
	32 Marine fishes	3.9	153	76	14	10	2	0	0	2	0	0	58
	33 Crustaceans	7.7	85	76	15	10	5	2	0	0	0	0	41
	34 Molluscs	3.5	41	75	11	14	0	0	0	0	0	0	36
	35 Aquatic animals, nei	6.4	25	57	21	21	0	0	0	0	0	0	14
	36 Aquatic plants	2.7	9	80	20	0	0	0	0	0	0	0	5
	38 Fishes, nei	4.3	220	77	6	16	3	0	0	0	0	0	31
4 Processed food, nei	41 Sugar	1.4	128	74	12	14	0	0	0	2	0	0	50
	42 Fat and oils	1.2	1,791	83	8	9	0	0	0	5	0	0	65
	43 Food, nei	3.6	412	80	20	0	0	0	0	7	0	0	15
	44 Alcoholic beverages	3.1	2	60	20	20	0	0	0	0	0	0	10

ASEAN = Association of Southeast Asian Nations, IC1 = item category level 1, IC2 = item category level 2, kg = kilogram, nei = not elsewhere included.

Notes: The prices and values represent the averages for 2014–2016. 'Price' refers to the import price, including cost, insurance, and freight (CIF) added to the tariff established by the ASEAN *Trade* in Goods Agreement (ATIGA). 'Value' refers to the imported value (CIF) without the tariff. See Appendix 3.6 for price ranges and approximate lines. The products for which the externally studentized residual was significantly large or small at the 10% level were counted. 'Obs.' refers to the number of detailed commodities classified according to the Broad Economic Categories (BEC) three-digit category numbers and used for applying approximation lines. Data category: FAOSTAT Commodity List (FCL) and adjusted groups under the International Standard Statistical Classification of Aquatic Animals and Plants (ISSCAAP), classified under BEC 111, 112, 121, and 122.

Sources: UNSD (2017); Appendix 3.6.

Table 4.8. Prices and Values of Products Imported into the ASEAN Region, by Country, 2014–2016

Importer	Price ($/kg)	Value ($ million)	Number of imported products by price ranges (%)			Number of products deviated from approx. lines (%)						Obs.
						Imported larger			Imported smaller			
			Price ranges			Price ranges			Price ranges			
			Low	Mid	High	Low	Mid	High	Low	Mid	High	
Singapore	2.5	836	84	8	8	1	0	0	0	4	0	205
Brunei	3.0	19	63	20	16	0	0	0	0	1	0	93
Malaysia	1.7	1,868	86	6	8	2	0	0	0	0	0	216
Thailand	4.0	536	75	14	12	1	0	0	0	3	0	153
Indonesia	2.6	13	78	15	7	2	2	0	0	4	0	46
Philippines	1.7	506	68	13	20	2	1	0	0	0	0	87
Viet Nam	2.7	511	67	24	10	0	0	0	0	2	2	42
Lao PDR	3.7	0.0	33	33	33	0	0	0	0	0	0	3
Cambodia	2.1	8	58	17	25	0	0	0	0	0	0	36
Myanmar	1.9	0.0	52	21	28	0	0	0	0	0	0	58

ASEAN = Association of Southeast Asian Nations, kg = kilogram, nei = not elsewhere included.

Notes: The prices and values represent the averages for 2014–2016. 'Price' refers to the import price, including cost, insurance, and freight (CIF) added to the tariff established by the ASEAN *Trade* in Goods Agreement (ATIGA). 'Value' refers to the imported value (CIF) without the tariff. See Appendix 3.6 for price ranges and approximate lines. The products for which the externally studentized residual was significantly large or small at the 10% level were counted. 'Obs.' refers to the number of detailed commodities classified according to the Broad Economic Categories (BEC) three-digit category numbers and used for applying approximation lines. Data category: FAOSTAT Commodity List (FCL) and adjusted groups under the International Standard Statistical Classification of Aquatic Animals and Plants (ISSCAAP), classified under BEC 111, 112, 121, and 122.

Sources: UNSD (2017); Appendix 3.6.

Goods Imported in Smaller/Larger Quantities than Estimated Based on Prices: Non-price Competitiveness in the ASEAN Region

Indonesian vegetable products in the low- and mid-price ranges—especially stimulants and spices (15) such as cinnamon, cocoa powder/cake, and pepper—tended to be imported in great quantities by other ASEAN countries in 2014–2016, considering their prices (Table 4.9). Among the aquatic products, crustaceans (33) such as crabs, nei, and lobsters, and marine fishes (32) including sharks/rays/chimeras were imported in substantial quantities. Malaysia imported a great amount of processed food from Indonesia, particularly fat and oils (42) in the low-price range for industrial use. It might be beneficial to seek opportunities to develop further export markets for these products. Moreover, research on the causes of such active import demand, including production and sales methods, would help identify pathways toward increasing the sales of other items.

Research on the characteristics of the goods actively exported by other countries to Indonesia might also trigger a reconsideration of production and marketing strategies for domestic products that could compete with goods produced by other states in the ASEAN region, for instance: stone fruits from Thailand, green coffee from Viet Nam, and dried beans from Myanmar.[2]

There were also many products for which the import quantities were significantly smaller during 2014–2016, considering their prices, such as vegetable products in all the price ranges; aquatic products in the low- and high-price ranges; and processed food, nei, in the low-price range. Although these products were certainly exported to other ASEAN countries, they might not have been as competitive as the same products from other ASEAN and +6 countries. If these items are to be promoted as export goods destined for other ASEAN countries, active and intensive product differentiation will be necessary.

[2] For reference, see tables 2.9 to 9.9. See also Table A4.2 on major exports from the +6 countries.

Table 4.9. Goods Imported by ASEAN Countries in Smaller/Larger Quantities than Estimated Based on Prices, in Ascending Order of P-values, 2014–2016

A. Larger Quantities of Imports than Estimated Based on Prices

IC1	Rank	Price ranges																					
		Low							Mid							High							
		Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value
1 Vegetable products	1	SGP	14	112	Areca nuts	1.4	18	0.03	PHL	11	122	Cereals, breakfast	2.5	35	0.03								
	2	THA	15	112	Cinnamon (canella)	2.4	4	0.05	MYS	15	112	Pepper (piper spp.)	10.6	12	0.16								
	3	IDN	15	112	Nutmeg, mace and cardamoms	10.7	0.6	0.05	SGP	15	112	Pepper (piper spp.)	11.3	69	0.19								
	4	MYS	15	121	Cocoa, powder and cake	2.2	88	0.06															
	5	THA	12	111	Coconuts	0.3	30	0.07															
2 Livestock products	1	PHL	22	122	Ice cream and edible ice	3.6	2	0.10															
	2																						
	3																						
	4																						
	5																						
3 Aquatic products	1	MYS	33	112	Crabs, nei	3.0	10	0.06	IDN	33	122	Shrimps, prawns	7.7	0.4	0.07	IDN	38	122	Fish and fish products, nei	4.3	0.8	0.12
	2	MYS	32	112	Sharks, rays, chimaeras	10.6	0.3	0.06	VNM	32	122	Tunas, bonitos, billfishes	6.5	12	0.14								
	3	SGP	33	112	Lobsters, spiny-rock lobsters	7.9	0.9	0.09															
	4	MYS	38	112	Fish and fish products, nei	2.8	82	0.10															
	5	MYS	32	122	Sharks, rays, chimaeras	1.7	0.5	0.11															
4 Processed food, nei	1	MYS	42	121	Oil, palm	0.6	432	0.13															
	2	MYS	42	121	Oil, coconut (copra)	1.2	160	0.14															
	3	MYS	42	121	Cocoa, butter	1.2	45	0.15															
	4	MYS	42	121	Fat, nes, prepared	0.7	152	0.15															
	5	MYS	42	121	Oil, palm kernel	1.0	211	0.18															

B. Smaller Quantities of Imports than Estimated Based on Prices

IC1	Rank	Price ranges: Low — Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Mid — Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	High — Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value
1 Vegetable products	1	THA	11	122	Rice, milled/husked	0.7	0.000	0.00	SGP	11	121	Flour, maize	1.9	0.000	0.04	BRN	13	112	Mushrooms and truffles	12.2	0.000	0.12
	2	IDN	11	121	Flour, wheat	0.6	0.097	0.03	MYS	14	122	Fruit, cooked, homogenized preparations	3.2	0.002	0.05	MMR	13	112	Sweet corn frozen	1.3	0.004	0.13
	3	VNM	15	122	Coffee, roasted	5.4	0.000	0.04	VNM	11	122	Mixes and doughs	2.7	0.001	0.06	MYS	13	112	Potatoes, frozen	1.7	0.000	0.15
	4	BRN	14	112	Mangoes, mangosteens, guavas	3.3	0.000	0.06	VNM	12	122	Soya sauce	2.0	0.006	0.13	MMR	14	122	Juice, apple, concentrated	2.0	0.003	0.17
	5	THA	14	122	Juice, fruit nes	0.5	0.001	0.07														
2 Livestock products	1	PHL	22	122	Milk, whole evaporated	0.6	0.009	0.11														
	2																					
	3																					
	4																					
	5																					
3 Aquatic products	1	SGP	32	122	Cods, hakes, haddocks	4.0	0.000	0.01								THA	34	122	Clams, cockles, arkshells	7.0	0.000	0.16
	2	THA	32	112	Flounders, halibuts, soles	1.1	0.000	0.12								PHL	38	122	Fish and fish products, nei	6.7	0.000	0.16
	3	MYS	34	112	Oysters	2.1	0.002	0.18														
	4																					
	5																					
4 Processed food, nei	1	THA	42	121	Oil, sesame	3.0	0.000	0.01														
	2	IDN	42	121	Fat, nes, prepared	1.5	0.002	0.03														
	3	SGP	42	121	Oil, sesame	2.0	0.000	0.04														
	4	THA	43	122	Infant food	6.5	0.000	0.05														
	5	SGP	41	121	Fructose and syrup, other	1.0	0.000	0.07														

BEC = Broad Economic Categories, United Nations Statistics Division (UNSD), BRN = Brunei, IC1 = item category level 1, IC2 = item category level 2, IDN = Indonesia, kg = kilogram, MMR = Myanmar, MYS = Malaysia, nei = not elsewhere included, PHL = Philippines, SGP = Singapore, THA = Thailand, VNM = Viet Nam.

Notes: The values listed in this table represent the averages for 2014–2016. The top five agri-food products within each IC1 grouping are listed in ascending order of p-value < 0.2, under the BEC as follows: primary products mainly for industry (111), primary products mainly for household consumption (112), processed products mainly for industry (121), and processed products mainly for household consumption (122). 'Price' refers to the CIF (cost, insurance, and freight) import price added to the tariff set by the ASEAN *Trade* in Goods Agreement (ATIGA). 'Value' refers to the imported value (CIF) without the tariff. The expression 'p-value' refers to the p-value of the t-stat against the externally studentized residual. See Appendix 3.6. Data category: FAOSTAT Commodity List and the adjusted groups under the International Standard Statistical Classification of Aquatic Animals and Plants (ISSCAAP) classified under BEC 111, 112, 121, and 122.

Sources: UNSD (2017); Appendix 3.6.

Inter-commodity and Inter-country Comparisons of Land/Feed Productivity

The median land productivity of fruits and nuts (14) was the highest, followed by that of vegetables (13), in 2011–2015 (Table 4.10). The ratio of the yield is an indicator of comparative advantage within the ASEAN region, and this value for fruits and nuts exceeded that of every other IC2 group in the category of the vegetable products.

Table 4.10. Median Levels of Productivity and Resource Allocation in Each IC2 Group

IC1	IC2	Land productivity (Rp million/ha)	Chg (%)	Ratio of the yield Index (Yi/Yi')	Chg (%)	Area harvested (1,000 ha)	Chg (%)	Obs.
1 Vegetable products	11 Cereals	32	11	1.3	1	8,767	1	2
	12 Oil and sugar crops	13	-2	0.9	-1	485	1	8
	13 Vegetables	66	4	1.0	0	60	1	22
	14 Fruits and nuts	93	1	1.8	-1	102	1	13
	15 Stimulants and spices	10	-2	1.0	-2	143	2	9
	Total	50	2	1.1	0	104	1	54
IC1	**IC2**	**Feed productivity (Rp million/100 PU)**	**Chg (%)**	**Ratio of the yield Index (Yi/Yi')**	**Chg (%)**	**Producing animals (million PU)**	**Chg (%)**	**Obs.**
2 Livestock products	21 Meat	26	—	0.8	—	11	2	8
	22 Milk	10	—	1.5	—	12	4	3
	23 Eggs	60	—	0.9	—	65	2	2
	Total	29	—	1.0	—	12	3	13

Rp = rupiah (Indonesian currency).
ha = hectare, IC1 = item category level 1, IC2 = item category level 2, PU = unit of pig feed requirements, Yi = yield in Indonesia, Yi' = average yield in other ASEAN countries.
Notes: Land/feed productivity, ratio of the yield, and area harvested/producing animals represent the average values for 2011–2015. 'Chg' refers to the average annual rates of change during 2006–2015 (%). 'Obs.' refers to the number of items in the FAOSTAT Commodity List (FCL). The data on land productivity was deflated to constant 2015 rupiah prices. The figures are estimates based on all the FAOSTAT data under the 'Production' rubric. Data category: FCL.
Sources: FAO (2019); Appendix 3.7.

Within the category of fruits and nuts, tropical fruits (such as pineapples, bananas, papayas, and oranges) had comparatively high land productivity and ratios of the yield during the same period (Table 4.11). Pineapple's productivity and ratio of the yield sharply increased over this period. Furthermore, large quantities of pineapple juice (considering the high price) were imported by Singapore, indicating that it may have had high non-price competitiveness. Among the vegetable products, the productivity and the ratio of the yield of several vegetables (such as mushrooms and pumpkins/squash/gourds) and spices (15) (especially spices, nes) outstripped those values for the other products. Similarly, buffalo and cattle meat had high feed productivity and ratio of the yield, compared with those of other livestock products. Although the extent of harvested areas or number of animals involved in the production of the goods noted above were small, (except for those related to bananas and cattle), and were not necessarily increasing, the potential of these products as exports to other ASEAN countries could be high if they became competitive with the same products from those other countries by means of greater physical productivity.

As shown in the second column from the right in Table 4.11, which lists examples of products imported by other ASEAN countries from Indonesia during 2014–2016 in greater quantities than expected given their prices, many of these products apparently had non-price competitiveness or were differentiated from the same items produced in other ASEAN countries. Among these products were processed foods such as palm oil, pineapple juice, and ice cream, but most were primary products such as pepper, cinnamon, and green coffee under the IC2 group of stimulants and spices (15). The comparative advantage in terms of the physical productivity of those products, including major items such as

pepper and green coffee, was low in the ASEAN region. Maintaining or increasing non-price competitiveness is critically important for the international competitiveness of those products. As some products already have non-price competitiveness, that of other products should be actively improved in the interest of developing the FVC in Indonesia.

Table 4.11. Levels of Productivity and Resource Allocation for Individual Items

No.	IC2	FCL name	Land or feed productivity (Rp million/ha or Rp million/100 PU)	Chg (%)	Ratio of the yield Index (Yi/Yi')	Chg (%)	Area or producing animals (1,000 ha or million PU)	Chg (%)	Intpn. A	Intpn. B	Items imported larger or smaller compared with the price (p<0.2) Imported larger	in	Imported smaller	in
1	11	Rice, paddy	46	15	1.3	0	13,680	2	iii	ii				
2		Maize	19	7	1.3	2	3,854	1	iii	iii				
3	12	Sugar cane	28	-2	0.9	-3	455	1	iv	ii				
4		Oil, palm fruit	25	-1	0.9	-1	7,336	8	iv	i	Oil, palm	MYS		
5		Groundnuts, with shell	19	-2	0.9	-7	514	-4	iv	i				
6		Soybeans	13	4	1.1	4	594	1	iii	i				
7		Coconuts	11	-5	1.3	-1	3,011	1	iii	iii	Coconuts	THA	Oil, coconut (copra)	IDN
8		Castor oil seed	1	8	0.4	8	5	-6	iv	iv				
9		Seed cotton	1	-10	0.1	-17	7	-7	iv	iv				
10		Kapok fruit	—	—	0.4	0	165	2	—	—				
11	13	Mushrooms and truffles	303	-1	3.9	-6	1	4	i	i			Mushrooms, canned	SGP
12		Pumpkins, squash and gourds	224	10	2.7	7	10	-2	i	i				
13		Chillies and peppers, green	218	13	1.4	3	250	2	i	i				
14		Potatoes	138	4	1.1	-2	68	2	i	i				
15		Onions, dry	123	0	1.1	0	107	3	ii	i				
16		Carrots and turnips	118	5	1.2	-1	31	4	i	i				
17		Tomatoes	117	9	0.9	-1	57	1	ii	ii				
18		Garlic	109	2	1.1	1	2	-1	i	i				
19		Cabbages and other brassicas	106	4	1.0	-5	65	1	ii	ii				
20		Beans, green	77	14	3.8	3	123	-3	i	i				
21		Leeks, other alliaceous vegetables	66	1	1.5	2	57	1	i	i			Leeks, other alliaceous vegetables	SGP
22		Vegetables, fresh nes	56	4	0.9	-2	63	1	ii	iv				
23		Cassava	54	13	1.1	3	1,067	-3	i	iii				
24		Sweet potatoes	51	13	1.7	2	164	-2	i	iii				
25		Eggplants (aubergines)	48	10	1.0	2	50	0	iv	iv				
26		Cucumbers and gherkins	41	4	0.9	0	49	-3	iv	iv				
27		Spinach	17	5	0.3	-4	45	0	iv	iv				
28		Maize, green	15	4	0.5	2	96	1	iv	iv			Sweet corn frozen	MMR
29		Roots and tubers, nes	7	0	0.5	0	68	2	iv	iv				
30		Beans, dry	4	1	0.8	-3	232	-5	iv	iv				
31		Pulses, nes	2	1	0.6	0	2	1	iv	iv				
32		Cauliflowers and broccoli	—	—	0.7	-3	11	3	—	—				
33	14	Pineapples	421	6	4.2	4	15	-2	i	i	Juice, pineapple, concentrated	SGP		
34		Bananas	316	2	3.4	0	125	5	i	i				
35		Papayas	311	1	3.5	-4	11	3	i	i				
36		Oranges	241	-2	2.7	-3	51	-4	i	i			Juice, orange, concentrated	THA
37		Melons, other (inc.cantaloupes)	103	5	1.4	2	10	2	i	ii				
38		Fruit, fresh nes	93	1	2.0	3	102	0	i	i				
39		Avocados	93	1	3.4	2	23	5	i	i				
40		Mangoes, mangosteens, guavas	86	0	1.6	0	213	1	i	iv			Mangoes, mangosteens, guavas	BRN
41		Fruit, tropical fresh nes	83	0	1.8	-1	203	-2	i	iii			Fruit, tropical fresh nes	SGP
42		Watermelons	72	8	0.8	-1	34	2	ii	iv				
43		Areca nuts	5	0	0.5	-4	142	1	iv	iv	Areca nuts	SGP		
44		Nuts, nes	2	-1	0.3	-2	211	0	iv	iv	Nuts, nes	SGP		
45		Cashew nuts, with shell	2	10	0.1	-3	552	-1	iv	iv				
46	15	Spices, nes	285	1	11.5	1	5	-2	i	i				
47		Ginger	98	-2	1.3	-3	11	5	i	i				
48		Pepper (piper spp.)	34	5	0.2	4	172	-2	iv	ii	Pepper (piper spp.)	VNM		
49		Cinnamon (canella)	25	-4	2.4	-3	106	2	iii	i	Cinnamon (canella)	THA		
50		Coffee, green	10	1	0.3	-2	1,246	-1	iv	ii	Coffee, green	SGP		
51		Cocoa, beans	9	-6	1.3	9	1,753	7	iii	iii	Cocoa, powder and cake	MYS		
52		Nutmeg, mace and cardamoms	8	10	0.5	-5	143	10	iv	iv	Nutmeg, mace and cardamoms	IDN		
53		Tea	8	-5	0.7	-3	120	0	iv	iv				
54		Cloves	1	-3	1.0	1	473	8	iv	iii	Cloves	SGP		
55	21	Meat, pig	97	—	0.4	—	12	3	ii	ii				
56		Meat, buffalo	93	—	1.0	—	4	-1	i	i				
57		Meat, cattle	89	—	1.0	—	48	6	i	i				
58		Meat, sheep	29	—	0.8	—	10	-4	ii	i				
59		Meat, goat	24	—	0.4	—	20	1	iv	iv				
60		Meat, duck	20	—	0.7	—	7	2	iv	iv				
61		Meat, chicken	18	—	0.8	—	449	5	iv	iv				
62		Meat, horse	17	—	1.6	—	0	3	iii	iii				
63	22	Milk, whole fresh cow	47	—	1.0	—	12	4	i	ii	Ice cream and edible ice	PHL		
64		Milk, whole fresh goat	10	—	2.4	—	23	3	iii	i				
65		Milk, whole fresh sheep	8	—	1.5	—	11	5	iii	iii				
66	23	Eggs, other bird, in shell	63	—	1.0	—	16	3	i	i				
67		Eggs, hen, in shell	58	—	0.7	—	114	2	ii	iv				

Rp = rupiah (Indonesian currency).

BRN = Brunei, FCL = FAOSTAT Commodity List, ha = hectare, IC2 = item category level 2, IDN = Indonesia, Intpn. = interpretation, MMR = Myanmar, MYS = Malaysia, nes = not elsewhere specified, p = p-value, PHL = Philippines, PU = unit of pig feed requirements, SGP = Singapore, THA = Thailand, VNM = Viet Nam, Yi = yield in Indonesia, Yi' = average yield in other ASEAN countries.

Notes: 'Area' refers to the total harvested area, and 'producing animals' refers to the number of producing animals. Land/feed productivity, ratio of the yield, and area harvested/producing animals represent the average values for 2011–2015. 'Chg' refers to the average annual rates of change during 2006–2015 (%). The data on land productivity was deflated to constant 2015 rupiah prices. The figures are estimates based on all the FAOSTAT data provided under the 'Production' rubric. In the 'Intpn' column, the codes are as follows: i = both productivity and ratio of the yield are high; ii = productivity is high, but the ratio of the yield is low; iii =

productivity is low, but the ratio of the yield is high; and iv = both productivity and ratio of the yield are low. The codes under 'A' reflect the median of the broader product categories in IC1 (item category level 1), and those under 'B' reflect the median of the specific products in IC2 included here. Regarding the items imported in larger or smaller quantities compared with their prices ($p<0.2$), the names of the FCL items (classified according to the Broad Economic Categories) listed in the table are those with the smallest p-value < 0.2 estimated based on data during 2014–2016. Data category: FCL.
Source: Appendix 3.7.

Table 4.12 shows a positive correlation between the land productivity and ratios of the yield of vegetables (13) and fruits and nuts (14) during 2011–2015. In other words, the profitability per unit area of those FCL items tended to be high when they had a comparative advantage in terms of physical productivity within the ASEAN region. However, this was not true for products belonging to other IC2 groups.

Negative or non-existent correlations are observed between land/feed productivity or ratios of the yield and the extent of harvested areas or number of producing animals for all IC2 product groups other than oil and sugar crops (12). Such results show that most of the harvested land and producing animals in Indonesia were simply not allocated to products characterized by high productivity or competitiveness.

Table 4.12. Correlation Matrix of Comparative Advantage, Productivity, and Resource Allocation, 2011–2015

	Land or feed productivity						Ratio of the yield					
IC2	11 Cereals	12 Oil and sugar crops	13 Vegetables	14 Fruits and nuts	15 Stimulants and spices	21 Meat	11 Cereals	12 Oil and sugar crops	13 Vegetables	14 Fruits and nuts	15 Stimulants and spices	21 Meat
Ratio of the yield	—	0.32	**0.74**	**0.90**	0.32	-0.29	—	—	—	—	—	—
Area or producing animals	—	0.46	-0.14	**-0.71**	-0.57	0.10	—	**0.86**	-0.02	-0.61	-0.48	-0.36
Obs.	2	7	21	13	9	8	2	7	21	13	9	8

IC2 = item category level 2.
Notes: 'Area' refers to the total harvested area, and 'producing animals' refers to the number of producing animals. This table uses Spearman's rank correlation coefficient of average values during 2011–2015. The values were estimated based on the data for items on the FAOSTAT Commodities List (FCL) relating to land/feed productivity, the ratio of the yield, and the number of producing animals and the land area they used. FCL items with correlation coefficients less than 4 were omitted. 'Obs.' refers to the number of FCL items. Data category: FCL.
Source: Author's calculations, see Appendix 3.7.

5. Summary

Social and Economic Conditions

- The overwhelmingly large population of Indonesia and its strong prospect of population and economic growth suggest that the country has high potential as a consumption market for agri-food products.
- The VA of the agricultural, food-and-beverage, and wholesale/retail trade industries has been a major component of Indonesia's GDP; for instance, the VA of each accounted for about 10% of GDP in 2015. While the proportion of GDP due to the VA of most FVC-related industries shrank, that due to the VA of the food and beverage industries gradually expanded.
- Interindustry transactions involving product flows from agriculture and fishing to the food and beverage industries increased. Transactions from fishing to the hotel and restaurant industries gradually increased, as did transactions from the food and beverage industries to the hotel and restaurant industries. The growth of intra-industry transactions within agriculture and the food and beverage industries was observable, as well.

Linkages amongst FVC-Related Industries

- The increase in the final demand in downstream sectors of the FVC, particularly the food and beverage industries, had a positive impact on the VA of upstream sectors. This result suggests that interventions in the food and beverages industries do contribute to the development of agriculture.
- The effects of downstream industries on the VA of fishing was limited, compared with the effects on the VA of agriculture. It is also suggested that services from the wholesale and retail trade sectors were apparently necessary, but alone not sufficient, to automatically drive the development of the FVC-related industries.
- Production growth can accompany a rise in per capita employee compensation in many FVC-related industries, particularly in the agricultural sector.
- The food and beverages industries, which had remarkably high per capita compensation, seemed to be amongst the more attractive sectors with regard to labour absorption, although the number of employees in these industries was still very limited, and was increasing only slowly.

Supply–Demand Balance of Agri-food Products

- Most agri-food products—particularly cereals, oil and sugar crops, and vegetables—were produced and consumed mainly in the domestic market. A comparatively large amount of cereals was imported, followed by vegetables, sugar, and milk. The exportation of fat and oils, mainly consisting of palm oil, was remarkably large. The second-largest category of exports was stimulants and spices, and the third largest was vegetables. Even though cereals and vegetables are mainly produced/consumed at home, the little that's produced in foreign markets are in large enough volumes to rank high compared with other exports and imports. One of the characteristics of Indonesia was the large production and domestic supply of cereals and marine fishes, exceeding those of all the other ASEAN countries covered in this report.

- The export prices of several products—such as aquatic products, particularly raw and processed crustaceans, and processed meat—were remarkably high. We can conclude that raw crustaceans, which were exported in large amounts in spite of their high prices, must have had a high enough value to generate active trade.

The Competitiveness of Each Product in the ASEAN Region

- Indonesian vegetable products in the low- and mid-price ranges—especially stimulants and spices such as cinnamon, cocoa powder/cake, and pepper—tended to be imported in great amounts within the ASEAN region, considering their prices. Among aquatic products, crustaceans such as crabs, nei, and lobsters, and marine fishes, including sharks/rays/chimeras, were largely imported. Malaysia imported large quantities of processed food, particularly fat and oils in the low-price range for industry use.
- Research on the characteristics of the goods actively exported by other ASEAN countries to Indonesia might trigger a reconsideration of production and marketing strategies for domestic products that could compete with goods produced by other states in the ASEAN region, for instance: stone fruits from Thailand, green coffee from Viet Nam, and dried beans from Myanmar.
- In the category of fruits and nuts, tropical fruits such as pineapples, bananas, papayas, and oranges had comparatively high land productivity and ratios of the yield. Among the vegetable products, the productivity and ratios of the yield of several vegetables, such as mushrooms, pumpkins/squash/gourds, and spices (especially spices, nes, and minor spices), outstripped those values for the other products. Similarly, buffalo and cattle meats had high feed productivity and ratios of the yield compared with other livestock products. The potential of these products as exports to other ASEAN countries could be high if they became competitive with the same products from those other countries by means of greater physical productivity.

Chapter 5

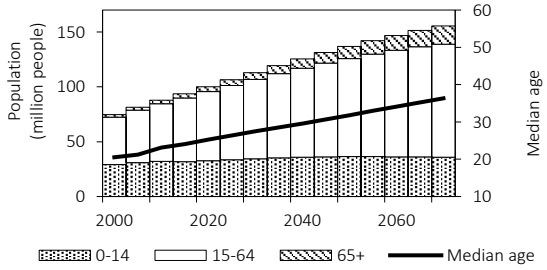
Philippines

1. Social and Economic Conditions

Population and Per Capita GDP

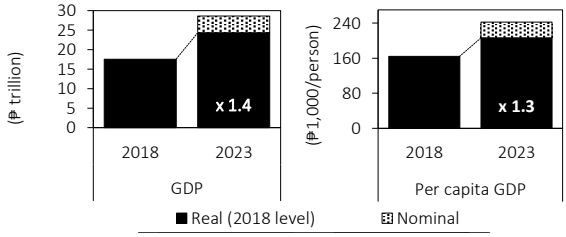
The population of the Philippines, 107 million people in 2018, accounts for 16% of the total population of the ASEAN region, placing it second amongst the ASEAN countries. It is expected to reach 151 million by 2050 (Figure 5.1). The working-age people, those between 15 and 65, are the majority of the country's population, and their numbers are projected to continue increasing at least until 2070. This trend may imply long-term economic growth. The Philippines' large population and strong population and economic growth suggest that the country has a high potential as a consumption market for agri-food products.

Figure 5.1. Population by Age Group, 2000–2060



Source: United Nations Department of Economic and Social Affairs (UN DESA, 2017).

Figure 5.2. Changes in GDP and Per Capita GDP, 2018 and 2023

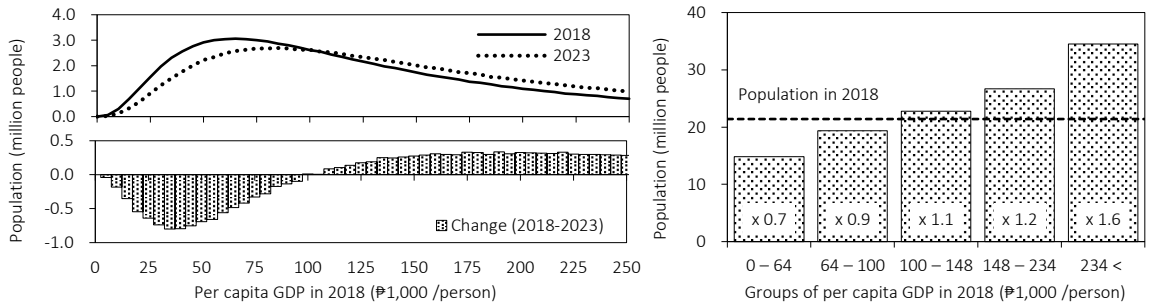


₱ = pesos (Philippine currency).
GDP = gross domestic product.
Source: Estimates based on data from the International Monetary Fund (IMF, 2018).

Real GDP and per capita real GDP are expected to increase by 1.4 times and 1.3 times, respectively, from 2018 to 2023 (Figure 5.2). According to a projection of the population of the Philippines based on the level of per capita GDP (Figure 5.3; Appendix 3.1), as per capita GDP approaches ₱100,000/person, a boundary is crossed whereby the number of people whose annual contributions to GDP are below that value will decrease. By contrast, the number of people with per capita GDP above ₱100,000 will increase across a wide range of the distribution. In particular, the population with per capita GDP above ₱234,000 (i.e. the 80th percentile) will expand by 1.5 times by 2023. This projection implies a rapid increase in the number of high-income people. It will thus be necessary to establish a system for supplying agri-food products to match the demand from this rapidly growing upper-income bracket.

Figure 5.3. Estimated Population of the Philippines by Per Capita GDP, 2018 and 2023

A. Distribution of Population Changes B. Population Divided into Five GDP Groups



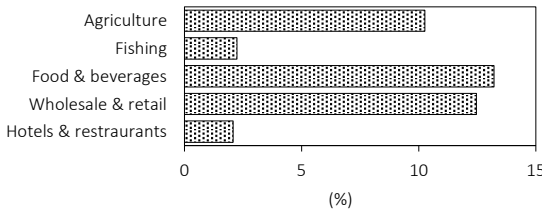
₱ = pesos (Philippine currency).
GDP = gross domestic product.
Note: The per capita GDP is based on a constant 2018 prices. The bars in Figure B show the estimated populations of the GDP groups in 2023. The numbers in bars show the changes of these populations from 2018 to 2023.
Source: Appendix 3.1.

The VA of FVC-related Industries

The VA of agriculture, food and beverages, and wholesale and retail trade has been a major component of the Philippines' GDP; for instance, the VA of each accounted for about 10% of GDP in 2015 (Figure 5.4). Meanwhile, the VA of the fishing and hotel-and-restaurant industries was very limited.

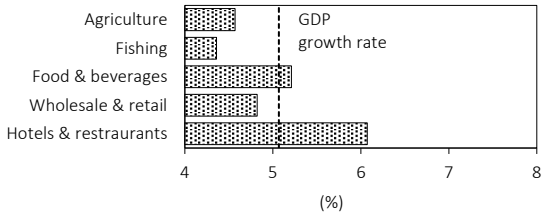
The annual growth rates of real VA in FVC-related industries averaged around 5% during 2000–2015, lower than the average GDP growth rate, except for the hotel-and-restaurant and food-and-beverage industries, whose rates were higher (Figure 5.5). While the proportion of GDP due to the VA of most FVC-related industries shrank, the proportions due to the VA of the hotel-and-restaurant and food-and-beverage industries gradually expanded.

Figure 5.4. The Proportion of VA in GDP, 2015



GDP = gross domestic product, VA = value added.
Sources: Estimates based on data from Eora (2018).

Figure 5.5. Average Annual Change in Real VA, 2000–2015



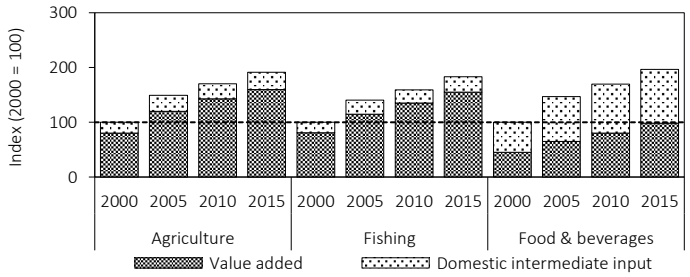
GDP = gross domestic product, VA = value added.
Sources: Estimates based on data from Eora (2018) and the Internatioanl Monetary Fund (IMF, 2018).

The production values of the agriculture, fishing, and food-and-beverage industries increased gradually, nearly doubling from 2000 to 2015 (Figure 5.6). The part of production value due to the VA (i.e. the VA rate) was large in the agriculture and fishing industries, at around 85%, and smaller in the food and beverage sector, at around 50% (Figure 5.7). The food and beverage sector depended on

intermediate inputs from within this sector and from other, related sectors; and production in the food and beverage sector would generally induce more production within that sector, and in related sectors, than it would in agriculture and fishing.

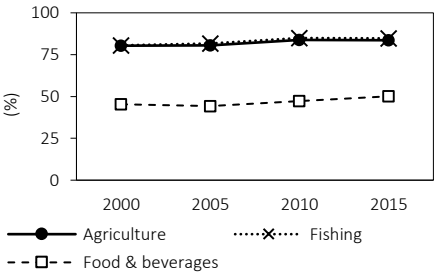
The slight growth of the VA rates in the agriculture, fishing, and food-and-beverage industries suggest a decrease in their use of intermediate inputs. Such a change may have been caused by an increase in the number of products with lower cost of sales to revenue ratios, an improvement in the efficiency of the product mix, and/or technical progress that resulted in savings on inputs.

Figure 5.6. Values of Domestic Production, 2000–2015



Note: The results in the figure are based on real values.
Sources: Estimates based on Eora (2018) and the International Monetary Fund (IMF, 2018).

Figure 5.7. VA Rates, 2000–2015



VA = value added.
Sources: Estimates based on data from Eora (2018).

Intermediate inputs in Agri-food Industries

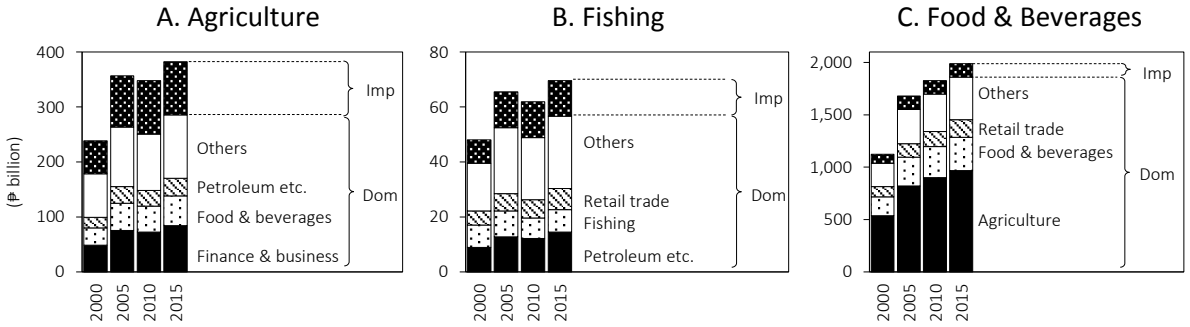
Figure 5.8 shows which industries contributed to the growth of the agriculture, fishing, and food-and-beverage industries from 2000 to 2015. Intermediate inputs into all three agri-food production sectors came mainly from domestic sources, whilst a certain value of intermediate inputs into agriculture and fishing was imported. Inputs in agriculture and fishing stagnated after 2005, while those in the food and beverage industries gradually increased.

Intermediate inputs from the finance and business industries accounted for the largest portion of inputs into agriculture, followed by inputs from the food-and-beverage and petroleum, chemical, and non-metallic mineral product ('petroleum etc.') industries.[1] The largest source of inputs in the fishing industry was petroleum etc., and the largest source of inputs in the food and beverage industries was agriculture.

In fact, agriculture was a very substantial source of intermediate inputs into the food the beverage industries. This implies that growth in the food and beverage industries was mainly driven by the supply of raw agricultural products, rather than processed foods. The growth of the food and beverage industries in the Philippines induced the development of agriculture through the industries' demand for intermediate inputs.

[1] Table A2.1, in Appendix 2, shows the industry classifications mentioned in this section, including 'petroleum etc.' One major input from the petroleum etc. industry was fuel oil, which was needed for agriculture and for the production of chemical fertilizers.

Figure 5.8. Sources of Intermediate Inputs, 2000–2015

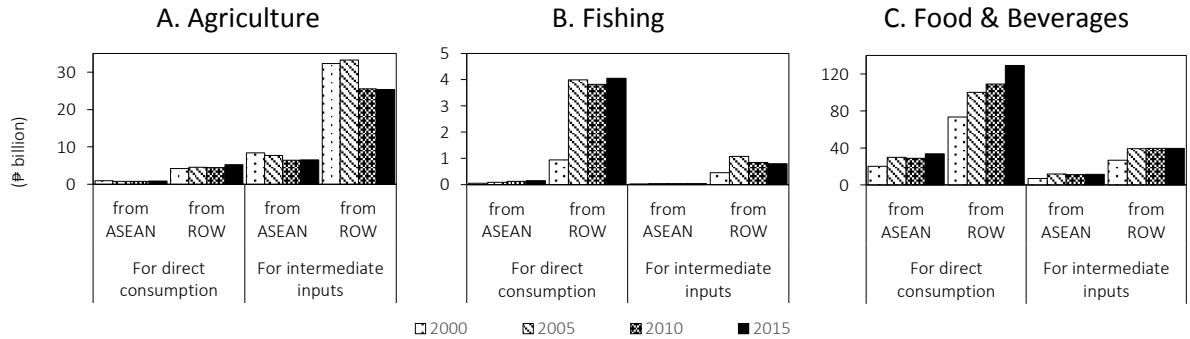


₱ = pesos (Philippine currency).
Dom = domestic supply, Imp = imports.
Notes: The values in these graphs are based on constant 2015 prices. 'Petroleum etc.' refers to the petroleum, chemical, and non-metallic mineral product industries.
Sources: Estimates using data from Eora (2018) and the International Monetary Fund (IMF, 2018).

The value of imports from foreign agricultural, fishing, and food-and-beverage sectors was limited compared with that of domestic production between 2000 and 2015 (Figure 5.9). Imports from foreign agricultural and fishing sectors stagnated, while those from foreign food-and-beverage sectors steadily increased during this period. The volume of imported agricultural products for use as intermediate inputs was larger than that destined for direct consumption. Conversely, imported fish and food-and-beverage products were generally used for direct consumption. Put briefly, the Philippines imported agricultural products mainly for processing, and fish and food-and-beverage products mainly for direct consumption.

Imports from other ASEAN countries were small and stagnant compared with those from ROW. We can see from Figure 5.9 that, during 2000–2015, Thailand gradually strengthened its linkages with the ROW as an importer, rather than deepening its integration into the ASEAN region.

Figure 5.9. Values of Imports, by Purpose, 2000–2015

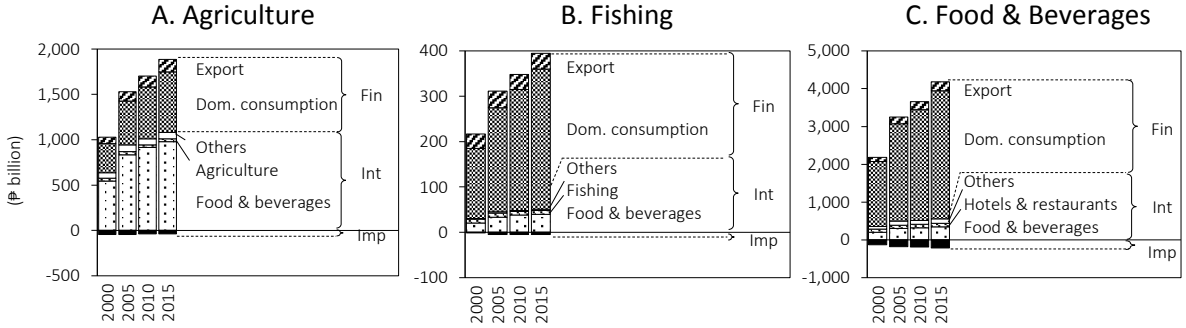


₱ = pesos (Philippine currency).
ASEAN = Association of Southeast Asian Nations, ROW = rest of the world.
Notes: The values of imports shown in these graphs are based on constant 2015 prices. They include imports from foreign agricultural, fishing, and food-and-beverage sectors destined for domestic final consumption and for use as intermediate inputs in all domestic industries.
Sources: Estimates based on data from Eora (2018) and the International Fund (IMF, 2018).

Destinations of Products of Agri-food Industries

Interindustry transactions involving flows of products from agriculture and fishing to the food-and-beverage industries increased gently during 2000–2015 (Figure 5.10). The flows from the food-and-beverage industries to the hotel-and-restaurant industries also increased slightly. The expansion of intra-industry transactions within the food and beverage sector is observable, as well, while those in agriculture and fishing stagnated. Several linkages within the FVC slowly tightened in the Philippines with regard to both interindustry and intra-industry transactions.

Figure 5.10. Destinations of Domestically Produced and Imported Goods, 2000–2015

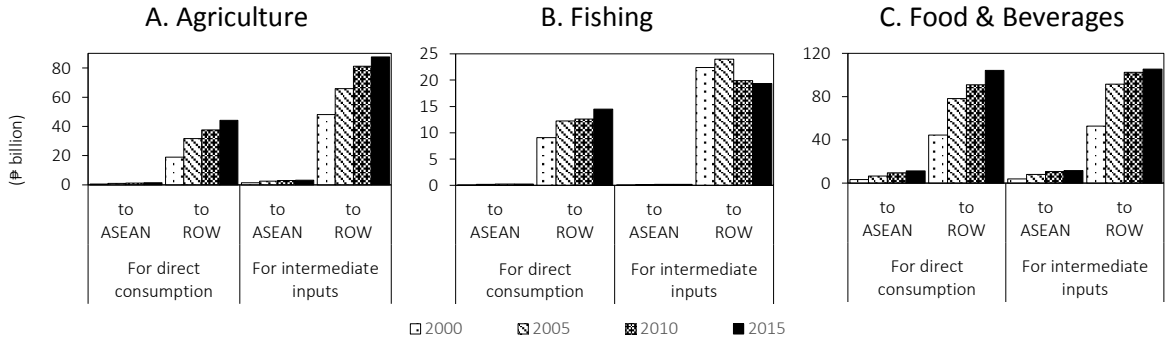


₱ = pesos (Philippine currency).
Dom. = domestic.
Notes: The values in these graphs are based on constant 2015 prices. 'Fin' = final demand for domestic and imported goods, 'Int' = intermediate demand for domestic and imported goods, and 'Imp' = the imports of final and intermediate goods. Total demand = Fin + Int. Domestic production = Fin + Int - Imp.
Sources: Estimates based on data from Eora (2018) and the International Monetary Fund (IMF, 2018).

Both final and intermediate demand grew in the agriculture, fishing, and food-and-beverage industries during 2000–2015. The agriculture and food-and-beverage industries saw their exports gradually increase during this period, though their share of final demand was small, and exports from the fishing industry stagnated from 2000 on. Figure 5.11 shows that a relatively large portion of the agricultural and fishery products exported from the Philippines was consumed as intermediate goods. Meanwhile, exports from the food and beverage industries were almost evenly divided between direct consumption and intermediate inputs.

The primary destination of exports from the agricultural, fishing, and food-and-beverage sectors was the ROW. With regard to these three sectors, the Philippines deepened its linkages more with the ROW (as an exporter), than with the rest of the ASEAN region.

Figure 5.11. Values of Exports, by Purpose, 2000–2015



₱= pesos (Philippine currency).
ASEAN = Association of Southeast Asian Nations, ROW = rest of the world.
Note: The values in these graphs are based on constant 2015 prices.
Sources: Estimates based on data from Eora (2018) and the International Monetary Fund (IMF, 2018).

2. Linkages amongst FVC-related Industries

Final Demand in FVC Industries

First, let us see how final demand for domestic FVC-related industries induces the use of intermediate inputs and affects production and VA in each industry.

Table 5.1 shows the composition of final demand during 2000–2015. Final demand was particularly strong in the food and beverage industries, followed by the retail trade industry and agriculture. The average annual growth of final demand in the food and beverage industries, ₱111 billion, outstripped the average values for the other FVC-related industries. Household consumption accounted for most of the value of the food and beverage industries. In fact, household consumption grew sharply during this period, by ₱88 billion annually. It is also notable that household consumption of agricultural and fishing products had comparatively large values and rapid growth.

Table 5.1. Final Demand for Products/Services of FVC-related Industries, 2000–2015

(₱ billion)

	Domestic production of											
	Agriculture		Fishing		Food & beverages		Wholesale trade		Retail trade		Hotels & restraurants	
Final demand as	Value	Change	Value	Change	Value	Change	Value	Change	Value	Change	Value	Change
Domestic consupmtion												
Household consumption	323	10	291	9	2,850	88	223	7	496	15	241	7
Other consumption	16	0	14	0	140	4	11	0	24	1	12	0
Capital formation	320	12	0	0	238	10	60	2	133	4	0	0
Export												
Export to ASEAN	5	0	0	0	23	1	7	0	16	1	12	1
Export to ROW	132	4	34	0	210	7	110	4	246	9	139	4
Total	795	27	339	10	3,461	111	411	13	915	30	404	12
Annual change rate (%)		4.8		3.9		4.5		4.6		4.6		4.0

₱ = pesos (Philippine currency).
ASEAN = Association of Southeast Asian Nations, FVC = value food chain, ROW = rest of the world.
Notes: The values in this table are in constant 2015 prices. 'Change' refers to the average annual changes as estimated based on data for 2000–2015.
Source: Appendix 3.2.

Production and VA Induced by Final Demand

Table 5.2 shows sources of intermediate inputs during 2000–2015 that came from domestic and foreign industries, and were destined for use in production by major FVC-related industries in the Philippines. The table indicates that 17% of intermediate inputs into the hotel and restaurant sector

came from the domestic food and beverage sector, and that 25% of inputs into the food and beverage sector came from domestic agriculture. This suggests that the hotel-and-restaurant and food-and-beverage sectors can sequentially induce a large amount of agricultural production. The table also shows that FVC-related industries in the Philippines rarely used inputs from foreign countries, compared with products and services from domestic sources.

The small increments of annual change in the shares of inputs shown in Table 5.2 indicate a stable input–output structure in the Philippines during 2000–2015, except for the linkage between the hotel-and-restaurant and food-and-beverage industries. The hotel-and-restaurant industries saw a sharp decrease in intermediate inputs from the food-and-beverage industries, which implies a weakening of this inter-sector linkage. If this structural weakening continues, any growth in final demand in the hotel-and-restaurant industries will generate less VA in the food-and-beverage industries in the future.

Table 5.2. Sources of Intermediate Inputs in Major FVC-related Industries, 2000–2015

		Domestic production of											
		Agriculture		Fishing		Food & beverages		Wholesale trade		Retail trade		Hotels & restraurants	
Input from		Share (%)	Change	Share (%)	Change	Share (%)	Change	Share (%)	Change	Share (%)	Change	Share (%)	Change
Agriculture	Domestic	2	-0.09	0	0.00	25	-0.14	0	0.00	0	0.00	2	-0.06
	ASEAN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	ROW	0	-0.01	0	0.00	0	-0.01	0	0.00	0	0.00	0	0.00
Fishing	Domestic	0	0.00	2	-0.12	1	0.00	0	0.00	0	0.00	0	-0.01
	ASEAN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	ROW	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Food & beverages	Domestic	3	-0.03	2	-0.02	8	-0.07	0	0.00	0	0.00	17	-0.72
	ASEAN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	ROW	0	0.00	0	0.00	1	-0.01	0	0.00	0	0.00	3	-0.02
Wholesale trade	Domestic	1	-0.01	1	-0.01	2	-0.01	0	-0.01	0	-0.01	1	-0.04
	ASEAN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	ROW	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.01
Retail trade	Domestic	1	-0.02	2	-0.03	4	-0.03	0	-0.03	0	-0.03	3	-0.08
	ASEAN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	ROW	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Hotels & restraurants	Domestic	0	0.00	0	0.00	0	0.00	0	-0.03	0	-0.03	0	0.00
	ASEAN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	ROW	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

ASEAN = Association of Southeast Asian Nations, FVC = food value chain, ROW = rest of the world.
Notes: 'Share' refers to the intermediate inputs as a percentage of total inputs in 2015. 'Change' refers to the average annual changes in the shares as estimated based on data for 2000–2015.
Source: Appendix 3.2.

Table 5.3 shows the VA directly and indirectly boosted by a 1% increase over the 2015 value of final demand for domestic products and services through an increase in domestic production and intermediate inputs. For example, a 1% increase in final demand in the food and beverage sector generated a ₱8 billion increase in the VA of agriculture, as well as a ₱18 billion increase in the VA of the food-and-beverage sector itself.

Increases in final demand in the food and beverage industries had an impact on the VA of upstream sectors, particularly agriculture. This result suggests that interventions in the food and beverage industries do contribute to the development of agriculture.

Downstream industries had only a limited effect on the VA of fishing compared with their effect on the VA of agriculture. An increase in final demand in the downstream sectors will not necessarily result in sequential growth in the fishing industry. In the short term, direct interventions to stimulate final demand in the fishing industry may be an efficient way to encourage its growth. In the long term, it can be an effective way to strengthen inter-sector linkages by increasing the use of aquatic products in downstream sectors and by changing the input–output structure to make it more conductive the ripple effects.

The inducement effect of final demand in the wholesale and retail trade sectors on the other four sectors discussed above was very small in 2015, as is shown in Table 5.3. Meanwhile, Table 5.2 indicates that FVC-related industries, especially the food-and-beverage and hotel-and-restaurant sectors, did depend on inputs from wholesale and retail trade during 2000–2015. It is suggested that services from the trade sectors were necessary, but alone not sufficient, to automatically drive the development of the FVC-related industries.

Table 5.3. VA Induced by a 1% Increase in Final Demand, 2015

(₱ billion)

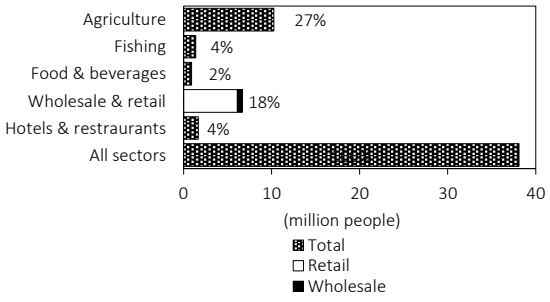
	1% increase in final demand for					
Induced value added in	Agriculture	Fishing	Food & beverages	Wholesale trade	Retail trade	Hotels & restraurants
Agriculture	6.45	0.02	7.69	0.00	0.01	0.21
Fishing	0.00	2.84	0.33	0.00	0.00	0.01
Food & beverages	0.13	0.03	18.46	0.00	0.01	0.37
Wholesale trade	0.06	0.03	0.72	3.41	0.01	0.06
Retail trade	0.12	0.07	1.60	0.01	7.59	0.13
Hotels & restraurants	0.00	0.00	0.03	0.01	0.02	2.59

₱ = pesos (Philippine currency).
VA = value added.
Source: Appendix 3.2.

The Relationship amongst the Number of Employees, Per Capita Compensation, and Production

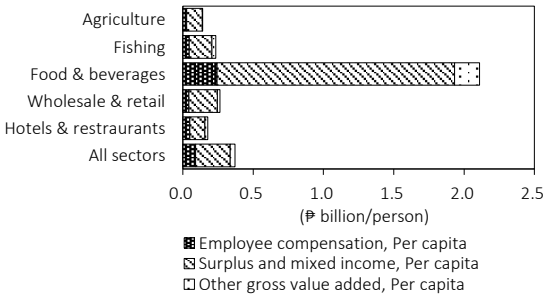
Now let us consider how an increase in production relates to changes in the number of employees and per capita employee compensation in an industry. According to figures 5.12 and 5.13, the agricultural sector in 2005 was characterized by a large number of employees, low labour productivity, and low per capita compensation compared with other FVC-related industries. By contrast, the food and beverage industries had a limited number of employees, but particularly high labour productivity and per capita compensation compared with the average values in the Philippines.

Figure 5.12. Number of Employees, by Sector, 2015



Sources: International Labour Organization (ILO, 2019); Appendix 3.3.

Figure 5.13. Gross VA per Capita, by Sector, 2015



₱ = pesos (Philippine currency).
VA = value added.
Sources: Estimates based on data from Eora (2018) and the International Labour Organization (ILO, 2019); Appendix 3.3.

Figure 5.14 illustrates the relationship amongst the number of employees, per capita compensation, and production during 2000–2015. Figure 5.14A depicts the proportion of the average annual rate of change in production in each sector that was attributable to total employee compensation. In all

sectors, production growth averaged around 4%, including a contribution of 0.5% from the increase in the total value of the compensation.

The average annual rates of change in the total value of employee compensation were within the range of 4%–6% in all FVC-related sectors (Figure 5.14B). Two factors determine the changes in total employee compensation: the number of employees and per capita compensation. In the agriculture and fishing sectors, the number of employees decreased, accompanied by an increase in per capita compensation. Although the growth rate for total compensation was similar to that in other industries, per capita compensation grew faster, accompanied by the decrease in the number of employees. In other sectors, per capita compensation and the number of employees steadily increased, especially the number of employees in the food-and-beverage and wholesale/retail trade industries.

These results suggest that production growth can accompany a rise in per capita compensation in all FVC-related industries, particularly in the agricultural and fishing sectors. Another notable point is the decline in the number of employees in the agricultural sector. The large number of employees, low labour productivity, and low per capita compensation, together with a steep growth in per capita compensation and decrease in the number employees, imply the existence of a labour surplus in the agricultural sector. Any interindustry movement of labourers would be deeply connected to the productivity and efficient development of agriculture. The food and beverage industries, which had remarkably high per capita compensation and a stable increase in the numbers of their employees, seem to have been an attractive sector in terms of labour absorption, although the actual numbers of employees were still very limited.

Figure 5.14. Changes in Production and Employee Compensation, 2000–2015

A. Breakdown of the Average Annual Rates of Change in Production

B. Breakdown of the Average Annual Rates of Change in Employee Compensation

Notes: Other factors include changes in the value added (VA), other than from employee compensation, and changes in intermediate inputs. The data is from selected years during 2000–2015.
Source: Appendix 3.3.

3. Supply–Demand Balance of Agri-food Products

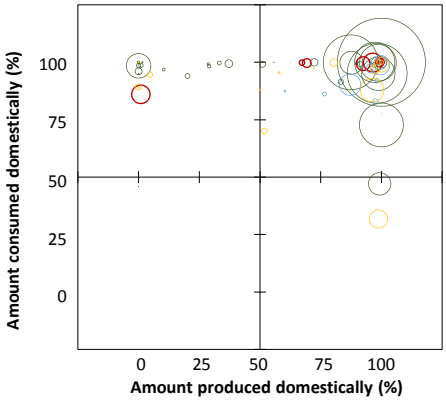
Supply–Demand Structure

Figure 5.15 shows the structure of domestic commerce and foreign trade in 2004–2013. There are two graphs, each of which is divided into four quadrants defined by two criteria: whether agri-food goods were *produced* domestically or in foreign markets and whether they were *consumed* domestically or in foreign markets. In 5.15 A and 5.15 B, the circles are scattered across three of the four quadrants. The circles vary in size according to the volumes produced of the goods they represent. The pattern of circles is the same in both graphs, but the circles in Figure 5.15 A are colour-coded to indicate the agri-food sector, whilst those in Figure 5.15 B are colour-coded to reflect growth rates.

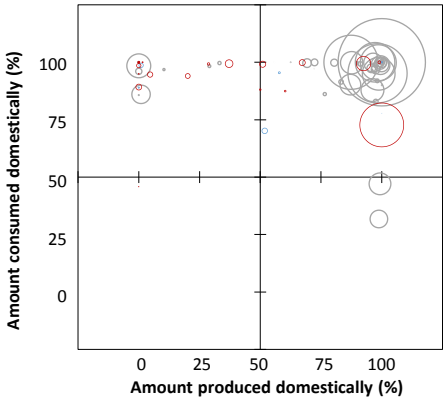
The top side of each graph represents goods that were mostly or completely consumed domestically, and the right side represents goods that were mostly or completely produced domestically. Most of the agri-food products are concentrated in the first (upper-right) quadrant, which represents goods produced and consumed in the domestic market (i.e. domestic-oriented goods). We can also see some small and medium-sized circles in the second (upper-left) and fourth (lower-right) quadrants. Goods falling into the second quadrant were produced in foreign markets and consumed in the domestic market (i.e. import-oriented goods), whilst goods falling into the fourth quadrant were produced in the domestic market and consumed in foreign markets (i.e. export-oriented goods). Note the many small circles straddling the 100% level of domestic consumption (across the first and second quadrants). This means that products completely consumed in the Philippines come from both domestic and foreign producers. There are no circles in the third (lower-left) quadrant, which represents imported products destined for re-exportation (i.e. trade-oriented goods). Compared with the patterns for Malaysia (Figure 2.15) and Thailand (Figure 3.15), the large circles, indicating major products, are more concentrated in the first quadrant. Furthermore, more products are observed in the second quadrant than in the corresponding figures for Lao PDR (Figure 7.15), Cambodia (Figure 8.15), and Myanmar (Figure 9.15). The supply–demand structure of the Philippines' agri-food sector is similar to that of Indonesia (Figure 4.15), though with fewer products falling into the fourth (export-oriented) quadrant.

Figure 5.15. Classification of Agri-food Products by Supply–Demand Balance, 2004–2013

A. By IC1 Group, Annual Averages



B. By Average Annual Growth Rate



IC1 = item category level 1, nei = not elsewhere included.

Notes: Each circle represents a Food Balance Sheet (FBS) item as designated by FAOSTAT. The sizes of the circles express the quantity of total supply, with the proportions estimated based on quantitative data. 'IC1' comprises the author's classifications of broad agri-food product categories (see Appendix 2.2). In these graphs, the percentage of goods not produced/consumed domestically are produced/consumed in foreign markets. Data classification: FBS items.
Sources: FAO (2019); Appendix 3.4.

Table 5.4 shows that most agri-food products—particularly oil and sugar crops (12), cereals (11), and fruits and nuts (14)—were produced and consumed mainly in the domestic market during 2004–2013. A comparatively large quantity of cereals (11) was imported, followed by milk (22). The biggest export category, produced in remarkedly large quantities, was fruits and nuts (14), mostly bananas and pineapples. The second-biggest export category was fat and oils (42), and the third biggest was oil and sugar crops (12). A major characteristic of the Philippines was the large production of fruits and nuts, which approached that of Indonesia, the most important producer of the countries covered in this report.

Annual change data indicates rapid growth in the production of cereals (11) and a corresponding expansion of domestic supply. A similar structure is observed in many IC2 groups, such as fruits and nuts, vegetables (13), meat (21), and aquatic plants (36). Oil and sugar crops are conspicuous for their decrease in production, imports, and exports, while their domestic supply increased.

Table 5.4. Supply–Demand Balance of Agri-food Products, 2004–2013

(1,000 metric tons)

IC1	IC2	2004–2013 average				Average annual change, 2004–2013			
		Production	Domestic supply	Import	Export	Production	Domestic supply	Import	Export
1 Vegetable products	11 Cereals	17,409	21,926	4,595	50	480	525	17	5
	12 Oil and sugar crops	46,935	45,979	458	714	-71	128	-5	-27
	13 Vegetables	8,690	9,398	740	32	234	258	23	-2
	14 Fruits and nuts	15,098	11,873	316	3,565	443	382	25	94
	15 Stimulants and spices	131	270	146	7	-3	19	22	0
2 Livestock products	21 Meat	2,897	3,201	313	9	87	116	30	2
	22 Milk	15	1,357	1,564	220	1	18	1	-14
	23 Eggs	409	411	3	0	13	13	0	0
3 Aquatic products	31 Freshwater fishes	695	696	4	3	28	28	0	1
	32 Marine fishes	2,102	2,178	279	204	10	-7	-9	9
	33 Crustaceans	145	123	4	26	3	3	0	0
	34 Molluscs	166	168	22	20	2	3	1	1
	35 Aquatic animals, nei	1	1	0	0	0	0	0	0
	36 Aquatic plants	1,625	1,613	9	20	73	72	0	0
4 Processed food, nei	41 Sugar	2,410	2,341	266	305	8	24	28	21
	42 Fat and oils	1,783	1,072	334	1,046	-16	8	19	1
	43 Food, nei	0	14	15	2	0	-2	-1	1
	44 Alcoholic beverages	1,360	1,365	27	23	19	23	0	-3

IC1 = item category level 1, IC2 = item category level 2, nei = not elsewhere included.
Note: 'IC1' and 'IC2' comprise the author's classifications of broader product categories and more specific groups, respectively (Appendix 2.2). This table is based on an aggregation of all the data available from FAOSTAT's Food Balance Sheet (FBS). Data classification: FBS items.
Sources: FAO (2019); Appendix 3.4.

Table 5.5 shows FBS items (as designated by FAOSTAT) listed in descending order of total supply quantity within each category in 2004–2013, corresponding to the quadrants in Figure 5.15. The products existing in large quantities, such as sugar cane, coconuts, rice, and bananas, are concentrated in the column for domestic-oriented products. Most products are in the columns for domestic- or import-oriented products. Products for which supply quantity is large are mostly in the row for stable markets, while many products are also in the rows for expanding or shrinking markets.

Bananas, which outstripped the supplies of other products in the row for expanding markets, is notable as a domestic-oriented product by its large quantity of supply undergoing rapid growth. Meats (21)—such as poultry, offal, mutton, and goat meat—and coffee and products are also remarkable for their accelerated growth. Pineapples and coconut oil are the two only export-oriented products, both with stable markets. The markets for several import-oriented products sharply expanded, including those for potatoes, sweeteners other than sugar, and minor oil crops. A few import-oriented items—wheat and products, and milk—are conspicuous for their large supplies. Another feature of the supply–demand balance in the Philippines is the sharp growth of tea as the sole trade-oriented product.

Table 5.5. Total Quantities of Supply for Product Categories, in Descending Order, 2004–2013

(1,000 metric tons)

Category		Domestic-oriented			Export-oriented			Import-oriented			Trade-oriented		
Provided by		Domestic market			Domestic market			Foreign market			Foreign market		
Consumed in		Domestic market			Foreign market			Domestic market			Foreign market		
Change	Rank	IC2	FBS items	Quantity	IC2	FBS items	Quantity	IC2	FBS items	Quantity	IC2	FBS items	Quantity
Annual change rate, 2004–2013 (%) r > 5 Expanding	1	14	Bananas	8,005				13	Potatoes and products	282	15	Tea (including mate)	5
	2	21	Poultry meat	915				41	Sweeteners, other	174			
	3	15	Coffee and products	187				42	Oilcrops oil, other	146			
	4	21	Offals, edible	182				14	Oranges, mandarines	124			
	5	21	Mutton & goat meat	50				14	Apples and products	103			
-5 < r < 5 Stable	1	12	Sugar cane	31,682	14	Pineapples and products	2,147	11	Wheat and products	2,565			
	2	12	Coconuts - incl copra	14,765	42	Coconut oil	1,446	22	Milk - excluding butter	1,577			
	3	11	Rice (milled equivalent)	12,397				11	Barley and products	230			
	4	11	Maize and products	6,725				13	Beans	87			
	5	13	Vegetables, other	5,612				12	Groundnuts (shelled eq)	71			
r < -5 Shrinking	1	42	Palm oil	158				12	Soyabeans	104			
	2	42	Soyabean oil	29				43	Infant food	15			
	3	13	Yams	23				44	Cream	6			
	4	42	Groundnut oil	4				42	Rape and mustard oil	2			
	5	12	Cottonseed	0.9				12	Rape and mustardseed	0.9			

FBS = Food Balance Sheet (FAOSTAT), IC2 = item category level 2, r = average annual change rate.
Notes: The values in this table represent the averages for 2004–2013. Data classification: FBS items.
Sources: FAO (2019); Appendix 3.4.

Trade Prices and Volumes

The export prices of aquatic products such as raw and processed crustaceans (33), processed freshwater fishes (31), and processed molluscs (34) were remarkably high during 2014–2016 (Table 5.6). While the export values of these products were limited, those of high-priced processed marine fishes (32) were considerable. We can conclude that processed marine fishes (32) exported in large quantities had high enough values during this period to induce active trade.

The import prices of raw and processed eggs (23), raw crustaceans, and food, nei (43), exceeded those of many other products. The import values of most of these high-priced products were quite small, except for products in the food, nei, category (41). High-priced items that were imported in large quantities, such as processed food, nei (41), seemed to have had high import values for the Philippines.

It is not clear from Table 5.6 whether primary products or processed products were traded at higher prices. That would have depended on the differences between exports and imports, amongst the IC2 groups, and in the composition of the more detailed products within each IC2 group. As was the case for other ASEAN countries, the Philippines saw higher import prices for raw versions of a few aquatic products, and for sugar and eggs, than for most processed products.

Table 5.6. Prices and Values of Exported/Imported Agri-food Products, 2014–2016

IC1	IC2	Price ($/kg)				Value ($ million)			
		Export		Import		Export		Import	
		Primary products	Processed products	Primary products	Processed products	Primary products	Processed products	Primary products	Processed products
1 Vegetable products	11 Cereals	3.2	1.7	0.3	0.5	2	174	983	646
	12 Oil and sugar crops	1.8	1.7	0.6	1.7	221	65	97	155
	13 Vegetables	1.0	1.8	0.4	0.8	6	5	73	148
	14 Fruits and nuts	0.3	0.9	1.0	0.9	1,059	597	231	51
	15 Stimulants and spices	3.9	2.2	2.1	2.9	9	15	74	414
2 Livestock products	21 Meat	—	3.4	—	1.6	0.0	38	0.0	787
	22 Milk	2.1	3.3	1.4	2.5	0.9	67	146	612
	23 Eggs	—	—	11.4	4.6	0.0	0.0	5	4
3 Aquatic products	31 Freshwater fishes	2.7	6.6	0.8	1.4	39	155	0.1	63
	32 Marine fishes	3.2	3.2	3.0	0.5	67	404	0.7	206
	33 Crustaceans	5.8	11.5	4.7	2.4	125	56	15	1
	34 Molluscs	4.2	6.0	1.0	1.7	50	3	33	0.5
	35 Aquatic animals, nei	—	—	—	—	0.0	0.0	0.0	0.0
	36 Aquatic plants	1.5	—	1.4	—	31	0.0	11	0.0
	38 Fishes, nei	—	3.5	—	0.8	0.0	5	0.0	3
4 Processed food, nei	41 Sugar	—	0.6	3.6	0.5	0.0	232	2	407
	42 Fat and oils	—	1.2	—	1.1	0.0	1,222	0.0	336
	43 Food, nei	—	2.0	—	4.0	0.0	159	0.0	673
	44 Alcoholic beverages	—	1.1	—	1.7	0.0	8	0.0	98

IC1 = item category level 1, IC2 = item category level 2, kg = kilogram, nei = not elsewhere included.
Notes: This table shows the averages for 2014–2016. The values indicated for exports are based on 'free on board' (FOB) prices, and those for imports are based on 'cost, insurance, and freight' (CIF) prices. Data category: IC2 groups based on the Broad Economic Categories (BEC) classifications of primary products (11) and processed products (12).
Sources: UNSD (2017); Appendix 3.6.

4. The Competitiveness of Each Product in the ASEAN Region

Commodities Imported by ASEAN Countries

Tables 5.7 and 5.8 provide information about the agri-food products imported by ASEAN countries from the Philippines in 2014–2016. ASEAN countries imported many of these products from the Philippines more cheaply than they did from other ASEAN+6 countries (Table 5.7). Roughly 50%–80% of items in the IC2 groups were imported as low-priced products. Philippine exports to Malaysia were notably large, followed by those to Thailand, Singapore, and Viet Nam (Table 5.8).

As shown in Table 5.7, 2% of cereals (11) and 1% of fruits and nuts (14), both categorized in the low-price range, were imported by other ASEAN countries in significantly larger quantities than had been estimated based on approximate lines. Meanwhile, products imported in lesser quantities than estimated stood out more. Such products included stimulants and spices (15) and molluscs (34) in the low-price range, and vegetables (13) in the low- and mid-price ranges.

Table 5.7. Prices and Values of Products Imported by ASEAN Countries, by IC2 Group, 2014–2016

IC1	IC2	Price ($/kg)	Value ($ million)	Number of imported products by price ranges (%)			Number of products deviated from approx. lines (%)						Obs.
							Imported larger			Imported smaller			
				Price ranges			Price ranges			Price ranges			
				Low	Mid	High	Low	Mid	High	Low	Mid	High	
1 Vegetable products	11 Cereals	3.1	63	77	10	13	2	0	0	2	2	0	48
	12 Oil and sugar crops	2.4	11	78	11	11	0	0	0	4	0	0	27
	13 Vegetables	3.1	5	55	23	23	0	0	0	5	3	0	40
	14 Fruits and nuts	2.0	49	70	7	24	1	0	0	2	0	0	106
	15 Stimulants and spices	4.7	12	60	9	30	0	0	0	17	0	2	53
2 Livestock products	21 Meat	3.5	0.6	86	14	0	0	0	0	0	0	0	14
	22 Milk	3.4	3	53	22	25	0	0	0	0	0	0	36
	23 Eggs	2.1	0.0	—	—	—	—	—	—	—	—	—	0
3 Aquatic products	31 Freshwater fishes	7.5	0.6	67	17	17	0	0	0	0	0	0	6
	32 Marine fishes	4.0	37	75	16	9	0	0	0	0	0	0	32
	33 Crustaceans	10.3	9	50	39	11	0	0	0	0	0	0	18
	34 Molluscs	5.7	4	73	13	13	0	0	0	7	0	0	15
	35 Aquatic animals, nei	3.5	7	67	11	22	0	0	0	0	0	0	9
	36 Aquatic plants	10.2	2	50	50	0	0	0	0	0	0	0	4
	38 Fishes, nei	7.9	4	55	23	23	0	0	0	0	0	0	22
4 Processed food, nei	41 Sugar	2.9	32	45	33	21	0	0	0	0	0	0	33
	42 Fat and oils	2.6	26	59	16	25	0	0	0	3	0	3	32
	43 Food, nei	3.8	74	87	13	0	0	0	0	0	0	0	15
	44 Alcoholic beverages	1.6	3	75	25	0	0	0	0	0	0	0	8

ASEAN = Association of Southeast Asian Nations, IC1 = item category level 1, IC2 = item category level 2, kg = kilogram, nei = not elsewhere included.

Notes: The prices and values represent the averages for 2014–2016. 'Price' refers to the import price, including cost, insurance, and freight (CIF) added to the tariff established by the ASEAN *Trade* in Goods Agreement (ATIGA). 'Value' refers to the imported value (CIF) without the tariff. See Appendix 3.6 for price ranges and approximate lines. The products for which the externally studentized residual was significantly large or small at the 10% level were counted. 'Obs.' refers to the number of detailed commodities classified according to the Broad Economic Categories (BEC) three-digit category numbers and used for applying approximation lines. Data category: FAOSTAT Commodity List (FCL) and adjusted groups under the International Standard Statistical Classification of Aquatic Animals and Plants (ISSCAAP), classified under BEC 111, 112, 121, and 122.

Sources: UNSD (2017); Appendix 3.6.

Table 5.8. Prices and Values of Products Imported into the ASEAN Region, by Country, 2014–2016

Importer	Price ($/kg)	Value ($ million)	Number of imported products by price ranges (%)			Number of products deviated from approx. lines (%)						Obs.
						Imported larger			Imported smaller			
			Price ranges			Price ranges			Price ranges			
			Low	Mid	High	Low	Mid	High	Low	Mid	High	
Singapore	3.4	63	67	19	14	0	0	0	0	4	1	128
Brunei	3.5	5	70	7	23	0	0	0	0	1	0	71
Malaysia	2.5	128	66	16	18	2	0	0	0	2	1	95
Thailand	5.2	85	66	15	19	0	0	0	0	3	0	118
Indonesia	3.1	15	62	21	17	0	0	0	3	3	0	29
Philippines	—	0.0	—	—	—	—	—	—	—	—	—	0
Viet Nam	2.9	39	69	7	24	0	0	0	3	7	0	29
Lao PDR	8.2	0.0	0	100	0	0	0	0	0	0	0	1
Camboodia	2.1	1	64	14	23	0	0	0	0	5	0	22
Myanmar	2.6	0.0	36	32	32	0	0	0	0	4	0	25

ASEAN = Association of Southeast Asian Nations, kg = kilogram, nei = not elsewhere included.

Notes: The prices and values represent the averages for 2014–2016. 'Price' refers to the import price, including cost, insurance, and freight (CIF) added to the tariff established by the ASEAN *Trade* in Goods Agreement (ATIGA). 'Value' refers to the imported value (CIF) without the tariff. See Appendix 3.6 for price ranges and approximate lines. The products for which the externally studentized residual was significantly large or small at the 10% level were counted. 'Obs.' refers to the number of detailed commodities classified according to the Broad Economic Categories (BEC) three-digit category numbers and used for applying approximation lines. Data category: FAOSTAT Commodity List (FCL) and adjusted groups under the International Standard Statistical Classification of Aquatic Animals and Plants (ISSCAAP), classified under BEC 111, 112, 121, and 122.

Sources: UNSD (2017); Appendix 3.6.

Goods Imported in Smaller/Larger Quantities than Estimated Based on Prices: Non-price Competitiveness in the ASEAN Region

Philippine vegetable products in low- and mid-price ranges—especially fruits and nuts (14) such as bananas and pineapples, and other products such as processed breakfast cereals and flour from roots and tubers, nes—tended to be imported in great quantities by other ASEAN countries in 2014–2016, considering their prices (Table 5.9). Regarding aquatic products, Malaysia imported seaweeds in significantly larger quantities than had been estimated based on their import prices. It might be beneficial to seek opportunities to develop further export markets for these products. Moreover, research on the causes of such active import demand, including production and sales methods, would help identify pathways toward increasing the sales of other items.

Research on the characteristics of the goods actively exported by other countries to the Philippines might also trigger a reconsideration of production and marketing strategies for domestic products that could compete with goods produced by other states in the ASEAN region, for instance: dried fruits, soya paste, and yogurt from Thailand; breakfast cereals and ice cream from Indonesia; tilapias and other cichlids from Viet Nam; and soya sauce from Singapore.[2]

There were also many products for which import quantities were significantly smaller during 2014–2016, considering their prices, such as vegetable products in all the price ranges; and livestock, aquatic products, and processed food, nei, in the low-price range. Although those products were certainly exported to other ASEAN countries, they might not have been as competitive as the same products from other ASEAN and +6 countries. If these items are to be promoted as export goods destined for other ASEAN countries, active and intensive product differentiation will be necessary.

[2] For reference, see tables 2.9 to 9.9. See also Table A4.2 on major exports from the +6 countries.

Table 5.9. Goods Imported by ASEAN Countries in Smaller/Larger Quantities than Estimated Based on Prices, in Ascending Order of P-values, 2014–2016

A. Larger Quantities of Imports than Estimated Based on Prices

IC1	Rank	Price ranges																		
		Low							Mid							High				
		Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value
1 Vegetable products	1	MYS	14	112	Bananas	0.6	7	0.04	THA	13	121	Flour, roots and tubers nes	13.2	0.2	0.13							
	2	MYS	11	122	Cereals, breakfast	3.4	9	0.10														
	3	SGP	14	112	Bananas	0.7	20	0.16														
	4	SGP	14	112	Pineapples	0.8	3	0.16														
	5																					
2 Livestock products	1																					
	2																					
	3																					
	4																					
	5																					
3 Aquatic products	1								MYS	36	111	Seaweeds, food, nei	11.4	2	0.18							
	2																					
	3																					
	4																					
	5																					
4 Processed food, nei	1																					
	2																					
	3																					
	4																					
	5																					

B. Smaller Quantities of Imports than Estimated Based on Prices

IC1	Rank	Price ranges																			
		Low							Mid							High					
		Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value
1 Vegetable products	1	KHM	15	122	Coffee, roasted	4.5	0.000	0.00	SGP	11	121	Flour, wheat	1.2	0.000	0.03	VNM	15	122	Coffee, extracts	10.9	0.000	0.02
	2	VNM	15	121	Cocoa, powder and cake	2.8	0.006	0.02	MYS	13	112	Asparagus	3.9	0.000	0.04	KHM	14	122	Nuts, prepared (exc. groundnuts)	2.8	0.000	0.11
	3	BRN	15	112	Tea	10.7	0.000	0.02	MMR	13	122	Mushrooms, canned	1.9	0.002	0.15	MYS	15	112	Spices, nes	9.9	0.005	0.12
	4	SGP	15	122	Tea, mate extracts	4.2	0.012	0.04								MYS	14	112	Fruit, stone nes	3.0	0.001	0.15
	5	THA	14	112	Fruit, stone nes	3.9	0.000	0.04														
2 Livestock products	1	SGP	22	122	Ice cream and edible ice	0.6	0.003	0.11								MMR	22	122	Cheese, whole cow milk	6.2	0.000	0.14
	2	MYS	22	112	Milk, whole fresh cow	1.5	0.001	0.12														
	3	THA	22	112	Yoghurt	2.8	0.000	0.18														
	4	THA	21	122	Meat, beef and veal sausages	0.9	0.000	0.20														
	5																					
3 Aquatic products	1	MYS	34	112	Mussels	3.4	0.001	0.03								SGP	38	112	Fish and fish products, nei	21.8	0.021	0.11
	2	THA	32	122	Herrings, sardines, anchovies	2.0	0.001	0.10								SGP	34	112	Squids, cuttlefishes, octopuses	12.0	0.002	0.17
	3	SGP	34	112	Clams, cockles, arkshells	4.0	0.000	0.15														
	4	SGP	38	122	Fish and fish products, nei	5.2	0.106	0.15														
	5	SGP	31	122	Tilapias and other cichlids	1.1	0.000	0.15														
4 Processed food, nei	1	IDN	42	122	Oil, soybean	1.3	0.009	0.04								IDN	42	122	Margarine, short	2.0	0.000	0.08
	2	THA	42	122	Ghee, butteroil of cow milk	4.3	0.000	0.10														
	3	KHM	43	122	Food preparations, nes	0.5	0.003	0.10														
	4	THA	42	121	Oil, palm	1.2	0.000	0.14														
	5	SGP	43	121	Food preparations, nes	3.5	0.000	0.19														

BEC = Broad Economic Categories, United Nations Statistics Division (UNSD), BRN = Brunei, IC1 = item category level 1, IC2 = item category level 2, IDN = Indonesia, kg = kilogram, KHM = Cambodia, MMR = Myanmar, MYS = Malaysia, nei = not elsewhere included, nes = not elsewhere specified, SGP = Singapore, THA = Thailand, VNM = Viet Nam.

Notes: The values listed in this table represent the averages for 2014–2016. The top five agri-food products within each IC1 grouping are listed in ascending order of p-value < 0.2, under the BEC as follows: primary products mainly for industry (111), primary products mainly for household consumption (112), processed products mainly for industry (121), and processed products mainly for household consumption (122). 'Price' refers to the CIF (cost, insurance, and freight) import price added to the tariff set by the ASEAN *Trade* in Goods Agreement (ATIGA). 'Value' refers to the imported value (CIF) without the tariff. The expression 'p-value' refers to the p-value of the t-stat against the externally studentized residual. See Appendix 3.6. Data category: FAOSTAT Commodity List and the adjusted groups under the International Standard Statistical Classification of Aquatic Animals and Plants (ISSCAAP) classified under BEC 111, 112, 121, and 122.

Sources: UNSD (2017); Appendix 3.6.

Inter-commodity and Inter-country Comparisons of Land/Feed Productivity

The median land productivity of stimulants and spices (15), vegetables (13), and fruits and nuts (14) had similarly high values in 2011–2015 (Table 5.10). The ratios of the yield, an indicator of comparative advantage in the ASEAN region, were for stimulants and spices (15) and cereals (11) the same or slightly higher than those for other IC2 groups in the category of vegetable products.

Table 5.10. Median Levels of Productivity and Resource Allocation in Each IC2 Group

IC1	IC2	Land productivity (₱1,000/ha)	Chg (%)	Ratio of the yield Index (Yi/Yi')	Chg (%)	Area harvested (1,000 ha)	Chg (%)	Obs.
1 Vegetable products	11 Cereals	62	4	0.9	0	2,575	1	3
	12 Oil and sugar crops	34	1	0.7	-2	21	-1	8
	13 Vegetables	154	3	0.7	-1	5	0	28
	14 Fruits and nuts	154	0	0.6	-3	9	0	18
	15 Stimulants and spices	164	3	0.9	-2	7	-1	4
	Total	114	2	0.7	-2	8	0	61
IC1	**IC2**	**Feed productivity (₱1,000/100 PU)**	**Chg (%)**	**Ratio of the yield Index (Yi/Yi')**	**Chg (%)**	**Producing animals (million PU)**	**Chg (%)**	**Obs.**
2 Livestock products	21 Meat	144	—	1.2	—	6	1	10
	22 Milk	579	—	2.9	—	0	-1	1
	23 Eggs	124	—	0.8	—	19	1	2
	Total	125	—	1.2	—	5	0	13

₱ = pesos (Philippine currency).
ha = hectare, IC1 = item category level 1, IC2 = item category level 2, PU = unit of pig feed requirements, Yi = yield in the Philippines, Yi' = average yield in other ASEAN countries.
Notes: Land/feed productivity, ratio of the yield, and area harvested/producing animals represent the average values for 2011–2015. 'Chg' refers to the average annual rates of change during 2006–2015 (%). 'Obs.' refers to the number of items in the FAOSTAT Commodity List (FCL). The data on land productivity was deflated to constant 2015 peso prices. The figures are estimates based on all the FAOSTAT data under the 'Production' rubric. Data category: FCL.
Sources: FAO (2019); Appendix 3.7.

For stimulants and spices, vegetables, and fruits and nuts (14), the land productivity and ratios of the yield of nuts, nes, or minor nuts, exceeded those values for the other products during the same period (Table 5.11). While the production land area was quite small, the productivity and ratio of the yield of nuts, nes, gradually increased. Within the stimulants and spices and vegetables categories, pepper and asparagus had the highest land productivity, respectively. It is worth noting that the rapid increase in the productivity of asparagus was accompanied by drops in its ratio of the yield and producing land area. A similar trend is observed for pepper production. These trends imply that, even with diminished production and competitiveness, productivity could be high if the land area devoted to production is limited. For similar reasons, goat meat, turkey, and fresh whole cow's milk had high feed productivity and ratios of the yield compared with those values for other livestock products. Although the extent of the harvested areas or the number of producing animals for the products mentioned above were small, and were not necessarily increasing, the potential of these products as exports to other ASEAN countries could be high if they became competitive with the same products from those other countries by means of greater physical productivity.

As shown in the second column from the right in Table 5.11, which lists examples of products imported by other ASEAN countries from the Philippines during 2014–2016 in greater quantities than expected based on their prices, a few products—such as roots and tubers; flour, nes; pineapples; and bananas—apparently had non-price competitiveness or were differentiated from the same items produced in other ASEAN countries. The comparative advantage of these products (other than pineapples) in

terms of physical productivity was low in the ASEAN region. Maintaining or increasing non-price competitiveness is critically important for their international competitiveness. As some products already have non-price competitiveness, that of other products should be actively improved for the sake of developing the FVC in the Philippines.

Table 5.11. Levels of Productivity and Resource Allocation for Individual Items

No.	IC2	FCL name	Land or feed productivity (₱1,000/ha or ₱1,000/100 PU)	Chg (%)	Ratio of the yield Index (Yi/Yi')	Chg (%)	Area or producing animals (1,000 ha or million PU)	Chg (%)	Intpn. A	Intpn. B	Items imported larger or smaller compared with the price (p<0.2) Imported larger	in	Imported smaller	in
1	11	Rice, paddy	68	4	0.9	0	4,674	1	iii	i				
2		Sorghum	62	16	4.2	13	0	9	iii	i				
3		Maize	38	3	0.6	-1	2,575	0	iv	iv				
4	12	Sugar cane	163	0	0.9	-3	433	1	i	i				
5		Oil, palm fruit	45	-7	0.5	-5	54	7	iv	ii			Margarine, short	IDN
6		Groundnuts, with shell	42	4	0.7	3	26	-2	iii	ii				
7		Soybeans	39	-3	0.9	-2	1	-3	iii	i			Oil, soybean	IDN
8		Coconuts	29	3	0.7	0	3,542	1	iii	iii				
9		Seed cotton	19	—	0.2	-12	0	-44	iv	iv				
10		Castor oil seed	9	1	0.7	-1	0	-28	iii	iii				
11		Oilseeds nes	7	3	0.6	0	16	0	iv	iv				
12	13	Asparagus	908	16	1.0	-20	0	-16	i	i			Asparagus	MYS
13		Onions, dry	430	1	1.1	1	15	3	i	i				
14		Potatoes	400	0	0.9	-1	8	2	i	i				
15		Garlic	349	4	0.5	2	3	-6	ii	ii			Garlic	THA
16		Carrots and turnips	314	3	0.8	1	6	1	i	i				
17		Cauliflowers and broccoli	302	5	0.8	1	1	2	i	i				
18		Peas, green	264	0	0.3	-2	2	-4	ii	ii				
19		Cabbages and other brassicas	246	4	0.7	-2	8	0	ii	ii				
20		Lettuce and chicory	241	4	0.6	-7	1	3	ii	ii				
21		Eggplants (aubergines)	192	2	0.9	-3	21	0	i	i				
22		Leeks, other alliaceous vegetables	185	0	0.7	-2	1	-1	i	ii				
23		Tomatoes	177	2	0.7	-1	17	-1	i	i				
24		Pumpkins, squash and gourds	159	-1	0.5	-10	20	-1	ii	ii				
25		Okra	149	0	0.7	-5	4	1	i	iii				
26		Vegetables, fresh nes	129	2	0.6	-1	594	2	ii	iv				
27		Chillies and peppers, green	127	1	0.6	-3	5	1	ii	iv				
28		Pigeon peas	101	6	1.9	7	1	-5	iii	iii				
29		Beans, green	95	4	1.1	0	3	-1	iii	iii				
30		Cucumbers and gherkins	94	0	0.6	1	2	1	iv	iv				
31		Taro (cocoyam)	81	3	0.7	3	16	-2	iii	iii	Flour, roots and tubers nes	THA	Flour, roots and tubers nes	SGP
32		Cassava	74	4	0.5	1	219	1	iv	iv				
33		Sweet potatoes	73	6	0.5	-2	95	-4	iv	iv				
34		Cow peas, dry	70	3	2.9	5	0	-3	iii	iii				
35		Beans, dry	41	3	0.5	-4	44	2	iv	iv				
36		Pulses, nes	31	4	0.9	0	37	0	iii	iii				
37		Roots and tubers, nes	22	-7	0.3	-7	6	6	iv	iv	Flour, roots and tubers nes	THA	Flour, roots and tubers nes	SGP
38		Peas, dry	—	—	4.0	—	0	—	—	—			Peas, dry	MYS
39		Spinach	—	—	0.6	-2	0	6	—	—				
40	14	Nuts, nes	930	6	6.3	5	2	1	i	i			Nuts, prepared (exc. groundnuts)	VNM
41		Pineapples	311	4	1.3	-1	60	2	i	i	Pineapples	SGP		
42		Fruit, tropical fresh nes	220	1	1.2	0	379	1	i	i				
43		Watermelons	204	1	1.0	-3	7	0	i	i				
44		Bananas	187	2	0.6	-6	447	0	ii	i	Bananas	MYS		
45		Melons, other (inc.cantaloupes)	180	-4	0.6	-5	1	-1	ii	i				
46		Fruit, citrus nes	172	-1	1.7	-3	20	0	i	i				
47		Cashew nuts, with shell	163	5	3.6	5	28	1	i	i			Cashew nuts, shelled	SGP
48		Papayas	154	1	0.3	-4	8	-2	ii	ii				
49		Grapefruit (inc. pomelos)	139	-2	0.6	-4	5	0	ii	iv				
50		Oranges	90	-3	0.1	-3	1	-3	iv	iv				
51		Mangoes, mangosteens, guavas	83	-2	0.4	-3	196	1	iv	iv				
52		Avocados	66	0	0.3	-3	5	0	iv	iv				
53		Lemons and limes	54	-4	0.2	-5	1	-5	iv	iv			Juice, lemon, concentrated	MYS
54		Fruit, fresh nes	25	-9	0.2	-13	157	18	iv	iv				
55		Tangerines, mandarins, clementines, satsumas	22	-9	0.2	-2	9	-1	iv	iv				
56		Grapes	9	8	0.0	6	0	0	iv	iv				
57		Plantains and others	—	—	0.9	-2	261	0	—	—				
58	15	Pepper (piper spp.)	422	5	1.5	-7	2	-1	i	i				
59		Ginger	276	11	0.4	0	4	0	ii	ii			Ginger	THA
60		Coffee, green	51	-1	0.6	-5	117	-1	iv	iv			Coffee, green	SGP
61		Cocoa, beans	40	0	1.2	8	11	2	iii	iii				
62	21	Meat, pig	893	—	1.2	—	26	1	i	ii				
63		Meat, cattle	219	—	1.2	—	16	2	i	i				
64		Meat, turkey	197	—	1.4	—	0	0	i	i				
65		Meat, goat	191	—	1.6	—	7	2	i	i				
66		Meat, buffalo	165	—	1.2	—	9	0	i	i				
67		Meat, sheep	122	—	1.4	—	0	0	iii	iii				
68		Meat, duck	82	—	1.1	—	5	2	iv	iv				
69		Meat, goose and guinea fowl	69	—	0.7	—	0	0	iv	iv				
70		Meat, chicken	48	—	0.7	—	275	6	iv	iv				
71		Meat, horse	28	—	0.8	—	0	0	iv	iv				
72	22	Milk, whole fresh cow	579	—	2.9	—	0	-1	i	i				
73	23	Eggs, other bird, in shell	125	—	0.8	—	3	-2	ii	ii				
74		Eggs, hen, in shell	123	—	0.9	—	35	4	iv	iii				

₱ = pesos (Philippine currency).

FCL = FAOSTAT Commodity List, ha = hectare, IC2 = item category level 2, IDN = Indonesia, Intpn. = interpretation, MYS = Malaysia, nes = not elsewhere specified, p = p-value, PU = unit of pig feed requirements, SGP = Singapore, THA = Thailand, VNM = Viet Nam, Yi = yield in the Philippines, Yi' = average yield in other ASEAN countries.

Notes: 'Area' refers to the total harvested area, and 'producing animals' refers to the number of producing animals. Land/feed productivity, ratio of the yield, and area harvested/producing animals represent the average values for 2011–2015. 'Chg' refers to the average annual rate of change during 2006–2015 (%). The data on land productivity was deflated to constant 2015 peso prices. The figures are estimates based on all the FAOSTAT data provided under the 'Production' rubric. In the 'Intpn' column, the codes are as follows: i = both productivity and ratio of the yield are high; ii = productivity is high, but the ratio of the yield is low; iii = productivity is low, but

the ratio of the yield is high; and iv = both productivity and ratio of the yield are low. The codes under 'A' reflect the median of the broader product categories in IC1 (item category level 1), and those under 'B' reflect the median of the specific products in IC2 included here. Regarding the items imported in larger or smaller quantities compared with their prices ($p<0.2$), the names of the FCL items (classified according to the Broad Economic Categories) listed in the table are those with the smallest p-value < 0.2 estimated based on data during 2014–2016. Data category: FCL.
Source: Appendix 3.7.

Table 5.12 shows a positive correlation between the land/feed productivity and ratios of the yield of fruits and nuts (14) and meat (21) during 2011–2015. In other words, the profitability per unit area of those FCL items tended to be high when they had a comparative advantage in terms of physical productivity within the ASEAN region. However, this was not true for products under other IC2 groups.

Weak or non-existent correlations are observed between land/feed productivity or ratio of the yield and the extent of harvested areas or number of producing animals for all IC2 product groups. Such results show that most of the harvested land and producing animals in the Philippines were simply not allocated to products characterized by high productivity or competitiveness.

Table 5.12. Correlation Matrix of Comparative Advantage, Productivity, and Resource Allocation, 2011–2015

	Land or feed productivity						Ratio of the yield					
IC2	11 Cereals	12 Oil and sugar crops	13 Vegetables	14 Fruits and nuts	15 Stimulants and spices	21 Meat	11 Cereals	12 Oil and sugar crops	13 Vegetables	14 Fruits and nuts	15 Stimulants and spices	21 Meat
Ratio of the yield	—	0.14	0.20	**0.87**	0.20	**0.66**	—	—	—	—	—	—
Area or producing animals	—	0.45	-0.33	0.29	**-0.80**	0.27	—	0.07	-0.30	0.37	-0.40	-0.13
Obs.	3	8	26	17	4	10	3	8	26	17	4	10

IC2 = item category level 2.
Notes: 'Area' refers to the total harvested area, and 'producing animals' refers to the number of producing animals. This table uses Spearman's rank correlation coefficient of average values during 2011–2015. The values were estimated based on the data for items on the FAOSTAT Commodities List (FCL) relating to land/feed productivity, the ratio of the yield, and the number of producing animals and the land area they used. FCL items with correlation coefficients less than 4 were omitted. 'Obs.' refers to the number of FCL items. Data category: FCL.
Source: Author's calculations, see Appendix 3.7.

5. Summary

Social and Economic Conditions

- The Philippines' large population and strong population and economic growth suggest that the country has a large potential as a consumption market for agri-food products.
- The VA of agriculture, food and beverages, and wholesale and retail trade has been a major component of GDP in the Philippines; for instance, the VA of each accounted for about 10% of GDP in 2015. While the proportion of GDP due to the VA of most FVC-related industries shrank, that due to the VA of the hotel-and-restaurant and food-and-beverage industries gradually expanded.
- Interindustry transactions involving product flows from agriculture and fishing to the food and beverage industries gently increased. The transactions from the food-and-beverage industries to the hotel-and-restaurant industries also slightly increased. The growth of intra-industry transactions within the food and beverage industries was observable, while transactions within agriculture and fishing stagnated.

Linkages amongst FVC-related Industries

- The increase of final demand in the food and beverage industries had some positive impacts on the VA of upstream sectors, particularly agriculture. This result suggests that interventions in the food and beverage industries do contribute to the development of agriculture.
- The effects of downstream industries on the VA of fishing was limited compared with those on agriculture. It is also suggested that services from the trade sectors were necessary, but alone not sufficient, to automatically drive the development of the FVC-related industries.
- Production growth can accompany a rise in per capita employee compensation in all FVC-related industries, especially the agricultural and fishing sectors.
- The food and beverage industries, which had remarkably high per capita compensation, as well as a stable increase in the number of employees, seemed to be one of the more attractive sectors in terms of labour absorption, although the number of employees was actually very limited.

Supply–Demand Balance of Agri-food Products

- Most agri-food products—particularly oil and sugar crops, cereals, and fruits and nuts—were produced and consumed mainly in the domestic market. A comparatively large amount of cereals were also imported, followed by milk. Fruits and nuts, mainly bananas and pineapples, were exported in remarkably large quantities, making them the largest category of export goods. The second largest export category was fat and oils, and the third was oil and sugar crops. Even though cereals are mainly produced/consumed at home, the little that's produced in foreign markets are in large enough volumes to rank high compared with other exports and imports. One of the characteristics of the Philippines was the large volume of fruit and nut production, approaching that of Indonesia, the largest producer of the countries covered in this report.
- The export prices of aquatic products—such as both raw and processed crustaceans, processed freshwater fishes, and processed molluscs—were remarkably high. While the export values of those products were limited, the export values of certain high-priced processed marine fishes were considerable. We can conclude that processed marine fishes exported in large amounts had

high enough values to induce active trade. By contrast, high-priced processed food, nei, seemed to have high import values for the Philippines.

The Competitiveness of Each Product in the ASEAN Region

- Philippine vegetable products in the low- and mid-price ranges, especially fruits and nuts such as bananas and pineapples, and other products such as processed cereals for breakfast and flour of roots and tubers, nes, tended to be imported in great quantities into the ASEAN region, considering their prices. With regard to aquatic products, Malaysia imported significantly larger quantities of seaweeds from the Philippines than had been estimated based on their import prices.
- Research on the characteristics of the goods actively exported by other countries to the Philippines might trigger a reconsideration of production and marketing strategies for domestic products that could compete with goods produced by other ASEAN states, for instance: dried fruits, soya paste, and yogurt from Thailand; breakfast cereals and ice cream from Indonesia; tilapias and other cichlids from Viet Nam; and soya sauce from Singapore.
- Within the categories of stimulants and spices, vegetables, and fruits and nuts, land productivity and ratios of the yield of nuts, nes, or minor nuts exceeded those values for all the other products. Amongst the stimulants and spices and vegetables, pepper and asparagus had the highest land productivity. Similarly, goat meat, turkey, and fresh whole cow's milk had high feed productivity and ratios of the yield, compared with those values for other livestock products. The potential of these products as exports to other ASEAN countries could be high if they became competitive with the products from those other countries by means of greater physical productivity.

Chapter 6

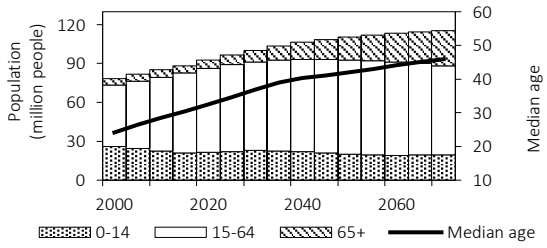
Viet Nam

1. Social and Economic Conditions

Population and Per Capita GDP

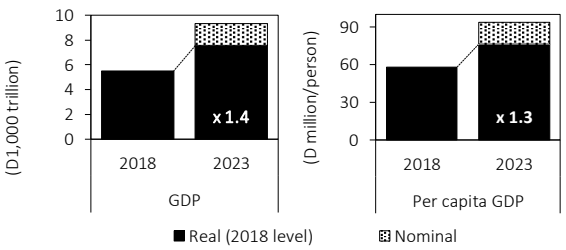
The population of Viet Nam, 96 million people in 2018, accounts for 15% of the total population of the ASEAN region, placing it third amongst the ASEAN countries. It is expected to reach 115 million by 2050 (Figure 6.1). The working-age people, those between 15 and 65, are the majority of the country's population, and their numbers are expected to steadily increase until 2040. This trend may imply economic growth for a time, but with the possibility of an economic slowdown in the long term. The large size of Viet Nam's population and its strong prospect of population and economic growth suggest that the country has a high potential as a consumption market for agri-food products. At the same time, this prospect also implies a growing importance of foreign markets as destinations for Vietnamese goods in the long term.

Figure 6.1. Population by Age Group, 2000–2060



Source: United Nations Department of Economic and Social Affairs (UN DESA, 2017).

Figure 6.2. Changes in GDP and Per Capita GDP, 2018 and 2023

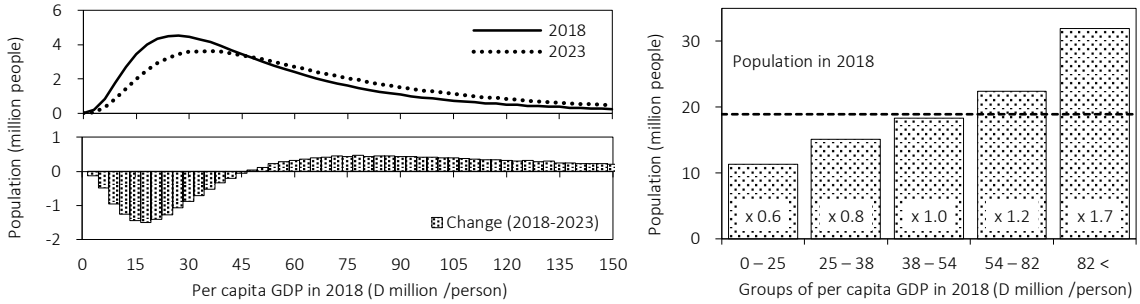


D = dong (Vietnamese currency).
GDP = gross domestic product.
Source: Estimates based on data from the International Monetary Fund (IMF, 2018).

Real GDP and per capita real GDP are expected to increase by 1.4 times and 1.3 times, respectively, from 2018 to 2023 (Figure 6.2). According to a projection of Viet Nam's population based on the level of per capita GDP (Figure 6.3, Appendix 3.1), as per capita GDP approaches D45 million, a boundary is crossed whereby the number of people whose annual contributions to GDP are below that value will decrease. By contrast, the number of people with per capita GDP above D45 million will increase across a wide range of the distribution. In particular, the population with incomes above D82 million (i.e. the 80th percentile) will expand by 1.5 times by 2023. This projection implies a rapid increase in the number of high-income people. It will thus be necessary to establish a system for supplying agri-food products to match the demand from this rapidly growing upper-income bracket.

Figure 6.3. Estimated Population of Viet Nam by Per Capita GDP, 2018 and 2023

A. Distribution of Population Changes B. Population Divided into Five GDP Groups



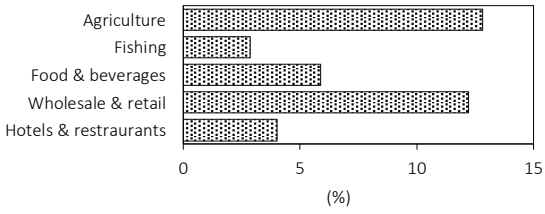
D = dong (Vietnamese currency).
GDP = gross domestic product.
Note: The per capita GDP is based on constant 2018 prices. Bars in Figure B are estimated population in 2023. Numbers in bars denote changes of the population from 2018 to 2023.
Source: Appendix 3.1.

The VA of FVC-related Industries

The VA of agriculture and of wholesale and retail trade has been a major component of Viet Nam's GDP; for instance, the VA of each accounted for about 13% of GDP in 2015 (Figure 6.4). Meanwhile, the VA of the other FVC-related industries was comparatively small.

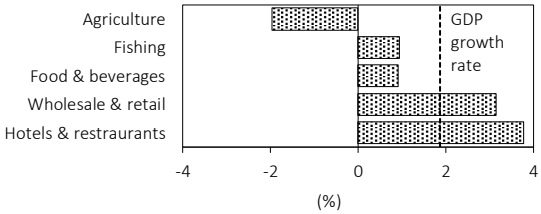
The annual growth rates of real VA in FVC-related industries were within the range of -2%–4%, lower than the rates for the other ASEAN countries covered in this report (Figure 6.5). The growth rates of the hotel-and-restaurant and wholesale and retail trade industries were higher than the average GDP growth rate, though the rates for other industries, especially agriculture, were lower. While the proportion of GDP due to the VA of most FVC-related industries shrank, the proportions due to the VA of the hotel-and-restaurant and wholesale and retail trade industries gradually expanded.

Figure 6.4. The Proportion of VA in GDP, 2015



GDP = gross domestic product, VA = value added.
Sources: Estimates based on data from Eora (2018).

Figure 6.5. Average Annual Change in Real VA, 2000–2015



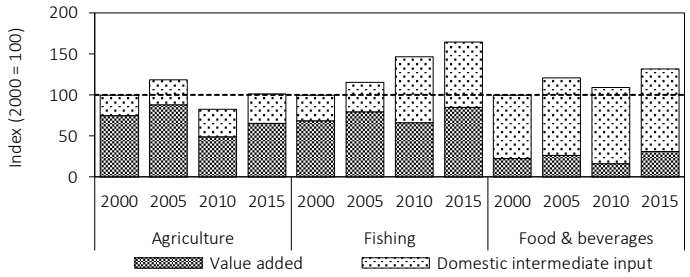
GDP = gross domestic product, VA = value added.
Sources: Estimates based on data from Eora (2018) and the Internatioanl Monetary Fund (IMF, 2018).

The production values of the agriculture and food-and-beverage industries were almost flat from 2000 to 2015, while that of fishing increased slowly during that period (Figure 6.6). The part of production value due to the VA (i.e. the VA rate) was large in the agriculture and fishing industries, at around 60%, and small in the food and beverage sector, at around 20% after 2010 (Figure 6.7). The food and

beverage sector depended on intermediate inputs from within this sector and from other, related sectors; and production in the food and beverage sector would generally induce more production within that sector, and in related sectors, than it would in agriculture and fishing.

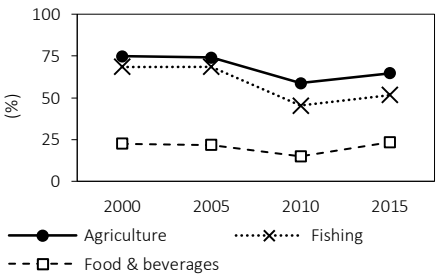
The VA rates of the food and beverage industries were almost flat between 2000 and 2015 (Figure 6.7). That may reflect the fact that the production structure stayed the same in terms of cost of sales to revenue ratios, the product mix, and/or the ability of technology to generate savings on inputs. The sudden drop in the VA rates of agriculture and fishing during 2005–2010 may indicate a change in the production structures that included a further use of intermediate inputs or a strengthening of ties with other industries.

Figure 6.6. Values of Domestic Production, 2000–2015



Note: The results in the figure are based on real values.
Sources: Estimates based on Eora (2018) and the International Monetary Fund (IMF, 2018).

Figure 6.7. VA Rates, 2000–2015



VA = value added.
Sources: Estimates based on data from Eora (2018).

Intermediate Inputs in Agri-food Industries

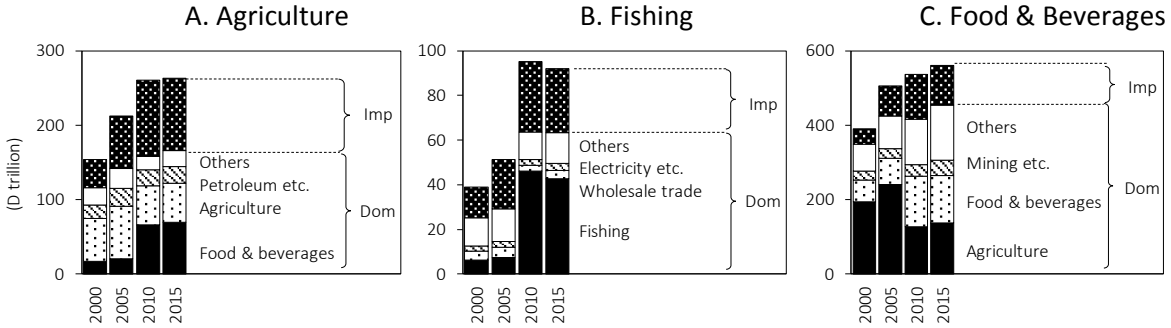
Figure 6.8 shows which industries contributed to the growth of the agriculture, fishing, and food-and-beverage industries from 2000 to 2015. Intermediate inputs into all three agri-food production sectors came largely from domestic sources, whilst a certain value of intermediate inputs was imported. Inputs in agriculture and fishing stagnated after 2010, while inputs in the food-and-beverage industries gradually increased.

Intermediate inputs from the food and beverage industries accounted for the largest portion of inputs into agriculture, followed by inputs from agriculture itself and from petroleum, chemical, and non-metallic mineral product ('petroleum etc.') industries.[1] The largest sources of inputs into the fishing and food-and-beverage industries were fishing and agriculture, respectively. An example of an input from the food and beverage industry into agriculture was feed used for livestock production.

The agriculture and food-and-beverage industries accounted for large portions of intermediate inputs into the food and beverage industry itself after 2010 (Figure 6.8 C). This implies that the growth of the food and beverage industry was largely driven in equally by supply of processed food and raw agricultural products. This growth in Viet Nam induced a certain degree of agricultural development through the industries' demand for intermediate inputs.

[1] Table A2.1, in Appendix 2, shows the industry classifications mentioned in this section, including 'petroleum etc.' One major input from the petroleum etc. industry was fuel oil, which was needed for agriculture and for the production of chemical fertilizers.

Figure 6.8. Sources of Intermediate Inputs, 2000–2015

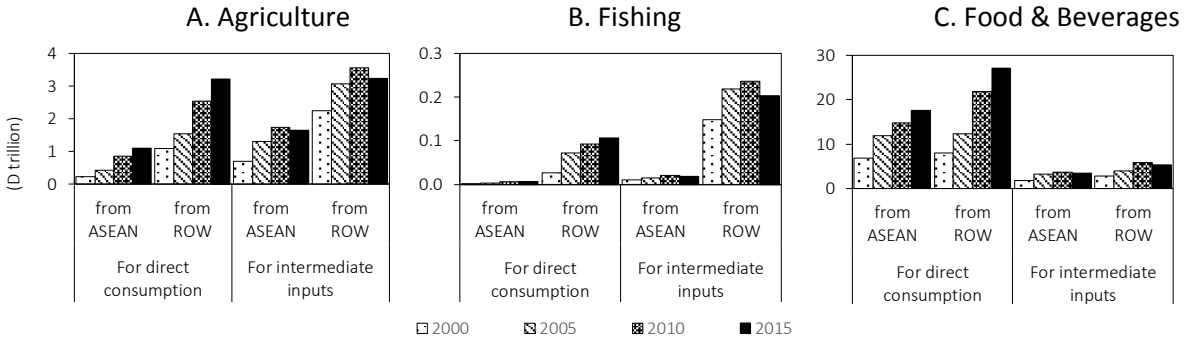


D = dong (Vietnamese currency).
Dom = domestic supply, Imp = imports.
Notes: The values in these graphs are based on constant 2015 prices. 'Petroleum etc.' refers to the petroleum, chemical, and non-metallic mineral product industries.
Sources: Estimates using data from Eora (2018) and the International Monetary Fund (IMF, 2018).

The value of imports from foreign agricultural, fishing, and food-and-beverage sectors were limited compared with the value of domestic production between 2000 and 2015 (Figure 6.9). Agricultural and food-and-beverage imports gradually increased, but imports of fishing products mostly stagnated from 2010 to 2015. Imported agricultural products for direct consumption and for use as intermediate inputs were at the same level. By contrast, Viet Nam imported more fishery products for use as intermediate inputs, and more food-and-beverage products for direct consumption.

Although the imports from ASEAN countries were smaller than those from the ROW, this is actually an indication of significant levels of value and growth. We can see from Figure 6.9 that, during 2000–2015, Viet Nam gradually strengthened its linkages as an importer with both the ROW and ASEAN countries.

Figure 6.9. Values of Imports, by Purpose, 2000–2015

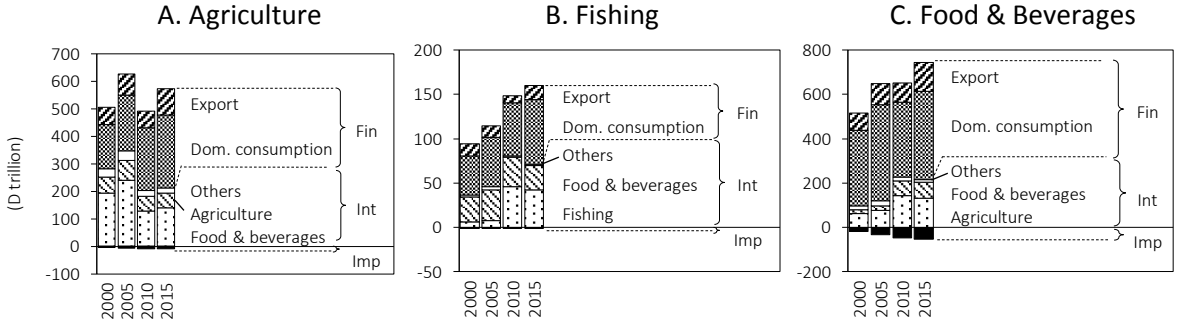


D = dong (Vietnamese currency).
ASEAN = Association of Southeast Asian Nations, ROW = rest of the world.
Notes: The values of imports shown in these graphs are based on constant 2015 prices. They include imports from foreign agricultural, fishing, and food-and-beverage sectors destined for domestic final consumption and for use as intermediate inputs in all domestic industries.
Sources: Estimates based on data from Eora (2018) and the International Fund (IMF, 2018).

Destinations of Products of Agri-food Industries

Interindustry transactions involving flows of products from agriculture and fishing to the food and beverage industries stagnated after 2010 (Figure 6.10). Unlike many other ASEAN countries in this report, there are no indications of domestic product flows from fishing to the hotel-and-restaurant industries or from the food-and-beverage industries to the hotel-and-restaurant industries. Intra-industry transactions within the agriculture, fishing, and food-and-beverage industries levelled off after 2000 or 2010, depending on the industry. Several linkages in the FVC remained at the same levels in Viet Nam, especially after 2010, with regard to interindustry and intra-industry transactions.

Figure 6.10. Destinations of Domestically Produced and Imported Goods, 2000–2015

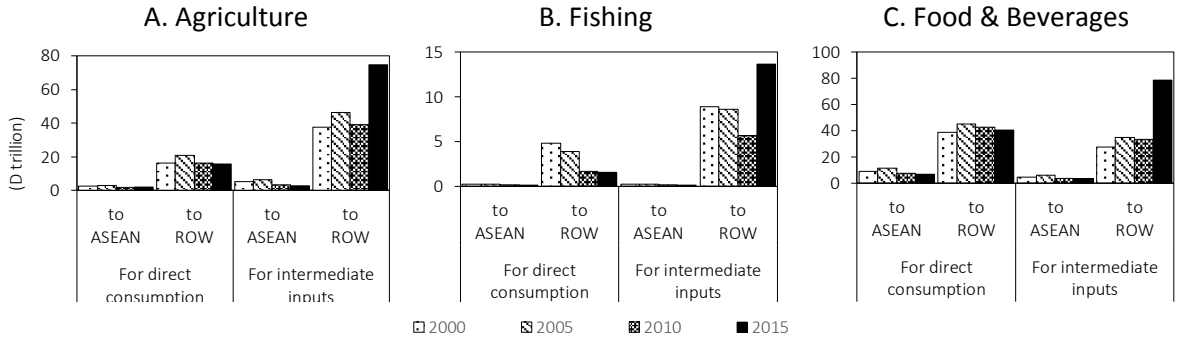


D = dong (Vietnamese currency).
Dom. = domestic.
Notes: The values in these graphs are based on constant 2015 prices. 'Fin' = final demand for domestic and imported goods, 'Int' = intermediate demand for domestic and imported goods, and 'Imp' = the imports of final and intermediate goods. Total demand = Fin + Int. Domestic production = Fin + Int - Imp.
Sources: Estimates based on data from Eora (2018) and the International Monetary Fund (IMF, 2018).

Final demand in the agriculture, fishing, and food-and-beverage industries hovered around the same level during 2000–2015 (Figure 6.10). Export value jumped during 2010–2015, after having levelled off or declined before 2010. Figure 6.11 shows that a relatively large portion of Viet Nam's agricultural and fishery exports were consumed as intermediate goods. Meanwhile, from 2000 to 2010, the exports from the country's food and beverage industries were almost evenly divided between direct consumption and use as intermediate inputs. In 2015, the exports used as intermediate inputs doubled, substantially exceeding those destined for direct consumption.

The primary destination of the exports from the agriculture, fishing, and food-and-beverage industries was the ROW. As an exporter, Viet Nam deepened its linkages more with the ROW than with the rest of the ASEAN region.

Figure 6.11. Values of Exports, by Purpose, 2000–2015



D = dong (Vietnamese currency).
ASEAN = Association of Southeast Asian Nations, ROW = rest of the world.
Note: The values in these graphs are based on constant 2015 prices.
Sources: Estimates based on data from Eora (2018) and the International Monetary Fund (IMF, 2018).

2. Linkages amongst FVC-related Industries

Final Demand in FVC Industries

First, let us see how final demand for domestic FVC-related industries induces the use of intermediate inputs and affects production and VA in each industry.

Table 6.1 shows the composition of final demand during 2000–2015. Final demand was strongest in the food and beverage industries, followed by agriculture. The annual growth of final demand in the food and beverage industry was driven by exports to the ROW, rather than by domestic household consumption, which was a major driver of final demand in the other ASEAN countries covered in this report. It is notable that household consumption of goods from the food and beverage industries levelled off in Viet Nam. The average annual growth of final demand in agriculture, D8 trillion, outstripped the rates for the other FVC-related industries. Household consumption claimed the largest share of final demand in agriculture, having grown rapidly.

Table 6.1. Final Demand for Products/Services of FVC-related Industries, 2000–2015

(D trillion)

Final demand as	Domestic production of											
	Agriculture		Fishing		Food & beverages		Wholesale trade		Retail trade		Hotels & restraurants	
	Value	Change	Value	Change	Value	Change	Value	Change	Value	Change	Value	Change
Domestic consupmtion												
Household consumption	218	5	72	2	324	-1	115	3	9	0	86	3
Other consumption	3	0	1	0	5	0	2	0	0	0	1	0
Capital formation	40	2	0	0	25	0	30	1	0	0	0	0
Export												
Export to ASEAN	5	0	0	0	10	0	2	0	0	0	5	0
Export to ROW	91	2	15	0	119	3	47	0	4	0	36	0
Total	356	8	89	2	483	2	196	4	13	0	128	3
Annual change rate (%)		2.9		2.6		0.5		2.4		1.1		2.4

D = dong (Vietnamese currency).
ASEAN = Association of Southeast Asian Nations, FVC = food value chain, ROW = rest of the world.
Notes: The values in this table are in constant 2015 prices. 'Change' refers to the average annual changes as estimated based on data for 2000–2015.
Source: Appendix 3.2.

Production and VA Induced by Final Demand

Table 6.2 shows sources of intermediate inputs during 2000–2015 that came from domestic and foreign industries, and were destined for use in production by major FVC-related industries in Viet Nam. The table indicates that 5% of intermediate inputs into the hotel and restaurant sector came from the domestic food and beverage sector, and 20% of inputs into the food and beverage sector came from domestic agriculture. This suggests that the hotel-and-restaurant and food-and-beverage sectors can sequentially induce some agricultural production. The table also shows that FVC-related industries in Viet Nam rarely used inputs other than from the wholesale trade industry, and these came more from foreign than from domestic sources.

The data in this table suggests that several linkages composing the input–output structure in Viet Nam drastically changed. Fishing rapidly increased the value of intermediate inputs sourced from within that industry: by 1.7% annually. Meanwhile, the food and beverage industries reduced the inputs they obtained from domestic agriculture by 1.5% annually. If structural changes such as these continue in the future, the development of fishing will drive a larger share of the growth of that sector, while the development of the food and beverage industry will have less of an effect on agriculture.

Table 6.2. Sources of Intermediate Inputs in Major FVC-related Industries, 2000–2015

Input from		Domestic production of: Agriculture Share (%)	Agriculture Change	Fishing Share (%)	Fishing Change	Food & beverages Share (%)	Food & beverages Change	Wholesale trade Share (%)	Wholesale trade Change	Retail trade Share (%)	Retail trade Change	Hotels & restraurants Share (%)	Hotels & restraurants Change
Agriculture	Domestic	9	-0.15	1	0.00	20	-1.53	0	-0.02	0	0.00	1	-0.12
	ASEAN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	ROW	0	0.00	0	0.00	0	0.01	0	0.00	0	0.00	0	0.00
Fishing	Domestic	0	-0.01	27	1.70	4	-0.12	0	0.00	0	0.00	1	-0.06
	ASEAN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	ROW	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Food & beverages	Domestic	12	0.74	0	-0.01	18	0.58	0	-0.03	0	-0.02	5	-0.41
	ASEAN	0	0.00	0	0.00	0	0.01	0	0.00	0	0.00	0	0.00
	ROW	0	0.00	0	0.00	0	0.01	0	0.00	0	0.00	0	0.01
Wholesale trade	Domestic	1	-0.06	2	-0.18	5	0.04	0	-0.24	1	-0.39	1	-0.09
	ASEAN	1	0.02	1	0.01	1	0.04	1	0.02	1	0.02	1	0.02
	ROW	3	0.15	3	0.13	6	0.28	3	0.13	5	0.20	3	0.15
Retail trade	Domestic	0	0.00	0	-0.01	0	0.00	0	-0.02	0	-0.13	0	0.00
	ASEAN	0	0.02	1	0.01	1	0.04	0	0.02	1	0.02	1	0.02
	ROW	1	0.03	1	0.02	2	0.06	1	0.03	1	0.04	1	0.03
Hotels & restraurants	Domestic	0	0.00	0	0.00	0	0.01	0	-0.03	0	-0.04	1	-0.02
	ASEAN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	ROW	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

ASEAN = Association of Southeast Asian Nations, FVC = food value chain, ROW = rest of the world.
Notes: 'Share' refers to the intermediate inputs as a percentage of total inputs in 2015. 'Change' refers to the average annual changes in the shares as estimated based on data for 2000–2015.
Source: Appendix 3.2.

Table 6.3 shows the VA directly and indirectly boosted by a 1% increase over the 2015 value of final demand for domestic products and services through an increase in domestic production and intermediate inputs. For example, a 1% increase in final demand in the food and beverage sector generated a D0.7 trillion increase in the VA of agriculture, as well as a D1.2 trillion increase in the VA of the food-and-beverage sector itself.

Increases in final demand in the food and beverage industries had some impact on the VA of upstream sectors, particularly agriculture. This result suggests that interventions in the food and beverage industries do contribute to the development of agriculture.

Downstream industries had a notable effect on the VA of fishing, as the size of the fishing market is limited. For instance, the amount of VA in the fishing sector induced by a 1% increase in final demand in the food and beverage industries (D0.14 trillion) was large compared with that driven by the final demand in the fishing sector itself (D0.51 trillion). Increasing final demand in the food and beverage industries can thus be an effective way to promote the development of the fishing industry.

The inducement effect of final demand in the wholesale and retail trade sectors on the other four sectors discussed above was very small, as is shown in Table 6.3. Meanwhile, Table 6.2 indicates that FVC-related industries, especially the food and beverage industries, did depend on inputs from the wholesale trade industry during 2000–2015. It is suggested that the services provided by the wholesale/retail trade sectors are necessary, but alone not sufficient, to automatically drive the development of the FVC-related industries.

Table 6.3. VA Induced by a 1% Increase in Final Demand, 2015

(D trillion)

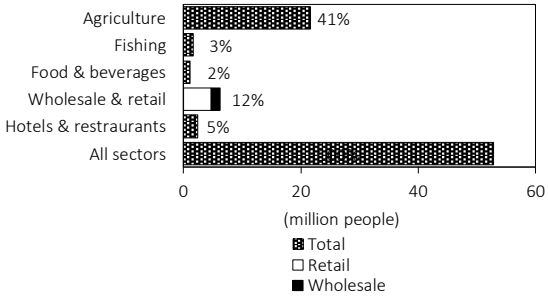
Induced value added in	1% increase in final demand for					
	Agriculture	Fishing	Food & beverages	Wholesale trade	Retail trade	Hotels & restraurants
Agriculture	2.18	0.01	0.72	0.00	0.00	0.02
Fishing	0.01	0.51	0.14	0.00	0.00	0.01
Food & beverages	0.12	0.00	1.21	0.00	0.00	0.02
Wholesale trade	0.08	0.03	0.29	1.43	0.00	0.02
Retail trade	0.00	0.00	0.00	0.00	0.09	0.00
Hotels & restraurants	0.00	0.00	0.01	0.01	0.00	0.84

D = dong (Vietnamese currency).
VA = value added.
Source: Appendix 3.2.

The Relationship amongst the Number of Employees, Per Capita Compensation, and Production

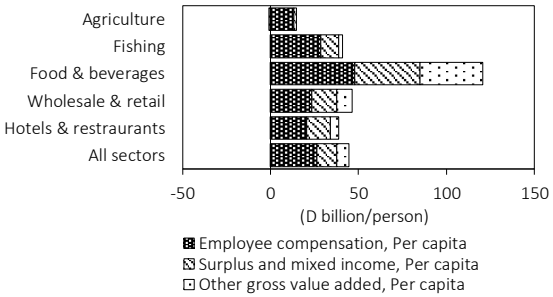
Now let us consider how an increase in production relates to changes in the number of employees and per capita employee compensation. According to figures 6.12 and 6.13, the agricultural sector in 2015 was characterized by a large number of employees, low labour productivity, and low per capita compensation compared with other FVC-related industries. By contrast, the food and beverage industries had a limited number of employees, but particularly higher labour productivity and per capita compensation than the average values in Viet Nam.

Figure 6.12. Number of Employees, by Sector, 2015



Sources: International Labour Organization (ILO, 2019); Appendix 3.3.

Figure 6.13. Gross VA per Capita, by Sector, 2015



D = dong (Vietnamese currency).
VA = value added.
Sources: Estimates based on data from Eora (2018) and the International Labour Organization (ILO, 2019); Appendix 3.3.

Figure 6.14 illustrates the relationship amongst the number of employees, per capita compensation, and production during 2000–2015. Figure 6.14A depicts the proportion of the average annual rate of change in production in each sector that was attributable to total employee compensation. The values differ by sector; for instance, they show stagnation in agriculture (0.3%) and rapid growth in fishing (3.8%). Among the countries covered in this report, the contribution of employee compensation to agricultural production has a negative value only in Viet Nam.

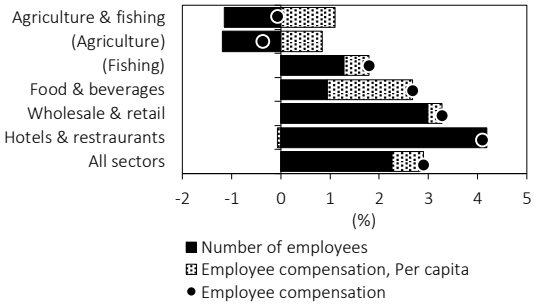
The average annual rates of change in the total value of employee compensation were within the range of 0.4%–4.1% in all of the observable FVC-related sectors (Figure 6.14 B). Two factors determine the total value of employee compensation: the number of employees and per capita compensation. In these sectors, the changes occurred in both the number of employees and per capita compensation. In the agricultural sector, the number of employees decreased, accompanied by an increase in per capita compensation. As the number of employees declined faster than the increase in per capita compensation, the total compensation appears to have slightly decreased. In the other sectors, with the exception of the food and beverage industries, the growth in the number of employees exceeded that of per capita compensation.

These results suggest that production growth can accompany a rise in per capita compensation in many FVC-related industries, particularly in the agricultural sector. Another notable point is the decline in the number of employees in the agricultural sector. The sector's large number of employees, low-level labour productivity, and low per capita compensation, along with a certain degree of growth in per capita compensation and a decrease in the number of employees, imply the existence of a labour surplus. Any interindustry movement of labourers would be deeply connected to the productivity and efficient development of agriculture. The food and beverage sector, which had higher per capita employee compensation than the other FVC-related industries, seems to have been an attractive sector in terms of labour absorption, although the number of employees was very limited and was increasing only slowly.

Figure 6.14. Changes in Production and Employee Compensation, 2000–2015

A. Breakdown of the Average Annual Rates of Change in Production

B. Breakdown of the Average Annual Rates of Change in Employee Compensation



Notes: Other factors include changes in the value added (VA), other than from employee compensation, and changes in intermediate inputs. The data is from selected years during 2000–2015.
Source: Appendix 3.3.

3. Supply–Demand Balance of Agri-food Products

Supply–Demand Structure

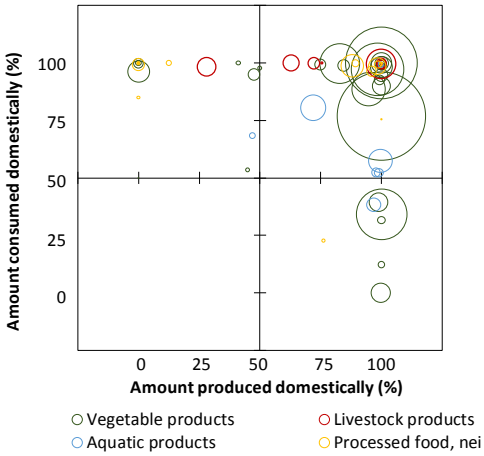
Figure 6.15 shows the structure of domestic commerce and foreign trade in 2004–2013. There are two graphs, each of which is divided into four quadrants defined by two criteria: whether agri-food goods were produced domestically or in foreign markets and whether they were *consumed* in domestically or in foreign markets. In 6.15 A and 6.15 B, the circles are scattered across three of the four quadrants. The circles vary in size according to the volumes produced of the goods they represent. The pattern of circles is the same in both graphs, but the circles in Figure 6.15 A are colour-coded to indicate the agri-food sector, whilst those in Figure 6.15 B are colour-coded to reflect growth rates.

The top side of each graph represents goods that were mostly or completely consumed domestically, and the right side represents goods that were mostly or completely produced domestically. Most agri-food products are concentrated in the first (upper-right) quadrant, which represents goods that were produced and consumed in the domestic market (i.e. domestic-oriented goods). There are a number of small and medium-sized circles falling along the level representing 100% domestic consumption, across the first and second (upper-left) quadrants, the latter representing goods produced in foreign markets and consumed domestically (i.e. import-oriented goods). There are also many small and medium-sized circles falling along the level representing 100% domestic production, across the first and fourth (lower-right) quadrants, the latter representing goods that are produced domestically and consumed in foreign markets (i.e. export-oriented). This means that many goods produced in Viet Nam were consumed in foreign markets, and many goods produced in foreign markets were consumed in Viet Nam.

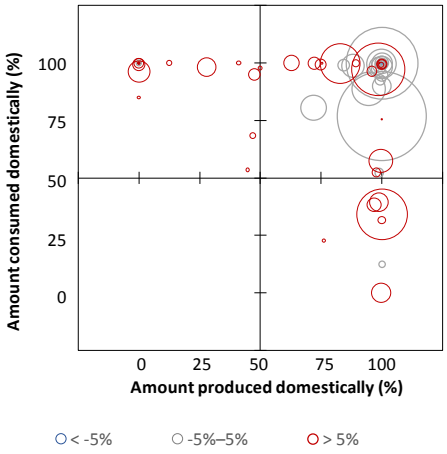
There are no circles to be observed in the third (lower-left) quadrant, which represents imported products that are destined for re-exportation (i.e. trade-oriented goods). Figure 6.15 shows fewer large circles at the spot representing 100% domestic production and consumption than are seen for Indonesia (Figure 4.15) and the Philippines (Figure 5.15). Furthermore, more products are observed in the second and fourth quadrants than are seen in the corresponding figures for Lao PDR (Figure 7.15), Cambodia (Figure 8.15), and Myanmar (Figure 9.15).

Figure 6.15. Classification of Agri-food Products by Supply–Demand Balance, 2004–2013

A. By IC1 Group, Annual Averages



B. By Average Annual Growth Rate



IC1 = item category level 1, nei = not elsewhere included.

Notes: Each circle represents a Food Balance Sheet (FBS) item as designated by FAOSTAT. The sizes of the circles express the quantity of total supply, with the proportions estimated based on quantitative data. 'IC1' comprises the author's classifications of broad agri-food product categories (see Appendix 2.2). In these graphs, the percentage of goods not produced/consumed domestically are produced/consumed in foreign markets. Data classification: FBS items.

Sources: FAO (2019); Appendix 3.4.

Table 6.4 shows that most agri-food products—particularly cereals (11), oil and sugar crops (12), and vegetables (13)—were produced and consumed mainly in the domestic market in 2004–2013. A comparatively large quantity of cereals was imported, followed by vegetables, milk (22), marine fishes (31), and fat and oils (42). Many vegetable and aquatic products, especially cereals (11) and vegetables (12), were also exported in significant quantities. Several IC2 groups, such as stimulants and spices (15) and crustaceans (33), were consumed more in foreign markets than in the domestic market. Another characteristic of Viet Nam is the large production and domestic supply of meat (21), which exceeded those of the other ASEAN countries covered in this report.

Annual change data indicates a soaring growth in the production and domestic supply of cereals, oil and sugar crops, and vegetables. Cereal imports and exports, as well as vegetables exports, also grew rapidly. Similarly, data on the production and domestic supply of fruits and nuts, meat, and freshwater fishes (31) shows steady growth during this period.

Table 6.4. Supply–Demand Balance of Agri-food Products, 2004–2013

(1,000 metric tons)

IC1	IC2	2004–2013 average				Average annual change, 2004–2013			
		Production	Domestic supply	Import	Export	Production	Domestic supply	Import	Export
1 Vegetable products	11 Cereals	30,495	27,042	2,840	6,061	864	761	334	401
	12 Oil and sugar crops	18,678	18,747	300	159	448	525	93	1
	13 Vegetables	19,770	14,266	306	5,809	1,058	411	31	1,042
	14 Fruits and nuts	7,612	6,771	347	1,151	200	132	49	140
	15 Stimulants and spices	1,567	197	40	1,429	88	16	7	78
2 Livestock products	21 Meat	3,992	4,419	440	12	195	309	112	-1
	22 Milk	316	1,114	816	19	29	85	56	1
	23 Eggs	275	273	0	2	23	23	0	0
3 Aquatic products	31 Freshwater fishes	1,823	1,063	9	789	150	55	2	110
	32 Marine fishes	1,567	1,777	655	446	61	74	34	22
	33 Crustaceans	625	247	20	398	38	4	3	37
	34 Molluscs	478	254	8	232	19	18	1	3
	35 Aquatic animals, nei	9	9	0	0	4	4	0	0
	36 Aquatic plants	86	86	0	1	22	22	0	0
4 Processed food, nei	41 Sugar	1,488	1,696	232	24	30	72	45	3
	42 Fat and oils	387	974	622	31	15	69	61	6
	43 Food, nei	0	10	10	0	0	1	1	0
	44 Alcoholic beverages	1,254	1,269	40	24	55	55	6	6

IC1 = item category level 1, IC2 = item category level 2, nei = not elsewhere included.

Note: 'IC1' and 'IC2' comprise the author's classifications of broader product categories and more specific groups, respectively (Appendix 2.2). This table is based on an aggregation of all the data available from FAOSTAT's Food Balance Sheet (FBS). Data classification: FBS items.

Sources: FAO (2019); Appendix 3.4.

Table 6.5 shows FBS items (as designated by FAOSTAT) listed in descending order of total supply quantity within each category in 2004–2013, corresponding to each quadrant in Figure 6.15. The products existing in large quantities, such as rice, sugar cane, and other vegetables, are concentrated in the column for domestic-oriented products. Most products are in the cells representing stable or expanding markets for domestic-, export-, or import-oriented products.

Other vegetables—mainly leaf fruit vegetables (other than tomatoes), onions, pulses, and starchy roots— are identifiable as domestic-oriented products by their large quantities of supply undergoing rapid growth. Maize and its products, freshwater fishes, and meats (21) such as poultry and bovine meats, also stand out for their rapid growth. Cassava and products, followed by coffee, nuts, and nut products, were major export-oriented items with rapidly growing supplies. By contrast, wheat and wheat products, as well as milk, are examples of import-oriented products.

Table 6.5. Total Quantities of Supply for Product Categories, in Descending Order, 2004–2013

(1,000 metric tons)

Category			Domestic-oriented			Export-oriented			Import-oriented			Trade-oriented		
Provided by			Domestic market						Foreign market					
Consumed in			Domestic market			Foreign market			Domestic market			Foreign market		
Change		Rank	IC2	FBS items	Quantity	IC2	FBS items	Quantity	IC2	FBS items	Quantity	IC2	FBS items	Quantity
Annual change rate, 2004–2013 (%)	Expanding r > 5	1	13	Vegetables, other	9,139	13	Cassava and products	8,435	11	Wheat and products	1,551			
		2	11	Maize and products	5,280	15	Coffee and products	1,172	22	Milk - excluding butter	1,132			
		3	31	Freshwater fish	1,852	14	Nuts and products	1,119	42	Palm oil	477			
		4	21	Poultry meat	821	33	Crustaceans	645	12	Soyabeans	464			
		5	21	Bovine meat	455	15	Tea (including mate)	177	11	Barley and products	315			
	Stable -5 < r < 5	1	11	Rice (milled equivalent)	25,953	15	Pepper	129	14	Apples and products	101			
		2	12	Sugar cane	16,934				42	Oilcrops oil, other	32			
		3	14	Fruits, other	3,671				42	Rape and mustard oil	3			
		4	21	Pigmeat	2,785				11	Cereals, other	3			
		5	32	Marine fish, other	2,109				44	Cream	0.8			
	Shrinking r < -5	1	12	Cottonseed	11									
		2												
		3												
		4												
		5												

FBS = Food Balance Sheet (FAOSTAT), IC2 = item category level 2, r = average annual change rate.
Notes: The values in this table represent the averages for 2004–2013. Data classification: FBS items.
Sources: FAO (2019); Appendix 3.4.

Trade Prices and Volumes

The export prices of all aquatic products, especially processed crustaceans (33), were remarkably high during 2014–2106 (Table 6.6). Export values, as well as export prices, were relatively high for both raw and processed crustaceans (33). We can conclude that the raw and processed crustaceans exported in large amounts had high enough values during this period to induce active trade.

The import prices of aquatic products, including raw aquatic animals, nei (35), raw marine fishes (32), and both raw and processed crustaceans (33), exceeded those of many other products. The prices of raw and processed eggs (23), stimulants and spices (15), and food, nei (43) were also conspicuously high. The import values of most of these high-priced products were quite small, with the exception of food, nei (41), raw crustaceans, and raw stimulants and spices. High-priced items that were largely imported, such as processed food, nei, raw crustaceans, and raw stimulants and spices, apparently had high import values for Viet Nam.

Overall, the export and import prices of processed products tended to be higher than those of primary products, except for some items such as eggs, sugar, and several aquatic products.

Table 6.6. Prices and Values of Exported/Imported Agri-food Products, 2014–2016

IC1	IC2	Price ($/kg)				Value ($ million)			
		Export		Import		Export		Import	
		Primary products	Processed products	Primary products	Processed products	Primary products	Processed products	Primary products	Processed products
1 Vegetable products	11 Cereals	0.4	0.5	0.3	1.2	21	3,298	679	538
	12 Oil and sugar crops	1.1	2.5	0.6	2.5	119	74	858	59
	13 Vegetables	1.1	1.5	1.0	2.4	674	119	310	77
	14 Fruits and nuts	4.3	2.4	1.3	2.4	2,548	349	1,088	27
	15 Stimulants and spices	2.5	5.4	5.6	6.3	4,233	306	208	60
2 Livestock products	21 Meat	—	2.9	—	2.6	0.0	72	0.0	239
	22 Milk	1.6	3.1	1.3	3.5	10	92	27	537
	23 Eggs	1.7	2.1	6.7	5.7	5	0.5	5	3
3 Aquatic products	31 Freshwater fishes	6.1	3.1	7.0	4.0	1	1,783	17	109
	32 Marine fishes	5.5	4.9	14.5	2.2	37	546	4	276
	33 Crustaceans	8.7	10.7	9.5	10.3	2,150	1,234	394	7
	34 Molluscs	4.3	6.9	4.6	5.5	413	117	50	1
	35 Aquatic animals, nei	4.4	6.2	16.2	—	1	1	0.2	0.0
	36 Aquatic plants	9.3	—	9.3	—	1	0.0	3	0.0
	38 Fishes, nei	6.1	4.1	8.2	2.9	55	691	2	94
4 Processed food, nei	41 Sugar	3.7	1.0	3.7	0.8	111	329	4	326
	42 Fat and oils	—	1.2	—	1.3	0.0	242	0.0	773
	43 Food, nei	—	3.2	—	6.3	0.0	265	0.0	704
	44 Alcoholic beverages	—	1.8	—	2.5	0.0	176	0.0	80

IC1 = item category level 1, IC2 = item category level 2, kg = kilogram, nei = not elsewhere included.
Notes: This table shows the averages for 2014–2016. The values indicated for exports are based on 'free on board' (FOB) prices, and those for imports are based on 'cost, insurance, and freight' (CIF) prices. Data category: IC2 groups based on the Broad Economic Categories (BEC) classifications of primary products (11) and processed products (12).
Sources: UNSD (2017); Appendix 3.6.

4. The Competitiveness of Each Product in the ASEAN Region

Commodities Imported by ASEAN Countries

Tables 6.7 and 6.8 provide information about the agri-food products imported by ASEAN countries from Viet Nam in 2014–2016. ASEAN countries imported many of these products from Viet Nam more cheaply than they did from other ASEAN+6 countries (Table 6.7). Roughly 65%–80% of items in the IC2 groups were imported as low-priced products. The values of exports from Viet Nam to the rest of the ASEAN region, other than the CLM countries, were at similar levels (Table 6.8).

As shown in Table 6.7, many Vietnamese products that were imported by other ASEAN countries in significantly larger quantities than estimated (based on approximate lines) were the low-price range. One example was freshwater fishes (31). More conspicuous were products that were imported in smaller quantities than initially estimated. Such products included meat (21), fat and oils (42), and sugar (41), all of them in the low-price range.

Table 6.7. Prices and Values of Products Imported by ASEAN Countries, by IC2 Group, 2014–2016

IC1	IC2	Price ($/kg)	Value ($ million)	Number of imported products by price ranges (%)			Number of products deviated from approx. lines (%)						Obs.
							Imported larger			Imported smaller			
				Price ranges			Price ranges			Price ranges			
				Low	Mid	High	Low	Mid	High	Low	Mid	High	
1 Vegetable products	11 Cereals	1.1	678	82	8	10	0	0	1	1	0	1	84
	12 Oil and sugar crops	1.6	18	68	14	18	0	0	0	2	0	2	44
	13 Vegetables	1.2	72	74	12	14	0	1	0	3	2	0	143
	14 Fruits and nuts	1.8	137	75	13	11	0	0	0	3	1	0	158
	15 Stimulants and spices	3.3	429	80	7	13	1	0	0	0	0	0	95
2 Livestock products	21 Meat	4.0	10	64	18	18	0	0	0	14	0	0	22
	22 Milk	2.0	12	74	11	16	0	0	0	0	0	0	38
	23 Eggs	1.2	3	75	0	25	0	0	0	0	0	0	4
3 Aquatic products	31 Freshwater fishes	2.1	116	65	26	10	6	3	0	0	0	0	31
	32 Marine fishes	2.1	85	84	8	8	0	0	0	4	0	0	50
	33 Crustaceans	7.8	63	76	16	8	0	0	0	3	0	0	37
	34 Molluscs	4.4	60	77	13	10	0	0	0	3	0	0	30
	35 Aquatic animals, nei	1.6	5	91	0	9	0	0	0	0	0	0	11
	36 Aquatic plants	8.8	0.1	67	33	0	0	0	0	0	0	0	3
	38 Fishes, nei	2.7	146	81	11	7	0	0	0	0	0	0	27
4 Processed food, nei	41 Sugar	1.6	83	68	15	17	0	0	0	6	0	0	47
	42 Fat and oils	1.3	15	68	14	18	0	0	0	7	0	0	44
	43 Food, nei	1.8	79	76	18	6	0	0	0	0	0	0	17
	44 Alcoholic beverages	1.7	55	78	11	11	0	0	0	0	0	0	18

ASEAN = Association of Southeast Asian Nations, IC1 = item category level 1 and IC2 = item category level 2 (FAOSTAT), kg = kilogram, nei = not elsewhere included.

Notes: The prices and values represent the averages for 2014–2016. 'Price' refers to the import price, including cost, insurance, and freight (CIF) added to the tariff established by the ASEAN *Trade* in Goods Agreement (ATIGA). 'Value' refers to the imported value (CIF) without the tariff. See Appendix 3.6 for price ranges and approximate lines. The products for which the externally studentized residual was significantly large or small at the 10% level were counted. 'Obs.' refers to the number of detailed commodities classified according to the Broad Economic Categories (BEC) three-digit category numbers and used for applying approximation lines. Data category: FAOSTAT Commodity List (FCL) and adjusted groups under the International Standard Statistical Classification of Aquatic Animals and Plants (ISSCAAP), classified under BEC 111, 112, 121, and 122.

Sources: UNSD (2017); Appendix 3.6.

Table 6.8. Prices and Values of Products Imported into the ASEAN Region, by Country, 2014–2016

Importer	Price ($/kg)	Value ($ million)	Number of imported products by price ranges (%)			Number of products deviated from approx. lines (%)						Obs.
						Imported larger			Imported smaller			
			Price ranges			Price ranges			Price ranges			
			Low	Mid	High	Low	Mid	High	Low	Mid	High	
Singapore	2.5	353	77	9	15	0	0	0	1	5	2	200
Brunei	2.0	2	68	9	23	0	0	0	0	7	0	57
Malaysia	1.8	412	76	17	7	1	1	0	0	2	0	190
Thailand	3.1	508	78	15	7	1	0	0	0	4	1	161
Indonesia	1.6	292	84	6	10	2	0	0	0	0	0	50
Philippines	1.3	433	76	13	11	0	1	0	0	1	0	82
Viet Nam	—	0.0	—	—	—	—	—	—	—	—	—	0
Lao PDR	2.3	13	92	8	0	0	0	0	0	0	0	13
Camboodia	1.0	35	77	3	20	0	0	1	1	0	0	96
Myanmar	2.2	0.0	50	26	24	0	0	0	0	0	0	54

ASEAN = Association of Southeast Asian Nations, kg = kilogram, nei = not elsewhere included.

Notes: The prices and values represent the averages for 2014–2016. 'Price' refers to the import price, including cost, insurance, and freight (CIF) added to the tariff established by the ASEAN *Trade* in Goods Agreement (ATIGA). 'Value' refers to the imported value (CIF) without the tariff. See Appendix 3.6 for price ranges and approximate lines. The products for which the externally studentized residual was significantly large or small at the 10% level were counted. 'Obs.' refers to the number of detailed commodities classified according to the Broad Economic Categories (BEC) three-digit category numbers and used for applying approximation lines. Data category: FAOSTAT Commodity List (FCL) and adjusted groups under the International Standard Statistical Classification of Aquatic Animals and Plants (ISSCAAP), classified under BEC 111, 112, 121, and 122.

Sources: UNSD (2017); Appendix 3.6.

Goods Imported in Smaller/Larger Quantities than Estimated Based on Prices: Non-price Competitiveness in the ASEAN Region

Vietnamese vegetable products in low- and mid-price ranges—such as stimulants and spices (15), including green coffee and pepper; and vegetables (13), such as chilies and green peppers—tended to be imported in great quantities by other ASEAN countries in 2014–2016, considering their prices (Table 6.9). Regarding the aquatic category, products in various IC2 groups were imported in substantial amounts, including miscellaneous freshwater fishes, and tilapias and other cichlids. Similarly, products categorized as processed food, nei (such as sugar confectionery) were imported in significantly larger quantities than had been estimated based on their import prices. It might be beneficial to seek opportunities to develop further export markets for these products. Moreover, research on the causes of such active import demand, including production and sales methods, would help identify pathways toward increasing the sales of other items.

Research on the characteristics of the goods actively exported by other countries to Viet Nam might also trigger a reconsideration of production and marketing strategies for domestic products that could compete with goods produced by other states in the ASEAN region, for instance: coconut oil from Malaysia; dried fruits, nes, and breakfast cereals from Thailand; and crabs, nei, from Myanmar.[2]

There were also many products for which the import quantities were significantly smaller during 2014–2016, considering their prices, such as vegetable products in all price ranges; and livestock and aquatic products and processed food, nei, in the low-price range. Although these products were certainly exported to other ASEAN countries, they might not have been as competitive as the same products from other ASEAN and +6 countries. If these items are to be promoted as export goods destined for other ASEAN countries, active and intensive product differentiation will be necessary.

[2] For reference, see tables 2.9 to 9.9. See also Table A4.2 on major exports from the +6 countries.

Table 6.9. Goods Imported by ASEAN Countries in Smaller/Larger Quantities than Estimated Based on Prices, in Ascending Order of P-values, 2014–2016

A. Larger Quantities of Imports than Estimated Based on Prices

IC1	Rank	Price ranges																			
		Low							Mid							High					
		Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value
1 Vegetable products	1	IDN	15	111	Coffee, green	1.8	26	0.10	MYS	13	112	Chillies and peppers, green	1.8	29	0.05	KHM	11	121	Flour, maize	0.6	0.0	0.09
	2	THA	15	112	Pepper (piper spp.)	9.8	27	0.10	SGP	12	111	Sugar beet	1.0	0.5	0.13							
	3	KHM	15	121	Cocoa, powder and cake	4.1	0.0	0.12	PHL	13	112	Yams	1.8	0.1	0.15							
	4	THA	15	111	Coffee, green	2.1	69	0.13	MYS	15	112	Pepper (piper spp.)	9.5	15	0.15							
	5	IDN	15	112	Tea	0.9	10	0.16														
2 Livestock products	1																					
	2																					
	3																					
	4																					
	5																					
3 Aquatic products	1	MYS	31	122	Miscellaneous freshwater fishes	1.7	14	0.02	PHL	31	122	Tilapias and other cichlids	1.5	25	0.04	SGP	38	112	Fish and fish products, nei	24.1	6	0.13
	2	THA	31	122	Miscellaneous freshwater fishes	1.9	39	0.02	THA	33	112	Lobsters, spiny-rock lobsters	15.6	2	0.14							
	3	KHM	38	112	Fish and fish products, nei	0.6	1	0.16	THA	38	122	Fish and fish products, nei	2.0	77	0.17							
	4	SGP	33	122	Shrimps, prawns	9.1	19	0.18	PHL	33	112	Shrimps, prawns	6.8	8	0.19							
	5																					
4 Processed food, nei	1	SGP	42	121	Oils	0.7	1	0.18	MMR	41	122	Sugar confectionery	3.9	2	0.12							
	2	MYS	43	121	Food preparations, nes	1.3	6	0.20														
	3																					
	4																					
	5																					

B. Smaller Quantities of Imports than Estimated Based on Prices

IC1	Rank	Price ranges																					
		Low							Mid							High							
		Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value
1 Vegetable products	1	MYS	11	122	Mixes and doughs	1.6	0.011	0.01	SGP	13	122	Vegetables, homogenized preparations	6.0	0.000	0.02	KHM	11	122	Cereals, breakfast	9.1	0.000	0.07
	2	THA	12	122	Peanut butter	2.4	0.000	0.01	THA	14	122	Fruit, cooked, homogenized preparations	7.5	0.000	0.07	SGP	12	122	Flour, mustard	28.2	0.000	0.07
	3	SGP	13	121	Flour, pulses	1.3	0.000	0.02	SGP	13	122	Vegetables, preserved nes	4.6	0.013	0.09	SGP	13	112	Lentils	1.5	0.000	0.13
	4	MYS	13	122	Vegetables in vinegar	2.0	0.000	0.04	SGP	13	112	Peas, dry	4.4	0.001	0.09	SGP	14	112	Apricots, dry	14.0	0.000	0.14
	5	SGP	14	112	Grapes	5.1	0.000	0.05	BRN	13	112	Cabbages and other brassicas	1.6	0.000	0.19	PHL	11	122	Mixes and doughs	6.2	0.002	0.15
2 Livestock products	1	THA	21	121	Meat, extracts	8.0	0.000	0.02	SGP	21	122	Meat, chicken	2.3	0.019	0.19	SGP	22	122	Ice cream and edible ice	7.5	0.022	0.18
	2	SGP	21	122	Meat, beef and veal sausages	1.7	0.009	0.07								PHL	22	112	Milk, whole fresh cow	2.0	0.000	0.19
	3	SGP	21	122	Meat, homogenized preparations	8.3	0.000	0.07														
	4	THA	22	121	Milk, products of natural constituents nes	4.8	0.000	0.15														
	5																					
3 Aquatic products	1	THA	33	112	Crabs, nei	4.1	0.000	0.01	MMR	36	111	Seaweeds, food, nei	8.9	0.000	0.17							
	2	SGP	32	112	Sharks, rays, chimaeras	22.6	0.002	0.03														
	3	MYS	32	112	Miscellaneous pelagic fishes	1.1	0.000	0.06														
	4	SGP	34	122	Mussels	2.8	0.000	0.07														
	5	SGP	32	122	Herrings, sardines, anchovies	5.4	0.015	0.17														
4 Processed food, nei	1	THA	41	121	Molasses	0.7	0.000	0.01	THA	41	122	Sugar refined	7.0	0.000	0.13							
	2	SGP	42	122	Margarine, liquid	1.0	0.000	0.02	MMR	43	122	Infant food	7.8	0.048	0.16							
	3	THA	42	121	Oils	0.6	0.008	0.02														
	4	BRN	41	122	Sugar confectionery	2.5	0.003	0.03														
	5	SGP	42	122	Oil, rapeseed	0.5	0.001	0.06														

BEC = Broad Economic Categories, United Nations Statistics Division (UNSD), BRN = Brunei, IC1 = item category level 1, IC2 = item category level 2, IDN = Indonesia, kg = kilogram, KHM = Cambodia, MMR = Myanmar, MYS = Malaysia, nei = not elsewhere included, nes = not elsewhere specified, PHL = Philippines, SGP = Singapore, THA = Thailand.

Notes: The values listed in this table represent the averages for 2014–2016. The top five agri-food products within each IC1 grouping are listed in ascending order of p-value < 0.2, under the BEC as follows: primary products mainly for industry (111), primary products mainly for household consumption (112), processed products mainly for industry (121), and processed products mainly for household consumption (122). 'Price' refers to the CIF (cost, insurance, and freight) import price added to the tariff set by the ASEAN *Trade* in Goods Agreement (ATIGA). 'Value' refers to the imported value (CIF) without the tariff. The expression 'p-value' refers to the p-value of the t-stat against the externally studentized residual. See Appendix 3.6. Data category: FAOSTAT Commodity List and the adjusted groups under the International Standard Statistical Classification of Aquatic Animals and Plants (ISSCAAP) classified under BEC 111, 112, 121, and 122.

Sources: UNSD (2017); Appendix 3.6.

Inter-commodity and Inter-country Comparisons of Land/Feed Productivity

Median land productivity was the highest for fruits and nuts (14), followed that of vegetables (13), in 2011–2015 (Table 6.10). The ratios of the yield, an indicator of comparative advantage in the ASEAN region, were similar for all IC2 groups except vegetables in the category of vegetable products.

Table 6.10. Median Levels of Productivity and Resource Allocation in Each IC2 Group

IC1	IC2	Land productivity (D million/ha)	Chg (%)	Ratio of the yield Index (Yi/Yi')	Chg (%)	Area harvested (1,000 ha)	Chg (%)	Obs.
1 Vegetable products	11 Cereals	38	2	1.4	1	1,158	0	3
	12 Oil and sugar crops	48	5	1.1	0	126	1	7
	13 Vegetables	61	5	0.9	0	136	2	9
	14 Fruits and nuts	127	5	1.3	2	46	1	10
	15 Stimulants and spices	25	0	1.3	0	80	3	5
	Total	67	5	1.2	1	86	1	34
IC1	**IC2**	**Feed productivity (D million/100 PU)**	**Chg (%)**	**Ratio of the yield Index (Yi/Yi')**	**Chg (%)**	**Producing animals (million PU)**	**Chg (%)**	**Obs.**
2 Livestock products	21 Meat	52	—	0.9	—	32	3	7
	22 Milk	731	—	2.1	—	2	4	2
	23 Eggs	97	—	1.3	—	24	2	1
	Total	69	—	1.0	—	16	3	10

D = dong (Vietnamese currency).

ha = hectare, IC1 = item category level 1, IC2 = item category level 2, PU = unit of pig feed requirements, Yi = yield in Viet Nam, Yi' = average yield in other ASEAN countries.

Notes: Land/feed productivity, ratio of the yield, and area harvested/producing animals represent the average values for 2011–2015. 'Chg' refers to the average annual rates of change during 2006–2015 (%). 'Obs.' refers to the number of items in the FAOSTAT Commodity List (FCL). The data on land productivity was deflated to constant 2015 dong prices. The figures are estimates based on all the FAOSTAT data under the 'Production' rubric. Data category: FCL.

Sources: FAO (2019); Appendix 3.7.

In the category of fruits and nuts, grapes and grapefruit had comparatively high land productivity and ratios of the yield during the same period (Table 6.11). While the ratio of the yield of grapes increased slightly at this time, productivity and the harvested land area steadily decreased. These trends imply that it was a decline in grape productivity in other ASEAN countries, rather than the vigorous production of grapes in Viet Nam, that created a favourable situation for the country's grape exports. Meanwhile, the productivity, ratio of the yield, and harvested area of grapefruit all gradually increased. In the vegetable products category, the productivity and the ratios of the yield of spices and stimulants (15), such as peppers and green coffee, and vegetables, especially cauliflower and broccoli, outstripped those values of the other products. Similarly, fresh whole cow's milk and buffalo meat had high feed productivity and ratios of the yield, compared with those of other livestock products. Although the harvested areas or numbers of producing animals for products mentioned above were small, and were not necessarily increasing, the potential of these products as exports to other ASEAN countries could be high if they became competitive with the same products from those other countries by means of greater physical productivity.

As shown in the second column from the right in Table 6.11, which lists examples of products imported by other ASEAN countries from Viet Nam during 2014–2016 in greater quantities than expected based on their prices, several products apparently had non-price competitiveness or were differentiated from the same items produced in other ASEAN countries. Half of these products were processed foods such as milled/husked rice, maize flour, and sugar confectionery; and the other half were primary products such as pepper, green coffee, and tea. In the case of Viet Nam, these items had a higher physical productivity than they did in most ASEAN states. Maintaining or increasing the non-price

competitiveness of these products would help improve the efficiency of agricultural production in the region. As some products already have non-price competitiveness, that of other products should be actively improved for the sake of developing the FVC in Viet Nam.

Table 6.11. Levels of Productivity and Resource Allocation for Individual Items

No.	IC2	FCL name	Land or feed productivity (D million/ha or D million/100 PU)	Chg (%)	Ratio of the yield Index (Yi/Yi')	Chg (%)	Area or producing animals (1,000 ha or million PU)	Chg (%)	Intpn. A	Intpn. B	Items imported larger or smaller compared with the price (p<0.2) Imported larger	in	Imported smaller	in
1	**11**	Millet	40	2	1.5	3	1	-5	iii	i				
2		Rice, paddy	38	1	1.4	1	7,793	1	iii	i	Rice, milled/husked	IDN		
3		Maize	32	5	1.1	-1	1,158	0	iv	iv	Flour, maize	KHM		
4	**12**	Coconuts	80	6	1.9	3	136	2	i	i			Oil, coconut (copra)	THA
5		Sugar cane	65	3	1.0	0	297	1	iv	ii	Sugar confectionery	MMR	Sugar raw centrifugal	SGP
6		Groundnuts, with shell	48	5	1.4	4	214	-3	iii	i				
7		Sesame seed	31	12	1.4	6	46	1	iii	iii			Sesame seed	SGP
8		Soybeans	25	4	1.0	-1	126	-7	iv	iv				
9		Castor oil seed	—	—	1.1	0	8	2	—	—				
10		Seed cotton	—	—	0.7	-10	5	-22	—	—				
11	**13**	Cauliflowers and broccoli	192	0	1.5	1	5	12	i	i				
12		Potatoes	159	11	0.9	4	24	-6	ii	i				
13		Cabbages and other brassicas	143	3	1.2	1	34	-2	ii	i			Cabbages and other brassicas	BRN
14		Sweet potatoes	69	10	0.9	-1	136	-4	ii	i				
15		Cassava	53	3	0.9	-1	555	2	iv	iv				
16		Onions, dry	42	1	0.3	0	92	2	iv	iv				
17		Beans, dry	26	10	0.7	-3	170	-3	iv	iv			Beans, dry	SGP
18		Pulses, nes	20	6	0.8	0	159	2	iv	iv			Pulses, nes	THA
19		Vegetables, fresh nes	—	—	1.5	0	737	9	—	—			Vegetables, fresh nes	BRN
20	**14**	Grapes	636	-9	1.6	3	1	-5	i	i				
21		Oranges	231	6	0.5	4	44	-5	ii	ii			Oranges	SGP
22		Grapefruit (inc. pomelos)	154	5	1.4	2	38	5	i	i				
23		Mangoes, mangosteens, guavas	139	5	1.2	3	79	5	i	ii				
24		Watermelons	127	6	1.3	2	48	9	i	ii				
25		Pineapples	118	8	0.4	2	35	-1	ii	iv				
26		Bananas	108	5	0.7	0	112	3	ii	iv				
27		Cashew nuts, with shell	87	-1	7.5	-1	304	0	i	iii				
28		Nuts, nes	51	2	3.2	2	3	2	iii	iii			Nuts, nes	BRN
29		Fruit, fresh nes	—	—	2.2	3	242	1	—	—				
30	**15**	Pepper (piper spp.)	364	12	3.9	-3	54	5	i	i	Pepper (piper spp.)	THA		
31		Coffee, green	84	5	3.9	0	576	3	i	i	Coffee, green	IDN		
32		Chillies and peppers, dry	25	0	0.8	-6	64	2	iv	ii				
33		Tea	13	-7	1.3	3	115	1	iii	iii	Tea	IDN		
34		Cinnamon (canella)	7	-1	0.4	3	80	10	iv	iv				
35	**21**	Meat, pig	231	—	0.8	—	67	3	ii	ii				
36		Meat, cattle	74	—	0.9	—	32	5	ii	i				
37		Meat, buffalo	69	—	1.1	—	8	-3	i	i				
38		Meat, goat	52	—	1.1	—	2	0	iii	i				
39		Meat, chicken	43	—	0.9	—	131	5	iv	iii			Meat, chicken	SGP
40		Meat, horse	32	—	0.7	—	0	-5	iv	iv				
41		Meat, duck	16	—	0.4	—	32	6	iv	iv				
42	**22**	Milk, whole fresh cow	731	—	2.4	—	3	9	i	i				
43		Milk, whole fresh buffalo	—	—	1.9	—	1	-1	—	—				
44	**23**	Eggs, hen, in shell	97	—	1.3	—	24	2	i	i				

D = dong (Vietnamese currency).

BRN = Brunei, FCL = FAOSTAT Commodity List, ha = hectare, IC2 = item category level 2, IDN = Indonesia, Intpn. = interpretation, KHM = Cambodia, MMR = Myanmar, nes = not elsewhere specified, p = p-value, PU = unit of pig feed requirements, SGP = Singapore, THA = Thailand, Yi = yield in Viet Nam, Yi' = average yield in other ASEAN countries.

Notes: 'Area' refers to the total harvested area, and 'producing animals' refers to the number of producing animals. Land/feed productivity, ratio of the yield, and area harvested/producing animals represent the average values for 2011–2015. 'Chg' refers to the average annual rates of change during 2006–2015 (%). The data on land productivity was deflated to constant 2015 dong prices. The figures are estimates based on all the FAOSTAT data provided under the 'Production' rubric. In the 'Intpn' column, the codes are as follows: i = both productivity and ratio of the yield are high; ii = productivity is high, but the ratio of the yield is low; iii = productivity is low, but the ratio of the yield is high; and iv = both productivity and ratio of the yield are low. The codes under 'A' reflect the median of the broader product categories in IC1 (item category level 1), and those under 'B' reflect the median of the specific products in IC2 included here. Regarding the items imported in larger or smaller quantities compared with their prices (p<0.2), the names of the FCL items (classified according to the Broad Economic Categories) listed in the table are those with the smallest p-value < 0.2 estimated based on data during 2014–2016. Data category: FCL.

Source: Appendix 3.7.

Table 6.12 shows a positive correlation between the land productivity and ratios of the yield of vegetables (13) and stimulants and spices (15) during 2011–2015. In other words, the profitability per unit area of those FCL items tended to be high when they had a comparative advantage in terms of

physical productivity within the ASEAN region. However, this was not true for products belonging to other IC2 groups.

Negative or non-existent correlations are observed between land/feed productivity or ratios of the yield and the extent of harvested areas or number of producing animals for all IC2 product groups. Such results show that most of the land and producing animals in Viet Nam were simply not allocated to products characterized by high productivity or competitiveness.

Table 6.12. Correlation Matrix of Comparative Advantage, Productivity, and Resource Allocation, 2011–2015

IC2	Land or feed productivity						Ratio of the yield					
	11 Cereals	12 Oil and sugar crops	13 Vegetables	14 Fruits and nuts	15 Stimulants and spices	21 Meat	11 Cereals	12 Oil and sugar crops	13 Vegetables	14 Fruits and nuts	15 Stimulants and spices	21 Meat
Ratio of the yield	—	0.40	0.83	-0.27	0.90	0.50	—	—	—	—	—	—
Area or producing animals	—	0.60	-0.79	-0.33	-0.30	0.18	—	-0.20	-0.60	-0.03	-0.10	-0.25
Obs.	3	5	8	9	5	7	3	5	8	9	5	7

IC2 = item category level 2.
Notes: 'Area' refers to the total harvested area, and 'producing animals' refers to the number of producing animals. This table uses Spearman's rank correlation coefficient of average values during 2011–2015. The values were estimated based on the data for items on the FAOSTAT Commodities List (FCL) relating to land/feed productivity, the ratio of the yield, and the number of producing animals and the land area they used. FCL items with correlation coefficients less than 4 were omitted. 'Obs.' refers to the number of FCL items. Data category: FCL.
Source: Author's calculations, see Appendix 3.7.

5. Summary

Social and Economic Conditions

- Viet Nam's large population and its strong prospect of population and economic growth suggest that the country has high potential as a consumption market for agri-food products. At the same time, this prospect implies a growing importance of foreign markets for Vietnamese exports in the long term.
- The VA of agriculture and wholesale and retail trade has been a major component of Viet Nam's GDP; for instance, the VA of each accounted for about 13% of GDP in 2015. While the proportion of GDP due to the VA of most FVC-related industries shrank, that due to the VA of the hotel-and-restaurant and wholesale/retail trade industries gradually expanded.

- Interindustry transactions involving product flows from agriculture and fishing to the food and beverage industries stagnated in Viet Nam after 2010. Unlike in other ASEAN countries, there were no observable interindustry transactions such as those from fishing to the hotel-and-restaurant industries or from the food-and-beverage to the hotel-and-restaurant industries. Intra-industry transactions within the agricultural, fishing, and food-and-beverage sectors levelled off after either 2000 or 2010, depending on the sector.

Linkages amongst FVC-related Industries

- The increase in final demand in the food and beverage industry has had some positive impacts on the VA of upstream sectors, particularly agriculture. This result suggests that interventions into the food and beverage industries do contribute to the development of agriculture.
- The effects of the food and beverage industries on the VA of fishing was notable, as the size of the fishing market is limited. It is also suggested that the services provided by the wholesale/retail trade sectors are necessary, but alone not sufficient, to automatically drive the development of the FVC-related industries.
- Production growth can accompany a rise in the per capita compensation in all FVC-related industries, particularly agriculture.
- The food and beverage industries, which had higher per capita employee compensation than other FVC-related industries, seems to have been one of the attractive sectors in terms of labour absorption, although the number of employees was actually very limited and was increasing only slowly.

Supply–Demand Balance of Agri-food Products

- Most agri-food products—particularly cereals, oil and sugar crops, and vegetables—were produced and consumed mainly in the domestic market. A comparatively large amount of cereals was nevertheless imported, followed by vegetables, milk, marine fishes, and fat and oils. Many vegetable and aquatic products, particularly cereals and vegetables, were exported in significant quantities. Even though cereals and vegetables are mainly produced/consumed at home, the little that's produced/consumed in foreign markets are in large enough volumes to rank high compared with other exports and imports. Several IC2 groups, such as stimulants and spices and crustaceans, were consumed in foreign markets that were larger than the domestic markets for these products. Another characteristic of Viet Nam was the large production and domestic supply of meat, exceeding those of all the other ASEAN countries covered in this report.
- The export prices of all aquatic products, especially processed crustaceans, were remarkably high. We can conclude that raw and processed crustaceans exported in large amounts had high enough values to induce active trade. By contrast, high-priced processed food, nei, raw crustaceans, and raw stimulants and spices seemed to have been valuable imports for Viet Nam.

The Competitiveness of Each Product in the ASEAN Region

- Vietnamese vegetable products in the low- and mid-price ranges—such as stimulants and spices, including green coffee and pepper, and vegetables such as chilies and green peppers—tended to

be imported in great quantities in the ASEAN region, considering their prices. In the category of aquatic products, those in various IC2 groups such as miscellaneous freshwater fishes and tilapias and other cichlids were imported in large quantities. Similarly, products in the processed food, nei, category such as sugar confectionery, were imported in significantly larger quantities than had been estimated based on their import prices.

- Research on the characteristics of the goods actively exported from other countries to Viet Nam might trigger a reconsideration of production and marketing strategies for domestic products that could compete with goods produced by other states in the ASEAN region, for instance: coconut oil from Malaysia, dried fruits, nes, and breakfast cereals from Thailand; and crabs, nei, from Myanmar.
- In the category of fruits and nuts, grapes and grapefruits had relatively high land productivity and ratios of the yield. In the vegetable products category, the productivity and the ratios of the yield of spices and stimulants, such as peppers and green coffee, and vegetables, especially cauliflower and broccoli, outstripped those of most other products. Similarly, fresh whole cow's milk and buffalo meat had high feed productivity and ratios of the yield, compared with those of other livestock products. The potential of these products as exports to other ASEAN countries could be high if they became competitive with the same products from those other countries by means of greater physical productivity.

Chapter 7

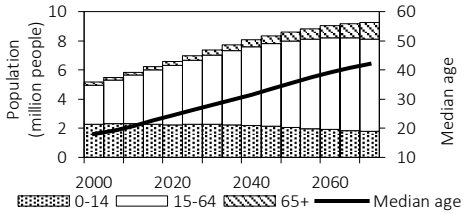
Lao PDR

1. Social and Economic Conditions

Population and Per Capita GDP

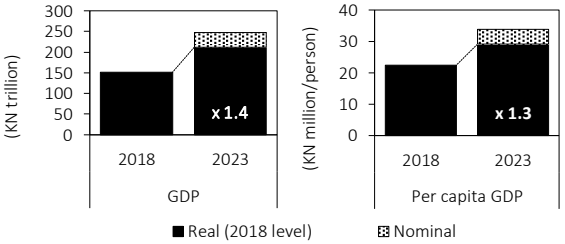
The population of Lao PDR, 7 million people in 2018, accounts for 1% of the total population of the ASEAN region, placing it eighth amongst the ASEAN countries. It is expected to reach 9 million by 2050 (Figure 7.1). The working-age people, those between 15 and 65, are the majority of the country's population, and their numbers are expected to increase steadily until around 2050. This trend may imply long-term economic growth. Despite the strong prospect of long-term population and economic growth, however, the small size of the population suggests that Lao PDR has only a limited potential as a domestic consumption market for agri-food products. Foreign markets, especially the ASEAN countries, where regional integration is in progress, will likely become more important as consumption markets for Laotian agri-food exports.

Figure 7.1. Population by Age Group, GDP, 2000–2060



Source: United Nations Department of Economic and Social Affairs (UN DESA, 2017).

Figure 7.2. Changes in GDP and Per Capita 2018 and 2023

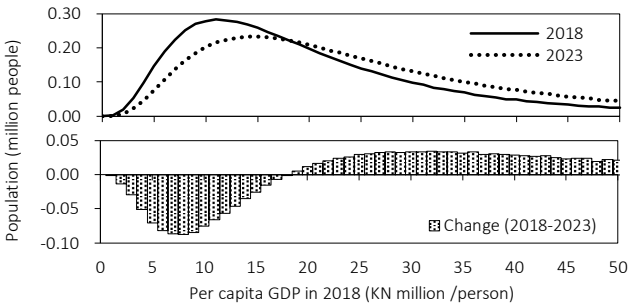


KN = kip (Laotian currency).
GDP = gross domestic product.
Source: Estimates based on data from the International Monetary Fund (IMF, 2018).

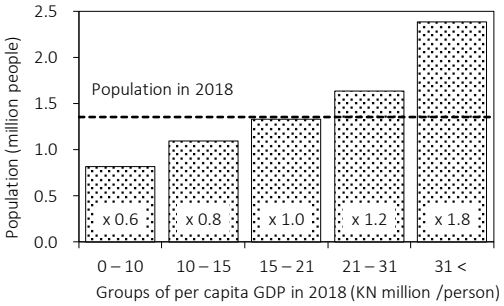
Real GDP and per capita real GDP are expected to increase by 1.4 times and 1.3 times, respectively, from 2018 to 2023 (Figure 7.2). According to a projection of Lao PDR's population based on the level of per capita GDP (Figure 7.3, Appendix 3.1), as per capita GDP approaches KN18 million, a boundary is crossed whereby the number of people whose annual contributions to GDP are below that value will decrease. By contrast, the number of people with per capita GDP above KN18 million will increase across a wide range of the distribution. In particular, the population with personal incomes above KN31 million (i.e. the 80th percentile) will expand by 1.8 times by 2023. This projection implies a rapid increase in the number of high-income people. It will thus be necessary to establish a system for supplying agri-food products to match the demand from this rapidly growing upper-income bracket.

Figure 7.3. Estimated Population of Lao PDR by Per Capita GDP, 2018 and 2023

A. Distribution of Population Changes



B. Population Divided into Five GDP Groups



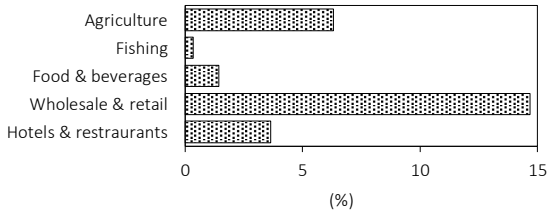
KN = kip (Laotian currency).
GDP = gross domestic product, Lao PDR = Lao People's Democratic Republic.
Note: The per capita GDP is based on constant 2018 prices. The bars in Figure B show the estimated populations of the GDP groups in 2023. The numbers in the bars show the changes in these populations from 2018 to 2023.
Source: Appendix 3.1.

The VA of FVC-related Industries

The VA of the wholesale and retail trade sectors has been a major component of the GDP of Lao PDR; for instance, it accounted for about 15% of GDP in 2015 (Figure 7.4). Meanwhile, the VA of the other FVC-related industries, including agriculture, was comparatively small.

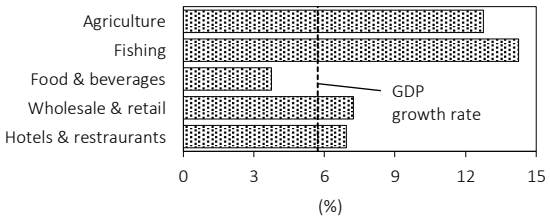
The annual growth rates of real VA in the fishing and agriculture industries averaged as high as 13%–14% during 2000–2015, followed by those of the wholesale/retail trade and the hotel-and-restaurant industries. The average growth rates for the FVC-related industries were higher than the average GDP growth rate (just under 6%), except for the food and beverage industries, which averaged 4% (Figure 7.5). While the proportion of GDP due to the VA of the food and beverage industries shrank, that of most FVC-related industries, especially fishing and agriculture, expanded.

Figure 7.4. The Proportion of VA in GDP, 2015



GDP = gross domestic product, VA = value added.
Sources: Estimates based on data from Eora (2018).

Figure 7.5. Average Annual Change in Real VA, 2000–2015



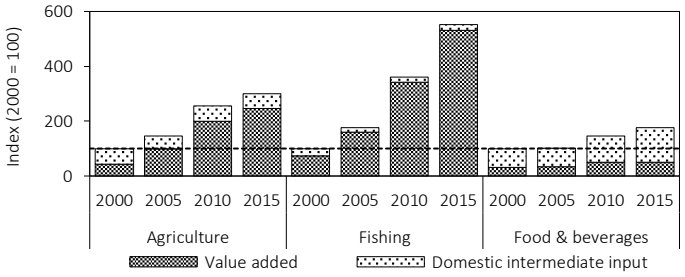
GDP = gross domestic product, VA = value added.
Sources: Estimates based on data from Eora (2018) and the Internatioanl Monetary Fund (IMF, 2018).

The production values of agriculture tripled, those of fishing quintupled, and those of the food and beverage industries doubled from 2000 to 2015 (Figure 7.6). The part of production value due to the

VA (i.e. the VA rate) was large in the fishing industry, reaching almost 100% in 2015, followed by that of agriculture, which reached 82% that year (Figure 7.7). The VA rate of the food and beverage sector was 29% that year, far below that of fishing or agriculture. The food and beverage sector depended on intermediate inputs from within this sector and from other, related sectors; and production in the food and beverage sector would generally induce more production within that sector, and in related sectors, than it would in agriculture and fishing.

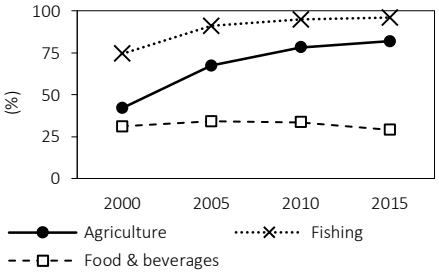
The growth trends in the VA rates of agriculture and fishing suggest a decrease in their use of intermediate inputs. Such a change may have been caused by an increase in the number of products with lower cost of sales to revenue ratios, an improvement in the efficiency of the product mix, and/or technical progress that resulted in savings on inputs. The trend toward lower VA rates in the food and beverage industries may suggest a gradual change in the production structures that included the further use of intermediate inputs or a strengthening of ties with other industries.

Figure 7.6. Values of Domestic Production, 2000–2015



Note: The results in the figure are based on real values.
Sources: Estimates based on Eora (2018) and the International Monetary Fund (IMF, 2018).

Figure 7.7. VA Rates, 2000–2015



VA = value added.
Sources: Estimates based on data from Eora (2018).

Intermediate Inputs in Agri-food Industries

Figure 7.8 shows which industries contributed to the growth of the agriculture, fishing, and food-and-beverage industries from 2000 to 2015. Intermediate inputs into the agriculture and food-and-beverage industries came mainly from domestic sources, whilst inputs into the fishing industry were mostly imported. Inputs into agriculture and fishing stagnated after around 2000, while inputs into the food and beverage industries rapidly increased after 2005.

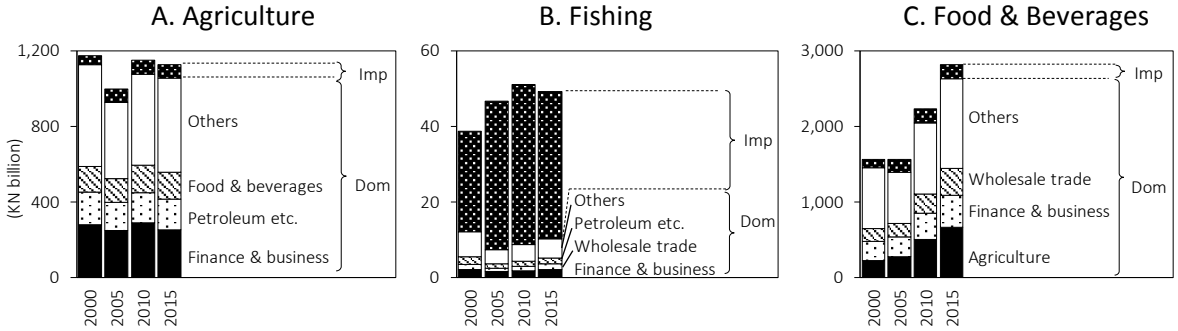
Intermediate inputs from the finance and business industries accounted for the largest portion of inputs into agriculture, followed by inputs from petroleum, chemical, and non-metallic mineral product ('petroleum etc.') and food-and-beverage industries.[1] The largest domestic sources of inputs for the fishing industry were the finance and business industries, and the largest domestic source of inputs for the food and beverage industries was agriculture.

The food and beverage industries in Lao PDR used few inputs from sources within these same industries, which was not the case for the food and beverage industries in most of the other ASEAN

[1] Table A2.1, in Appendix 2, shows the industry classifications mentioned in this section, including 'petroleum etc.' One major input from the petroleum etc. industry was fuel oil, which was needed for agriculture and for the production of chemical fertilizers.

countries. This situation suggests that the development of the food and beverage industry in Lao PDR was driven largely by the supply of raw agricultural products, rather than processed food. The growth of the food and beverage industries induced a certain degree of development in agriculture through the industries' demand for intermediate inputs.

Figure 7.8. Sources of Intermediate Inputs, 2000–2015

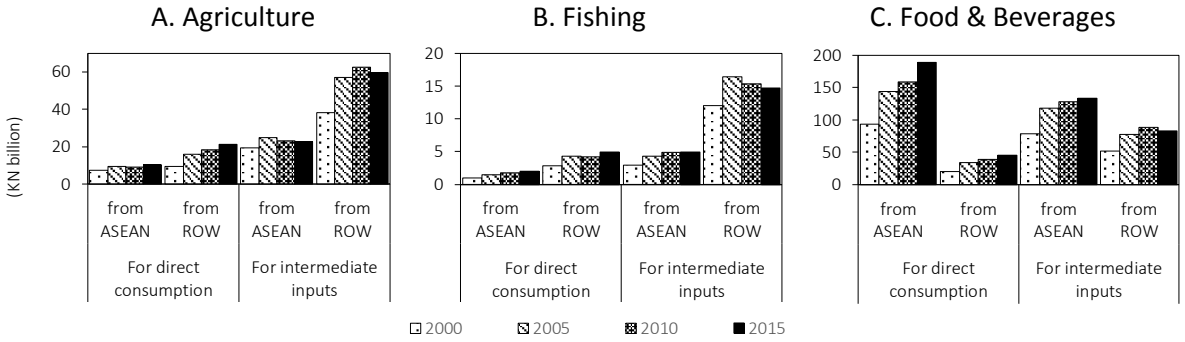


KN = kip (Laotian currency).
Dom = domestic supply, Imp = imports.
Notes: The values in these graphs are based on constant 2015 prices. 'Petroleum etc.' refers to the petroleum, chemical, and non-metallic mineral product industries.
Sources: Estimates using data from Eora (2018) and the International Monetary Fund (IMF, 2018).

The value of imports from foreign fishing and food-and-beverage sectors were relatively high between 2000 and 2015, compared with the value of domestic production. Imports of food and beverage products gradually increased, while agricultural and fishing imports stagnated from 2005 to 2015 (Figure 7.9). More agricultural and fishery products were imported for use as intermediate inputs than for direct consumption. By contrast, the imported food and beverage products were equally divided between direct consumption and use as intermediate inputs. Put briefly, Lao PDR imported agricultural and fishery products mainly for processing, and food and beverage products both for processing and direct consumption.

Lao PDR imported less from the agriculture and fishing industries of other ASEAN countries than from agriculture and fishing industries in the ROW, but it consistently imported more from the food and beverage industries of other ASEAN countries than from food and beverage industries in the ROW. We can conclude that, as an importer, Lao PDR gradually strengthened its linkages with both other ASEAN countries and the ROW.

Figure 7.9. Values of Imports, by Purpose, 2000–2015

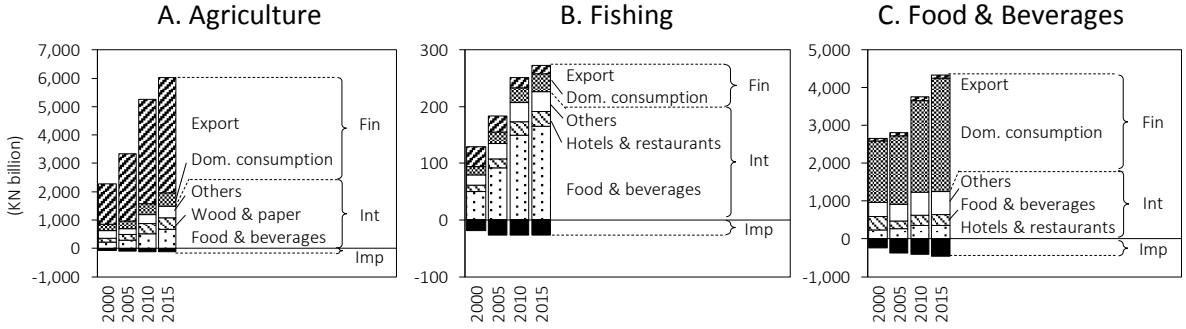


KN = kip (Laotian currency).
ASEAN = Association of Southeast Asian Nations, ROW = rest of the world.
Notes: The values of imports shown in these graphs are based on constant 2015 prices. They include imports from foreign agricultural, fishing, and food-and-beverage sectors destined for domestic final consumption and for use as intermediate inputs in all domestic industries.
Sources: Estimates based on data from Eora (2018) and the International Fund (IMF, 2018).

Destinations of Products of Agri-food Industries

Interindustry transactions involving flows of products from agriculture and fishing to the food and beverage industries increased gently during 2000–2015 (Figure 7.10). The flows from fishing to the hotel and restaurant industries, and from the food-and-beverage industries to the hotel-and-restaurant industries, also gradually increased. By contrast, intra-industry transactions within agriculture (which were observable in many other ASEAN countries) and fishing are not shown in Table 7.10. Intra-industry transactions within the food and beverage sector stayed at the same level from 2000 to 2015. Overall, interindustry transactions along the FVC grew steadily in Lao PDR, while intra-industry transactions stagnated.

Figure 7.10. Destinations of Domestically Produced and Imported Goods, 2000–2015

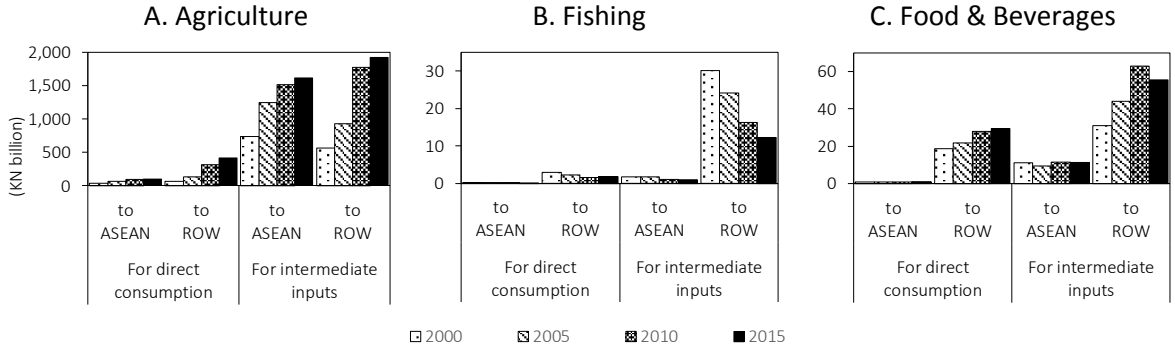


KN = kip (Laotian currency).
Dom. = domestic.
Notes: The values in these graphs are based on constant 2015 prices. 'Fin' = final demand for domestic and imported goods, 'Int' = intermediate demand for domestic and imported goods, and 'Imp' = the imports of final and intermediate goods. Total demand = Fin + Int. Domestic production = Fin + Int - Imp.
Sources: Estimates based on data from Eora (2018) and the International Monetary Fund (IMF, 2018).

Both final and intermediate demand grew in the agriculture and food-and-beverage industries during 2000–2015, but they levelled off in the fishing industry over the same period. Exports dominated the final demand for agriculture, having increased rapidly. By contrast, fishery exports dramatically decreased. Exports from the food and beverage industry were very limited compared with domestic consumption, and they stagnated from 2010 to 2015. Figure 7.11 shows that a large portion of the exported goods from the agriculture, fishing, and food-and-beverage industries in Lao PDR were consumed as intermediate inputs. However, a relatively large quantity of exported goods from the food and beverage industries was directly consumed.

The primary destination of exports from the fishing and food-and-beverage sectors was the ROW. Regarding these two sectors, Lao PDR deepened its linkages more with the ROW (as an exporter) than with the rest of the ASEAN region. It is clear that Lao PDR's agricultural exports to the other ASEAN countries, especially goods used as intermediate inputs, increased rapidly; in fact, they were approaching the level of the country's exports to the ROW.

Figure 7.11. Values of Exports, by Purpose, 2000–2015



KN = kip (Laotian currency).
ASEAN = Association of Southeast Asian Nations, ROW = rest of the world.
Note: The values in these graphs are based on constant 2015 prices.
Sources: Estimates based on data from Eora (2018) and the International Monetary Fund (IMF, 2018).

2. Linkages amongst FVC-related Industries

Final Demand in FVC-related Industries

First, let us see how final demand for domestic FVC-related industries induces the use of intermediate inputs and affects production and VA in each industry.

Table 7.1 shows the composition of final demand during 2000–2015. Final demand was strongest in the retail trade industry, although the levels of final demand in other industries—such as agriculture, wholesale trade, and hotels and restaurants—were close. The average annual growth of final demand in agriculture, KN202 billion, outstripped the average values for the other FVC-related industries. In agriculture, exports to both the ASEAN region and the ROW accounted for large shares of final demand, having increased dramatically. Meanwhile, the other FVC-related industries were mainly driven by household consumption.

Table 7.1. Final Demand for Products/Services of FVC-related Industries, 2000–2015

(KN billion)

Final demand as	Domestic production of											
	Agriculture		Fishing		Food & beverages		Wholesale trade		Retail trade		Hotels & restraurants	
	Value	Change	Value	Change	Value	Change	Value	Change	Value	Change	Value	Change
Domestic consupmtion												
Household consumption	414	15	23	1	2,691	84	2,160	66	5,075	164	3,473	109
Other consumption	5	0	1	0	38	1	63	2	93	3	46	1
Capital formation	21	1	1	0	24	0	805	33	236	10	0	0
Export												
Export to ASEAN	1,723	63	1	0	12	0	998	43	11	0	229	11
Export to ROW	2,344	123	14	-1	85	3	172	6	123	6	219	7
Total	4,506	202	40	0	2,850	88	4,199	151	5,537	184	3,967	129
Annual change rate (%)		7.3		- 1.1		4.2		5.2		4.7		4.5

KN = kip (Laotian currency).

ASEAN = Association of Southeast Asian Nations, FVC = food value chain, ROW = rest of the world.

Notes: The values in this table are in constant 2015 prices. 'Change' refers to the average annual changes as estimated based on data for 2000–2015.

Source: Appendix 3.2.

Production and VA Induced by Final Demand

Table 7.2 shows sources of intermediate inputs during 2000–2015 that came from domestic and foreign industries, and were destined for use in production by major FVC-related industries in Lao PDR. The table indicates that 7% of intermediate inputs into the hotel-and-restaurant sector came from the domestic food-and-beverage sector, and that 17% of inputs into the food-and-beverage sector came from domestic agriculture. This suggests that the hotel-and-restaurant and food-and-beverage sectors can sequentially induce some agricultural production. The table also shows that the FVC-related industries in Lao PDR rarely used inputs from foreign countries, compared with their use of domestic products and services.

The values shown in Table 7.2 suggest that several linkages in the input–output structure in Lao PDR gradually changed during 2000–2015. The food and beverage industries decreased the value of intermediate inputs sourced from within those same industries by 0.5% per year, while increasing the inputs from agriculture by the same percentage. Agriculture reduced the inputs from within that sector by 0.4% per year. If these structural changes continue, the development of the food and beverages industries will play a smaller role in driving the growth of that sector, though it will play a larger role in spurring the growth of agriculture. Similarly, progress in the development of agriculture will not drive increases in its production.

Table 7.2. Sources of Intermediate Inputs in Major FVC-related Industries, 2000–2015

Input from		Domestic production of: Agriculture Share (%)	Agriculture Change	Fishing Share (%)	Fishing Change	Food & beverages Share (%)	Food & beverages Change	Wholesale trade Share (%)	Wholesale trade Change	Retail trade Share (%)	Retail trade Change	Hotels & restraurants Share (%)	Hotels & restraurants Change
Agriculture	Domestic	2	-0.43	0	0.00	17	0.49	0	0.00	0	0.00	1	0.02
	ASEAN	0	0.00	0	-0.01	0	-0.01	0	0.00	0	0.00	0	0.00
	ROW	0	0.00	1	-0.08	0	0.00	0	0.00	0	0.00	0	0.00
Fishing	Domestic	0	0.00	0	-0.05	4	0.13	0	0.00	0	0.00	1	0.01
	ASEAN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	ROW	0	0.00	0	-0.03	0	0.00	0	0.00	0	0.00	0	0.00
Food & beverages	Domestic	2	-0.30	0	-0.06	6	-0.49	0	0.00	1	-0.02	7	-0.18
	ASEAN	0	0.00	0	-0.03	2	-0.01	0	0.00	0	0.00	1	-0.02
	ROW	0	0.00	1	-0.10	0	0.00	0	0.00	0	0.00	0	0.00
Wholesale trade	Domestic	2	-0.19	1	-0.09	9	0.10	1	-0.09	1	-0.03	3	-0.08
	ASEAN	0	0.00	0	0.00	0	0.00	2	-0.09	0	0.00	0	0.00
	ROW	0	0.00	0	-0.03	0	0.00	0	0.00	0	0.00	0	0.00
Retail trade	Domestic	0	-0.02	0	-0.02	0	0.01	0	0.00	0	0.00	2	-0.01
	ASEAN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	ROW	0	0.00	0	-0.03	0	0.00	0	0.00	0	0.00	0	0.00
Hotels & restraurants	Domestic	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	-0.03
	ASEAN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	ROW	0	0.00	0	-0.03	0	0.00	0	0.00	0	0.00	0	0.00

ASEAN = Association of Southeast Asian Nations, FVC = food value chain, ROW = rest of the world.
Notes: 'Share' refers to the intermediate inputs as a percentage of total inputs in 2015. 'Change' refers to the average annual changes in the shares as estimated based on data for 2000–2015.
Source: Appendix 3.2.

Table 7.3 shows the VA directly and indirectly boosted by a 1% increase over the 2015 value in final demand for domestic products and services through an increase in domestic production and intermediate inputs. For example, a 1% increase in final demand in the food and beverage sector generated a KN4.3 billion increase in the VA of agriculture, as well as a KN8.4 billion increase in the VA of the food-and-beverage sector itself.

Increases in final demand in the food and beverage industries had some impact on the VA of upstream sectors, particularly agriculture. This result suggests that interventions in the food and beverage industries do contribute to the development of agriculture.

Final demand in downstream industries had a notable effect on the VA of fishing, as the size of the fishing market is very limited. For instance, the amount of VA in the fishing sector induced by a 1% increase in final demand over the 2015 value in the food and beverage industries (KN1.07 billion) exceeded VA driven by the final demand in the fishing sector itself (KN0.34 billion). Similarly, the hotel and restaurant industries can also have a measurable effect on fishing. Increasing final demand in these downstream sectors can thus be an effective way to develop the fishing sector.

The inducement effect of final demand in the whole and retail trade sectors on the other four industries discussed above was very small, as is shown in Table 7.3. Meanwhile, Table 7.2 indicates that FVC-related industries, especially the food and beverage industries, did depend on inputs from the wholesale trade industry during 2000–2015. It is suggested that the services provided by the wholesale/retail trade sectors are necessary, but alone not sufficient, to automatically drive the development of the FVC-related industries.

Table 7.3. VA Induced by a 1% Increase in Final Demand, 2015

(KN billion)

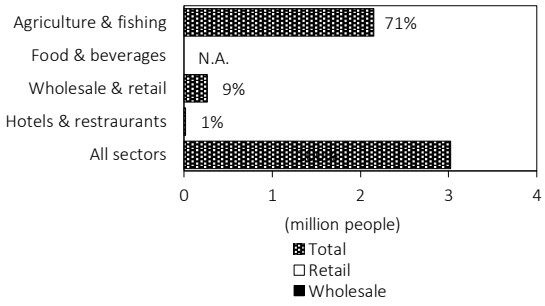
Induced value added in	1% increase in final demand for					
	Agriculture	Fishing	Food & beverages	Wholesale trade	Retail trade	Hotels & restraurants
Agriculture	37.47	0.00	4.32	0.05	0.12	0.74
Fishing	0.05	0.34	1.07	0.00	0.05	0.27
Food & beverages	0.33	0.00	8.39	0.02	0.11	0.79
Wholesale trade	0.92	0.00	2.54	31.52	0.71	1.47
Retail trade	0.16	0.00	0.17	0.15	41.62	0.55
Hotels & restraurants	0.05	0.00	0.13	0.12	0.17	23.59

KN = kip (Laotian currency).
VA = value added.
Source: Appendix 3.2.

The Relationship amongst the Number of Employees, Per Capita Compensation, and Production

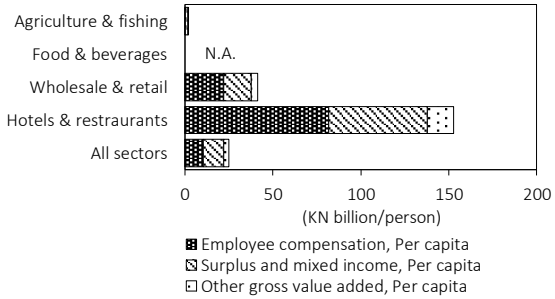
Now let us consider how an increase in production relates to changes in the number of employees and per capita employee compensation in an industry. According to figures 7.12 and 7.13, the agricultural and fishing sectors in 2015 were characterized by a considerably large number of employees, low labour productivity, and low per capita compensation compared with other FVC-related industries. By contrast, data from the hotel and restaurant industries shows the opposite characteristics to those of the agricultural and fishing sectors.

Figure 7.12. Number of Employees, by Sector, 2015



Sources: International Labour Organization (ILO, 2019); Appendix 3.3.

Figure 7.13. Gross VA per Capita, by Sector, 2015



KN = kip (Laotian currency).
VA = value added.
Sources: Estimates based on data from Eora (2018) and the International Labour Organization (ILO, 2019); Appendix 3.3.

Figure 7.14 illustrates the relationship amongst the number of employees, per capita compensation, and production during 2000–2015. Figure 7.14A depicts the proportion of the average annual rate of change in production in each sector that was attributable to total employee compensation. The results shown in the figure differ by industry. For instance, there was rapid growth in fishing (10%) along with high per capita employee compensation; and the slowest change in production, in the food and beverage industries (4%), occurred with a stagnation in per capita employee compensation.

The average annual rates of change in the total value of employee compensation were within the range of 7%–13% in all the observable FVC-related sectors (Figure 7.14 B). The changes occurred in

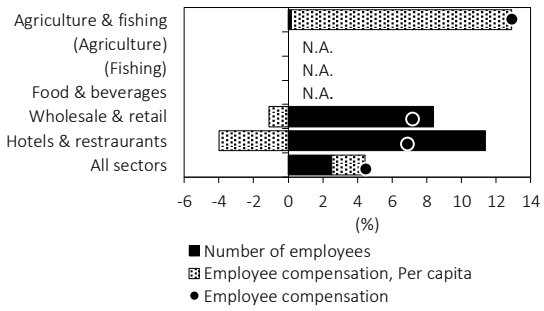
the number of employees and in per capita compensation, which together determine the growth of total compensation. In the agricultural and fishing sectors, the number of employees stagnated, while per capita compensation soared. Conversely, in the wholesale/retail trade and hotel-and-restaurant industries, a reduction in per capita compensation was accompanied by a strong growth in the number of employees.

These results suggest that production growth can accompany a rise in per capita compensation in many FVC-related industries, particularly in the agricultural sector. Another notable point is the decline in the number of employees in the agricultural sector. A large workforce, low-level labour productivity, low per capita compensation, and a steep growth in per capita compensation, together with a decrease in the number of employees, all imply that there was a labour surplus in the agricultural sector. Any interindustry movement of labourers would be deeply connected to the productivity and efficient development of agriculture. The hotel and restaurant sector, which had a remarkably high per capita compensation and a sharp increase in the number of employees, seems to have been an attractive sector in terms of labour absorption, although the number of employees was actually very limited.

Figure 7.14. Changes in Production and Employee Compensation, 2000–2015

A. Breakdown of the Average Annual Rates of Change in Production

B. Breakdown of the Average Annual Rates of Change in Employee Compensation



Notes: Other factors include changes in the value added (VA), other than from employee compensation, and changes in intermediate inputs. The data is from selected years during 2000–2015.
Source: Appendix 3.3.

3. Supply–Demand Balance of Agri-food Products

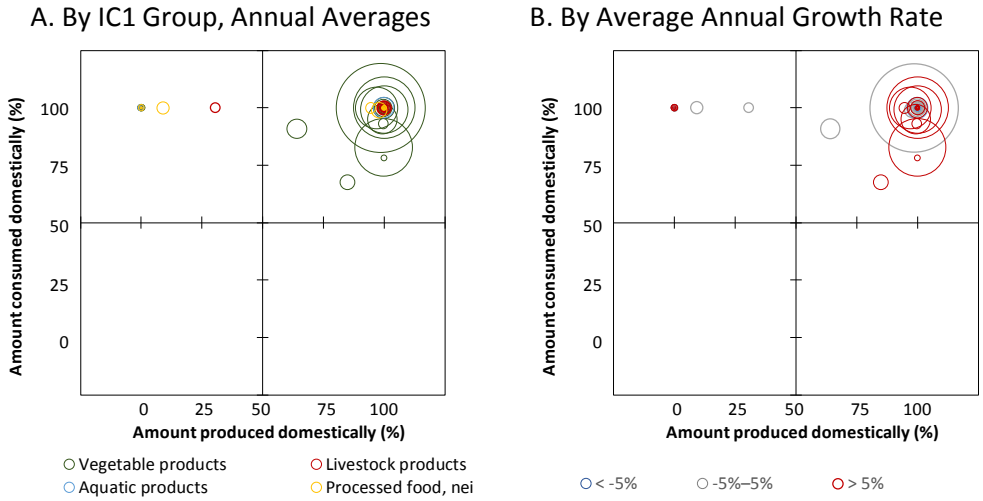
Supply–Demand Structure

Figure 7.15 shows the structure of domestic commerce and foreign trade in 2004–2013. There are two graphs, each of which is divided into four quadrants defined by two criteria: whether agri-food goods were *produced* domestically or in foreign markets and whether they were *consumed* in domestically or in foreign markets. In 7.15 A and 7.15 B, the circles are scattered across the top two quadrants. The circles vary in size according to the volumes produced of the goods they represent. The pattern of circles is the same in both graphs, but the circles in Figure 7.15 A are colour-coded to indicate the agri-food sector, whilst those in Figure 7.15 B are colour-coded to reflect growth rates.

The top side of each graph represents goods that were mostly or completely consumed domestically, and the right side represents goods that were mostly or completely produced domestically. The

majority of the agri-food products are concentrated in the first (upper-right) quadrant, which represents goods that were produced and consumed in the domestic market (i.e. domestic-oriented goods). There is a small number of circles in the second (upper-left) quadrant, representing goods that were produced in foreign markets and consumed in the domestic market (i.e. import-oriented goods). There are no observable circles in the third (lower-left) quadrant, representing goods that were imported for re-exportation (i.e. trade-oriented goods); nor are there any circles in the fourth (lower-right) quadrant, representing goods that were produced in the domestic market and consumed in foreign markets (i.e. export-oriented goods). Briefly said, the agri-food industries in Lao PDR, as well as in Cambodia, were more domestic-oriented than they were in the other ASEAN countries covered in this report.

Figure 7.15. Classification of Agri-food Products by Supply–Demand Balance, 2004–2013



IC1 = item category level 1, nei = not elsewhere included.
Notes: Each circle represents a Food Balance Sheet (FBS) item as designated by FAOSTAT. The sizes of the circles express the quantity of total supply, with the proportions estimated based on quantitative data. 'IC1' comprises the author's classifications of broad agri-food product categories (see Appendix 2.2). In these graphs, the percentage of goods not produced/consumed domestically are produced/consumed in foreign markets. Data classification: FBS items.
Sources: FAO (2019); Appendix 3.4.

Table 7.4 shows that, during 2004–2013, most agri-food products, particularly cereals (11) and vegetables (13), were produced and consumed mainly in the domestic market. A comparatively large quantity of cereals (11) were imported, followed by sugar (41) and fruits and nuts (14). Cereal exports (11) exceeded the exports of other IC2 groups. The second largest exports were fruits and nuts (14), and the third largest were stimulants and spices (15).

Annual change data indicates rapid growth in the domestic production and supply of vegetables, cereals, and oil and sugar crops (12). Both the production and domestic supply of fruits and nuts also saw relatively large increases. The growing exports, and slightly decreasing imports, of cereals are also notable characteristics of the supply–demand balance of agri-food products in Lao PDR. Changes in the production, imports, and exports of other items in the IC2 groups were relatively small.

Table 7.4. Supply–Demand Balance of Agri-food Products, 2004–2013

(1,000 metric tons)

IC1	IC2	2004–2013 average				Average annual change, 2004–2013			
		Production	Domestic supply	Import	Export	Production	Domestic supply	Import	Export
1 Vegetable products	11 Cereals	2,818	2,727	54	145	184	160	-2	24
	12 Oil and sugar crops	630	620	0	8	116	112	0	2
	13 Vegetables	1,578	1,575	14	0	198	200	0	0
	14 Fruits and nuts	417	434	38	20	28	23	-4	2
	15 Stimulants and spices	62	52	8	18	8	8	1	2
2 Livestock products	21 Meat	129	129	0	0	6	6	0	0
	22 Milk	7	24	16	0	0	0	0	0
	23 Eggs	15	15	0	0	0	0	0	0
3 Aquatic products	31 Freshwater fishes	106	106	0	0	5	5	0	0
	32 Marine fishes	0	12	12	0	0	2	2	0
	33 Crustaceans	0	0	0	0	0	0	0	0
	34 Molluscs	0	0	0	0	0	0	0	0
	35 Aquatic animals, nei	0	0	0	0	0	0	0	0
	36 Aquatic plants	0	0	0	0	0	0	0	0
4 Processed food, nei	41 Sugar	4	48	49	0	1	3	1	0
	42 Fat and oils	17	17	0	0	1	1	0	0
	43 Food, nei	0	1	1	0	0	0	0	0
	44 Alcoholic beverages	89	93	4	1	-2	1	0	0

IC1 = item category level 1, IC2 = item category level 2, nei = not elsewhere included.

Note: 'IC1' and 'IC2' comprise the author's classifications of broader product categories and more specific groups, respectively (Appendix 2.2). This table is based on an aggregation of all the data available from FAOSTAT's Food Balance Sheet (FBS). Data classification: FBS items.

Sources: FAO (2019); Appendix 3.4.

Table 7.5 shows FBS items (as designated by FAOSTAT) listed in descending order of total supply quantity within each category in 2004–2013, corresponding to the quadrants in Figure 7.15. The products existing in large quantities, such as rice, other vegetables, and maize, are concentrated in the column for the domestic-oriented products. Most products are in the cells representing stable or expanding markets for domestic- or import-oriented products. There are no items in the column for export-oriented goods.

Other vegetables—mainly leaf fruit vegetables (other than tomatoes), onions, pulses, and starchy roots—are identifiable as domestic-oriented products by their large quantities of supply undergoing rapid growth. Maize and its products, sugar cane, cassava and products, and bananas are notable for their accelerated rates of growth. Pelagic fish and sweeteners other than sugar are examples of rapidly increasing import-oriented products.

Table 7.5. Total Quantities of Supply for Product Categories, in Descending Order, 2004–2013

(1,000 metric tons)

Category		Domestic-oriented			Export-oriented			Import-oriented			Trade-oriented		
Provided by		Domestic market						Foreign market					
Consumed in		Domestic market			Foreign market			Domestic market			Foreign market		
Change	Rank	IC2	FBS items	Quantity	IC2	FBS items	Quantity	IC2	FBS items	Quantity	IC2	FBS items	Quantity
Annual change rate, 2004–2013 (%) r > 5 Expanding	1	13	Vegetables, other	963				32	Pelagic fish	11			
	2	11	Maize and products	842				41	Sweeteners, other	10			
	3	12	Sugar cane	577				11	Cereals, other	3			
	4	13	Cassava and products	446				44	Wine	1			
	5	14	Bananas	218									
-5 < r < 5 Stable	1	11	Rice (milled equivalent)	2,004				41	Sugar (raw equivalent)	38			
	2	14	Fruits, other	98				22	Milk - excluding butter	24			
	3	14	Oranges, mandarines	76				11	Wheat and products	11			
	4	44	Beer	63				32	Marine fish, other	2			
	5	21	Bovine meat	44				43	Infant food	0.6			
r < -5 Shrinking	1	13	Sweet potatoes	113				11	Barley and products	11			
	2	14	Lemons, limes and products	11				14	Apples and products	1			
	3												
	4												
	5												

FBS = Food Balance Sheet (FAOSTAT), IC2 = item category level 2, r = average annual change rate.
Notes: The values in this table represent the averages for 2004–2013. Data classification: FBS items.
Sources: FAO (2019); Appendix 3.4.

Trade Prices and Volumes

The export prices of processed stimulants and spices (15) were remarkably high during 2014–2016 (Table 7.6). Whilst the export values of processed goods were generally limited, those for higher-priced raw stimulants and spices were considerable. We can conclude from these results that raw stimulants and spices exported in large quantities had high enough values to induce active trade.

The import prices of processed crustaceans (33) and both raw and processed stimulants and spices exceeded those of many other products. The import values of these high-priced products were, however, quite small. Overall, export and import prices of processed products tended to be higher than those of primary products, except for some items, such as sugar.

Table 7.6. Prices and Values of Exported/Imported Agri-food Products, 2014–2016

		Price ($/kg)				Value ($ million)			
		Export		Import		Export		Import	
IC1	IC2	Primary products	Processed products	Primary products	Processed products	Primary products	Processed products	Primary products	Processed products
1 Vegetable products	11 Cereals	0.6	0.8	0.3	0.8	5	29	8	33
	12 Oil and sugar crops	1.5	—	0.9	1.9	9	0.0	0.3	0.4
	13 Vegetables	0.9	2.4	0.8	3.2	49	6	2	1
	14 Fruits and nuts	0.8	2.2	2.0	1.6	112	2	3	2
	15 Stimulants and spices	3.2	10.7	7.3	6.6	67	7	0.2	2
2 Livestock products	21 Meat	—	3.8	—	3.3	0.0	1.0	0.0	5
	22 Milk	1.8	3.2	1.5	2.7	0.4	1	2	4
	23 Eggs	—	—	—	—	0.0	0.0	0.0	0.0
3 Aquatic products	31 Freshwater fishes	—	—	—	—	0.0	0.0	0.0	0.0
	32 Marine fishes	—	2.4	—	3.8	0.0	0.1	0.1	1
	33 Crustaceans	—	—	—	12.1	0.0	0.0	0.0	0.2
	34 Molluscs	—	—	6.0	—	0.0	0.0	0.1	0.0
	35 Aquatic animals, nei	—	—	—	3.2	0.0	0.0	0.0	2
	36 Aquatic plants	—	—	—	—	0.0	0.0	0.0	0.0
	38 Fishes, nei	—	—	—	4.0	0.0	0.0	0.0	0.1
4 Processed food, nei	41 Sugar	4.0	0.7	—	0.9	0.1	152	0.0	64
	42 Fat and oils	—	—	—	1.3	0.0	0.0	0.0	3
	43 Food, nei	—	3.3	—	2.3	0.0	0.1	0.0	5
	44 Alcoholic beverages	—	1.3	—	1.3	0.0	20	0.0	6

IC1 = item category level 1, IC2 = item category level 2, kg = kilogram, nei = not elsewhere included.
Notes: This table shows the averages for 2014–2016. The values indicated for exports are based on 'free on board' (FOB) prices, and those for imports are based on 'cost, insurance, and freight' (CIF) prices. Data category: IC2 groups based on the Broad Economic Categories (BEC) classifications of primary products (11) and processed products (12).
Sources: UNSD (2017); Appendix 3.6.

4. The Competitiveness of Each Product in the ASEAN Region

Commodities Imported by ASEAN Countries

Tables 7.7 and 7.8 provide information about the agri-food products imported by ASEAN countries from Lao PDR in 2014–2016. ASEAN countries imported many of these products from Lao PDR more cheaply than they did from other ASEAN+6 countries (Table 7.7). Roughly 75%–100% of items in the IC2 groups were imported as low-priced products. Lao PDR exported notably more to Thailand than to the other ASEAN countries; its exports to Viet Nam were the second largest in volume (Table 7.8). The import values of the goods from Lao PDR were minimal in the other ASEAN countries.

In Table 7.7, we cannot observe any Laotian products imported by other ASEAN countries in significantly larger quantities than had been estimated based on approximate lines. Meanwhile, there was a conspicuously large number of products that were imported in smaller quantities than estimated, including cereals (11) and stimulants and spices (15) in the low-priced range, and fruits and nuts (14) in all price ranges.

Table 7.7. Prices and Values of Products Imported by ASEAN Countries, by IC2 Group, 2014–2016

IC1	IC2	Price ($/kg)	Value ($ million)	Number of imported products by price ranges (%)			Number of products deviated from approx. lines (%)						Obs.
							Imported larger			Imported smaller			
				Price ranges			Price ranges			Price ranges			
				Low	Mid	High	Low	Mid	High	Low	Mid	High	
1 Vegetable products	11 Cereals	0.4	10	90	10	0	0	0	0	10	0	0	10
	12 Oil and sugar crops	1.4	6	75	25	0	0	0	0	0	0	0	4
	13 Vegetables	0.5	67	94	6	0	0	0	0	0	0	0	18
	14 Fruits and nuts	1.3	10	73	7	20	0	0	0	7	7	7	15
	15 Stimulants and spices	4.1	39	85	0	15	0	0	0	5	0	0	20
2 Livestock products	21 Meat	4.1	0.0	—	—	—	—	—	—	—	—	—	0
	22 Milk	4.6	0.0	0	100	0	0	0	0	0	0	0	1
	23 Eggs	—	—	—	—	—	—	—	—	—	—	—	0
3 Aquatic products	31 Freshwater fishes	—	—	—	—	—	—	—	—	—	—	—	0
	32 Marine fishes	—	—	—	—	—	—	—	—	—	—	—	0
	33 Crustaceans	13.5	0.0	0	100	0	0	0	0	0	0	0	1
	34 Molluscs	—	—	—	—	—	—	—	—	—	—	—	0
	35 Aquatic animals, nei	0.2	0.0	100	0	0	0	0	0	0	0	0	1
	36 Aquatic plants	—	—	—	—	—	—	—	—	—	—	—	0
	38 Fishes, nei	1.8	0.0	100	0	0	0	0	0	0	0	0	1
4 Processed food, nei	41 Sugar	0.7	15	100	0	0	0	0	0	0	0	0	6
	42 Fat and oils	—	—	—	—	—	—	—	—	—	—	—	0
	43 Food, nei	3.1	0.0	100	0	0	0	0	0	0	0	0	2
	44 Alcoholic beverages	1.0	7	100	0	0	0	0	0	0	0	0	2

ASEAN = Association of Southeast Asian Nations, IC1 = item category level 1, IC2 = item category level 2, kg = kilogram, nei = not elsewhere included.

Notes: The prices and values represent the averages for 2014–2016. 'Price' refers to the import price, including cost, insurance, and freight (CIF) added to the tariff established by the ASEAN *Trade* in Goods Agreement (ATIGA). 'Value' refers to the imported value (CIF) without the tariff. See Appendix 3.6 for price ranges and approximate lines. The products for which the externally studentized residual was significantly large or small at the 10% level were counted. 'Obs.' refers to the number of detailed commodities classified according to the Broad Economic Categories (BEC) three-digit category numbers and used for applying approximation lines. Data category: FAOSTAT Commodity List (FCL) and adjusted groups under the International Standard Statistical Classification of Aquatic Animals and Plants (ISSCAAP), classified under BEC 111, 112, 121, and 122.

Sources: UNSD (2017); Appendix 3.6.

Table 7.8. Prices and Values of Products Imported into the ASEAN Region, by Country, 2014–2016

Importer	Price ($/kg)	Value ($ million)	Number of imported products by price ranges (%) Price ranges Low	Mid	High	Number of products deviated from approx. lines (%) Imported larger Price ranges Low	Mid	High	Imported smaller Price ranges Low	Mid	High	Obs.
Singapore	5.7	0.1	50	13	38	0	0	0	13	25	0	8
Brunei	—	0.0	—	—	—	—	—	—	—	—	—	0
Malaysia	13.2	0.0	0	0	100	0	0	0	0	0	0	1
Thailand	0.6	92	92	6	2	0	0	0	0	2	2	53
Indonesia	4.2	0.2	100	0	0	0	0	0	0	0	0	1
Philippines	5.7	0.1	100	0	0	0	0	0	0	0	0	1
Viet Nam	1.4	54	73	18	9	0	0	0	0	0	0	11
Lao PDR	—	0.0	—	—	—	—	—	—	—	—	—	0
Camboodia	1.6	7	100	0	0	0	0	0	0	0	0	6
Myanmar	—	0.0	—	—	—	—	—	—	—	—	—	0

ASEAN = Association of Southeast Asian Nations, kg = kilogram, nei = not elsewhere included.
Notes: The prices and values represent the averages for 2014–2016. 'Price' refers to the import price, including cost, insurance, and freight (CIF) added to the tariff established by the ASEAN *Trade* in Goods Agreement (ATIGA). 'Value' refers to the imported value (CIF) without the tariff. See Appendix 3.6 for price ranges and approximate lines. The products for which the externally studentized residual was significantly large or small at the 10% level were counted. 'Obs.' refers to the number of detailed commodities classified according to the Broad Economic Categories (BEC) three-digit category numbers and used for applying approximation lines. Data category: FAOSTAT Commodity List (FCL) and adjusted groups under the International Standard Statistical Classification of Aquatic Animals and Plants (ISSCAAP), classified under BEC 111, 112, 121, and 122.
Sources: UNSD (2017); Appendix 3.6.

Goods Imported in Smaller/Larger Quantities than Estimated Based on Prices: Non-price Competitiveness in the ASEAN Region

Pearled barley imported into Thailand was the only Laotian product imported in significantly larger quantities in 2014–2016 than had been estimated based on its import price (Table 7.9). It might be beneficial to seek opportunities to develop further export markets for this product. Moreover, research on the causes of this one case of active import demand, including production and sales methods, would help identify pathways toward increasing the sales of other items.

Research on the characteristics of the goods actively exported by other countries to Lao PDR might also trigger a reconsideration of production and marketing strategies for domestic products that could compete with goods produced by other states in the ASEAN region, such as boneless cattle meat from Malaysia.[2] Tables 2.9 to 9.9, and Table A3.2, do not show that the volume of imports of wine from Singapore and of fermented rice beverages from the Republic of Korea (henceforth, 'Korea') were greater than had been estimated.[3]

There are also many products for which the import quantities were significantly smaller during 2014–2016, considering their prices, such as vegetable products in all price ranges. Although these products were certainly exported to other ASEAN countries, they might not have been as competitive as the same products from other ASEAN and +6 countries. If these items are to be promoted as export goods destined for other ASEAN countries, active and intensive product differentiation will be necessary.

[2] For reference, see tables 2.9 to 9.9. See also Table A4.2 on major exports from the +6 countries.
[3] The p-values, import prices, and import values were as follows: wine from Singapore (p=0.19, $3.25/kg, $18,300) and fermented rice beverages from Korea (p=0.22, $1.48/kg, $20,000).

Table 7.9. Goods Imported by ASEAN Countries in Smaller/Larger Quantities than Estimated Based on Prices, in Ascending Order of P-values, 2014–2016

A. Larger Quantities of Imports than Estimated Based on Prices

IC1	Rank	Price ranges																	
		Low							Mid							High						
		Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value
1 Vegetable products	1	THA	11	122	Barley, pearled	0.8	3	0.10														
	2																					
	3																					
	4																					
	5																					
2 Livestock products	1																					
	2																					
	3																					
	4																					
	5																					
3 Aquatic products	1																					
	2																					
	3																					
	4																					
	5																					
4 Processed food, nei	1																					
	2																					
	3																					
	4																					
	5																					

B. Smaller Quantities of Imports than Estimated Based on Prices

IC1	Rank	Price ranges																			
		Low							Mid							High					
		Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value
1 Vegetable products	1	SGP	15	112	Tea	20.1	0.001	0.04	THA	14	122	Nuts, prepared (exc. groundnuts)	6.1	0.000	0.01	SGP	14	122	Nuts, prepared (exc. groundnuts)	22.5	0.000	0.07
	2	SGP	14	112	Bananas	0.5	0.000	0.05	THA	11	122	Cereals, breakfast	3.5	0.000	0.11	MYS	15	122	Coffee, roasted	13.2	0.005	0.15
	3	THA	11	111	Millet	0.3	0.000	0.08														
	4	THA	13	112	Carrots and turnips	1.4	0.000	0.14														
	5	THA	11	122	Macaroni	0.3	0.001	0.20														
2 Livestock products	1																				
	2																				
	3																				
	4																				
	5																				
3 Aquatic products	1																				
	2																				
	3																				
	4																				
	5																				
4 Processed food, nei	1	PHL	43	122	Food preparations, nes	5.7	0.021	0.16													
	2																				
	3																				
	4																				
	5																				

BEC = Broad Economic Categories, United Nations Statistics Division (UNSD), IC1 = item category level 1, IC2 = item category level 2, kg = kilogram, MYS = Malaysia, nes = not elsewhere specified, PHL = Philippines, SGP = Singapore, THA = Thailand.

Notes: The values listed in this table represent the averages for 2014–2016. The top five agri-food products within each IC1 grouping are listed in ascending order of p-value < 0.2, under the BEC as follows: primary products mainly for industry (111), primary products mainly for household consumption (112), processed products mainly for industry (121), and processed products mainly for household consumption (122). 'Price' refers to the CIF (cost, insurance, and freight) import price added to the tariff set by the ASEAN *Trade* in Goods Agreement (ATIGA). 'Value' refers to the imported value (CIF) without the tariff. The expression 'p-value' refers to the p-value of the t-stat against the externally studentized residual. See Appendix 3.6. Data category: FAOSTAT Commodity List and the adjusted groups under the International Standard Statistical Classification of Aquatic Animals and Plants (ISSCAAP) classified under BEC 111, 112, 121, and 122.

Sources: UNSD (2017); Appendix 3.6.

Inter-commodity and Inter-country Comparisons of Land/Feed Productivity

The median land productivity of fruits and nuts (14) was the highest, followed by that of vegetables (13), in 2011–2015 (Table 7.10). The ratios of the yield, an indicator of comparative advantage in the ASEAN region, were slightly higher for stimulants and spices (15) than for other IC2 groups in the category of vegetable products.

Table 7.10. Median Levels of Productivity and Resource Allocation in Each IC2 Group

IC1	IC2	Land productivity (KN million/ha)	Chg (%)	Ratio of the yield Index (Yi/Yi')	Chg (%)	Area harvested (1,000 ha)	Chg (%)	Obs.
1 Vegetable products	11 Cereals	9	3	1.2	1	568	5	2
	12 Oil and sugar crops	14	7	1.1	5	12	2	5
	13 Vegetables	40	3	1.0	2	9	3	7
	14 Fruits and nuts	67	2	0.9	1	4	2	10
	15 Stimulants and spices	20	8	1.6	8	6	4	4
	Total	36	3	1.0	2	8	3	28
IC1	**IC2**	**Feed productivity (KN million/100 PU)**	**Chg (%)**	**Ratio of the yield Index (Yi/Yi')**	**Chg (%)**	**Producing animals (million PU)**	**Chg (%)**	**Obs.**
2 Livestock products	21 Meat	26	—	0.6	—	2	4	7
	22 Milk	107	—	1.3	—	1	2	1
	23 Eggs	34	—	0.8	—	1	2	2
	Total	29	—	0.7	—	1	2	10

KN = kip (Laotian currency).
ha = hectare, IC1 = item category level 1, IC2 = item category level 2, PU = unit of pig feed requirements, Yi = yield in Lao PDR, Yi' = average yield in other ASEAN countries.
Notes: Land/feed productivity, ratio of the yield, and area harvested/producing animals represent the average values for 2011–2015. 'Chg' refers to the average annual rates of change during 2006–2015 (%). 'Obs.' refers to the number of items in the FAOSTAT Commodity List (FCL). The data on land productivity was deflated to constant 2015 kip prices. The figures are estimates based on all the FAOSTAT data under the 'Production' rubric.
Data category: FCL.
Sources: FAO (2019); Appendix 3.7.

In the category of fruits and nuts, the land productivity and ratios of the yield of tangerines/mandarins/clementines/satsumas exceeded those values for the other products during the same period (Table 7.11). The values for other fruits—such as lemons/limes, watermelons, and bananas—were also relatively high. The land productivity and ratio of the yield of tangerines etc. and bananas gradually increased, and their harvested land area expanded during that period. In the vegetable products category, the productivity and the ratios of the yield of dried chilies/peppers and root vegetables (such as potatoes, sweet potatoes, and cassava) outstripped those of the other products. Similarly, fresh whole cow's milk and goose/guinea fowl meat had high feed productivity and ratios of the yield compared with those values for other livestock products. Although the harvested areas or numbers of producing animals for the products mentioned above were small (except for cassava) and were not necessarily increasing, the potential of these products as exports to other ASEAN countries could be high if they became competitive with the same products from those other countries by means of greater physical productivity.

As indicated in the second column from the right in Table 7.11, which lists examples of products imported by other ASEAN countries from Lao PDR during 2014–2016 in greater quantities than would be expected based on their prices, apparently none of these products had non-price competitiveness or were differentiated from the same items produced in the other ASEAN countries. Agri-food products in Lao PDR should be actively improved for the sake of developing the FVC in that country.

Table 7.11. Levels of Productivity and Resource Allocation for Individual Items

No.	IC2	FCL name	Land or feed productivity (KN million/ha or KN million/100 PU)	Chg (%)	Ratio of the yield Index (Yi/Yi')	Chg (%)	Area or producing animals (1,000 ha or million PU)	Chg (%)	Intpn. A	Intpn. B	Items imported larger or smaller compared with the price (p<0.2) Imported larger	in	Imported smaller	in
1	11	Rice, paddy	10	2	0.9	0	913	3	iv	ii				
2		Maize	8	4	1.4	1	224	6	iii	iii				
3	12	Sugar cane	74	7	0.8	5	26	19	ii	ii				
4		Groundnuts, with shell	22	12	1.4	7	25	4	iii	i				
5		Sesame seed	14	19	2.2	6	12	2	iii	i				
6		Soybeans	12	2	1.1	2	9	1	iii	iii				
7		Seed cotton	5	-16	1.0	-18	2	-5	iii	iv				
8	13	Potatoes	144	5	1.5	2	1	-6	i	i				
9		Vegetables, fresh nes	61	-3	0.8	2	148	9	ii	ii				
10		Sweet potatoes	51	16	1.4	2	7	-9	i	i				
11		Cassava	40	3	1.3	7	51	24	i	i				
12		Beans, dry	11	12	0.9	-2	3	2	iv	iv				
13		Chillies and peppers, green	8	-9	0.2	-6	9	3	iv	iv				
14		Pulses, nes	5	2	1.0	-1	18	3	iii	iii				
15	14	Tangerines, mandarins, clementines, satsumas	129	3	1.1	9	4	3	i	i				
16		Oranges	119	3	0.4	1	5	-1	ii	ii				
17		Lemons and limes	82	7	0.9	6	1	-18	ii	i				
18		Watermelons	80	7	1.0	-2	8	7	ii	i				
19		Bananas	78	3	1.0	6	21	11	ii	i			Bananas	SGP
20		Melons, other (inc.cantaloupes)	57	-3	0.9	-2	1	18	ii	iv				
21		Pineapples	55	1	0.4	2	4	0	ii	iv				
22		Grapefruit (inc. pomelos)	49	2	0.5	-1	1	0	ii	iv				
23		Mangoes, mangosteens, guavas	32	-3	1.0	-1	1	4	iii	iii				
24		Fruit, fresh nes	26	-5	0.9	1	7	-1	iv	iv				
25	15	Chillies and peppers, dry	101	3	2.1	-4	3	2	i	i				
26		Tea	31	30	0.9	24	3	25	iv	ii				
27		Nutmeg, mace and cardamoms	9	5	1.8	5	9	1	iii	iii				
28		Coffee, green	7	11	1.4	11	63	6	iii	iv				
29	21	Meat, pig	112	—	0.6	—	2	5	ii	ii				
30		Meat, goose and guinea fowl	47	—	1.2	—	0	1	i	i				
31		Meat, cattle	31	—	0.6	—	5	4	ii	i				
32		Meat, buffalo	26	—	0.5	—	4	1	iv	ii				
33		Meat, goat	22	—	1.1	—	0	11	iii	iii				
34		Meat, duck	17	—	0.8	—	1	1	iii	iii				
35		Meat, chicken	10	—	0.5	—	9	6	iv	iv				
36	22	Milk, whole fresh cow	107	—	1.3	—	1	2	i	i				
37	23	Eggs, hen, in shell	51	—	1.1	—	1	3	i	i				
38		Eggs, other bird, in shell	17	—	0.5	—	0	2	iv	iv				

KN = kip (Laotian currency).

FCL = FAOSTAT Commodity List, ha = hectare, IC2 = item category level 2, Intpn. = interpretation, nes = not elsewhere specified, p = p-value, PU = unit of pig feed requirements, SGP = Singapore, Yi = yield in Lao PDR, Yi' = average yield in other ASEAN countries.

Notes: Area' refers to the total harvested area, and 'producing animals' refers to the number of producing animals. Land/feed productivity, ratio of the yield, and area harvested/producing animals represent the average values for 2011–2015. 'Chg' refers to the average annual rates of change during 2006–2015 (%). The data on land productivity was deflated to constant 2015 kip prices. The figures are estimates based on all the FAOSTAT data provided under the 'Production' rubric. In the 'Intpn' column, the codes are as follows: i = both productivity and ratio of the yield are high; ii = productivity is high, but the ratio of the yield is low; iii = productivity is low, but the ratio of the yield is high; and iv = both productivity and ratio of the yield are low. The codes under 'A' reflect the median of the broader product categories in IC1 (item category level 1), and those under 'B' reflect the median of the specific products in IC2 included here. Regarding the items imported in larger or smaller quantities compared with their prices (p<0.2), the names of the FCL items (classified according to the Broad Economic Categories) listed in the table are those with the smallest p-value < 0.2 estimated based on data during 2014–2016. Data category: FCL.

Source: Appendix 3.7.

Table 7.12 shows weak or non-existent correlations between the land/feed productivity and ratios of the yield of the FCL items in each IC2 group during 2011–2105. In other words, the profitability per unit area of FCL items was not necessarily high when those items had a comparative advantage in terms of physical productivity within the ASEAN region.

Negative or non-existent correlations are observed between land/feed productivity or ratio of the yield and the extent of harvested areas or number of producing animals for all IC2 product groups. Such results show that most of the land and producing animals in Lao PDR were simply not allocated to products characterized by high productivity or competitiveness.

Table 7.12. Correlation Matrix of Comparative Advantage, Productivity, and Resource Allocation, 2011–2015

	Land or feed productivity						Ratio of the yield					
IC2	11 Cereals	12 Oil and sugar crops	13 Vegetables	14 Fruits and nuts	15 Stimulants and spices	21 Meat	11 Cereals	12 Oil and sugar crops	13 Vegetables	14 Fruits and nuts	15 Stimulants and spices	21 Meat
Ratio of the yield	—	-0.10	0.50	0.22	0.40	0.18	—	—	—	—	—	—
Area or producing animals	—	1.00	-0.18	0.39	-1.00	-0.32	—	-0.10	-0.46	-0.02	-0.40	-0.82
Obs.	2	5	7	10	4	7	2	5	7	10	4	7

IC2 = item category level 2.

Notes: Area' refers to the total harvested area, and 'producing animals' refers to the number of producing animals. This table uses Spearman's rank correlation coefficient of average values during 2011–2015. The values were estimated based on the data for items on the FAOSTAT Commodities List (FCL) relating to land/feed productivity, the ratio of the yield, and the number of producing animals and the land area they used. FCL items with correlation coefficients less than 4 were omitted. 'Obs.' refers to the number of FCL items. Data category: FCL.

Source: Author's calculations, see Appendix 3.7.

5. Summary

Social and Economic Conditions

- In spite of Lao PDR's strong prospect of long-term population and economic growth, the small size of its population implies only a limited potential for the country's domestic consumption market. Foreign markets, especially in the ASEAN area, where regional integration is in progress, will likely become more important as consumption markets for agri-food exports from Lao PDR.
- The VA of the wholesale and retail trade sectors has been a major component of GDP in Lao PDR; for instance, it accounted for about 15% of the country's GDP in 2015. While the proportion of GDP due to the VA of the food and beverage sector shrank, that due to the VA of most of the FVC-related industries, particularly fishing and agriculture, expanded.
- Interindustry transactions involving product flows from agriculture and fishing to the food and beverage industries increased gently. Transactions from fishing to the hotel and restaurant industries also gradually increased, as did transactions from the food-and-beverage industries to the hotel-and-restaurant industries. By contrast, intra-industry transactions within agriculture, which were observable in many other ASEAN countries, were not observed in Lao PDR; nor were any transactions observed within the fishing industry. Intra-industry transactions within the food and beverage sector remained at the same level after 2000.

Linkages amongst FVC-related Industries

- An increase in final demand in the food and beverage industries had some positive impacts on the VA of upstream sectors, particularly agriculture. This result suggests that interventions in the food and beverage industries do contribute to the development of agriculture.
- The effects of downstream industries on the VA of fishing was notable, given the limited size of the fishing market. It is also suggested that the services provided by the wholesale/retail trade sectors are necessary, but alone not sufficient, to automatically drive the development of the FVC-related industries.

- Production growth can accompany a rise in per capita employee compensation in many FVC-related industries, particularly agriculture.
- The hotel and restaurant industries, which had a remarkably high per capita compensation and a sharp increase in the number of employees, seems to have been an attractive sector in terms of labour absorption, although the number of employees was actually very limited.

Supply–Demand Balance of Agri-food Products

- Most agri-food products, particularly cereals and vegetables, were produced and consumed mainly in the domestic market. A comparatively large quantity of cereals was imported, followed by sugar and fruits and nuts. The exports of cereals exceeded those of the other IC2 groups. The second- and third-largest export goods were fruits and nuts and stimulants and spices, respectively. Even though cereals are mainly produced/consumed at home, the little that's produced/consumed in foreign markets are in large enough volumes to rank high compared with other exports and imports.
- The export prices of processed stimulants and spices were remarkably high. While the export values of processed products were limited, those of high-priced raw stimulants and spices were considerable. We can conclude that raw stimulants and spices exported in large amounts had values that were high enough to induce active trade in Lao PDR.

The Competitiveness of Each Product in the ASEAN Region

- The pearled barley exported by Lao PDR to Thailand was the only item whose quantities were significantly larger than prior estimates based on their import prices in the destination market.
- Research on the characteristics of the goods actively exported by other countries to Lao PDR might trigger a reconsideration of production and marketing strategies for domestic products that could compete with goods produced by other ASEAN states, such as boneless cattle meat from Malaysia. The volume of wine imports from Singapore and of fermented rice beverages from Korea were also larger than prior estimates.
- In the category of fruits and nuts, the land productivity and ratios of the yield of tangerines/mandarins/clementines/satsumas exceeded those values for the other products. Those values for other fruits, such as lemons/limes, watermelons, and bananas, were also relatively high. In the vegetable products category, the productivity and ratios of the yield of dried chilies/peppers and for root vegetables (such as potatoes, sweet potatoes, and cassava) outstripped those values for other products. Similarly, fresh whole cow's milk and goose/guinea fowl meat had high feed productivity and ratios of the yield compared with those values for other livestock products. The potential of these products as exports to other ASEAN countries could be high if they became competitive with the same products from those other countries by means of greater physical productivity.

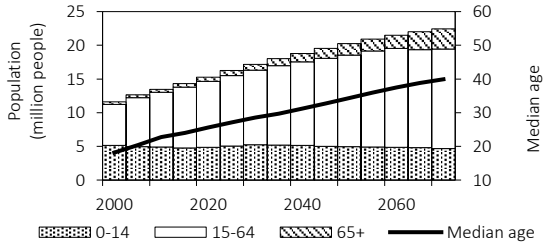
Chapter 8
Cambodia

1. Social and Economic Conditions

Population and Per Capita GDP

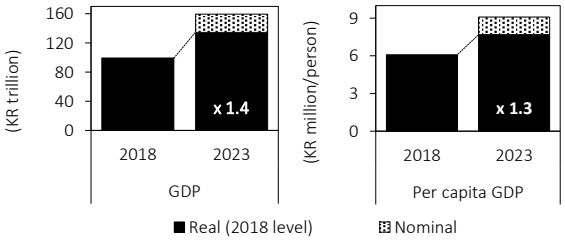
The population of Cambodia, 16 million people in 2018, accounts for 2% of the total population of the ASEAN region, placing it seventh amongst the ASEAN countries. It is expected to reach 22 million by 2050 (Figure 8.1). The working-age people, those between 15 and 65, are the majority of the country's population, and their numbers are expected to increase steadily until around 2055. This trend may imply long-term economic growth. In spite of the strong prospect of long-term population and economic growth, the small size of the population implies only a limited potential for the domestic consumption market. Foreign markets, especially in the ASEAN countries, where the regional integration is in progress, will likely become more important as consumption markets for agri-food products from Cambodia.

Figure 8.1. Population by Age Group, 2000–2060



Source: United Nations Department of Economic and Social Affairs (UN DESA, 2017).

Figure 8.2. Changes in GDP and Per Capita, GDP, 2018 and 2023

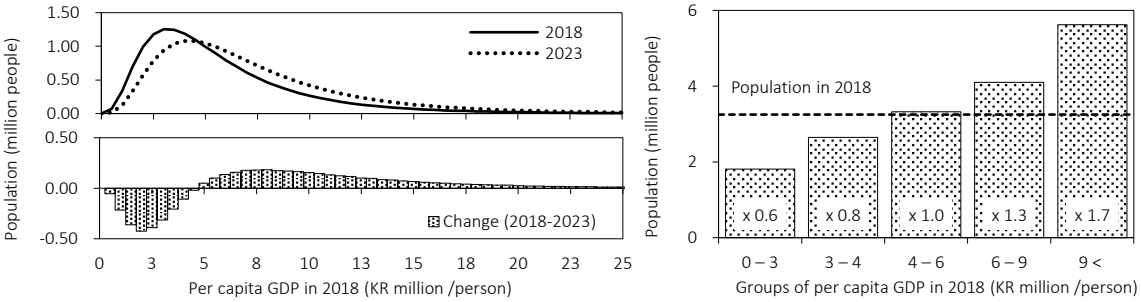


KR = riels (Cambodian currency).
GDP = gross domestic product.
Source: Estimates based on data from the International Monetary Fund (IMF, 2018).

Real GDP and per capita real GDP are expected to increase by 1.4 times and 1.3 times, respectively, from 2018 to 2023 (Figure 8.2). According to a projection of the population based on the level of per capita GDP (Figure 8.3; Appendix 3.1), as per capital GDP approaches about KR5 million, a boundary is crossed whereby the number of people whose annual contributions to GDP are below that value will decrease. By contrast, the number of people with per capita GDP above KR5 million will increase across a wide range of the distribution. In particular, the population with personal incomes above KR9 million (i.e. the 80th percentile) will expand by 1.7 times by 2023. This projection implies a rapid increase in the number of high-income people. It will thus be necessary to establish a system for supplying agri-food products to match the demand from this rapidly growing upper-income bracket.

Figure 8.3. Estimated Population of Cambodia by Per Capita GDP, 2018 and 2023

A. Distribution of Population Changes B. Population Divided into Five GDP Groups



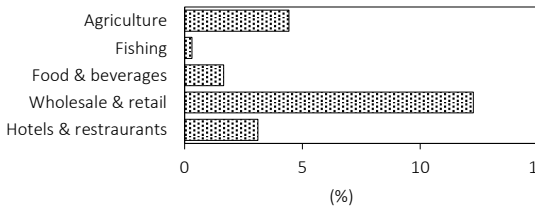
KR = riels (Cambodian currency).
GDP = gross domestic product.
Note: The per capita GDP is based on constant 2018 prices. The bars in Figure B show the estimated populations of the GDP groups in 2023. The numbers in the bars show the changes in these populations from 2018 to 2023.
Source: Appendix 3.1.

The VA of FVC-related Industries

The VA of the wholesale and retail trade sectors has been a major component of Cambodia's GDP; for instance, it accounted for about 12% of GDP in 2015 (Figure 8.4). Meanwhile, the VA of the other FVC-related industries, including agriculture, was comparatively small.

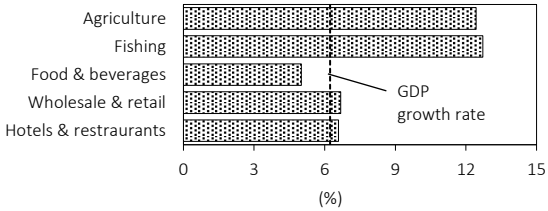
The annual growth rates of real VA in the fishing and agriculture industries averaged as high as 12%–13%, followed by those for the wholesale/retail trade and hotel-and-restaurant industries. The average growth rates of the FVC-related industries were higher than the average GDP growth rate, except for the food-and-beverage industries, which averaged 5% (Figure 8.5). While the proportion of GDP due to the VA of the food and beverage industries shrank, the proportions due to the VA of most FVC-related industries, especially fishing and agriculture, expanded.

Figure 8.4. The Proportion of VA in GDP, 2015



GDP = gross domestic product, VA = value added.
Sources: Estimates based on data from Eora (2018).

Figure 8.5. Average Annual Change in Real VA, 2000–2015



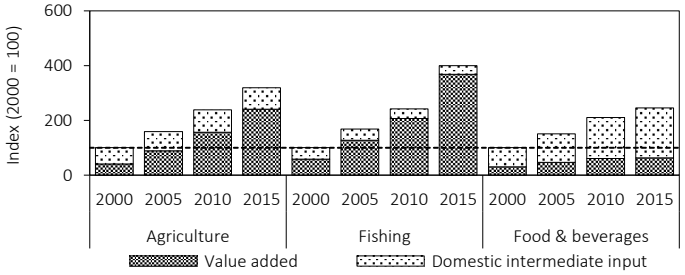
GDP = gross domestic product, VA = value added.
Sources: Estimates based on data from Eora (2018) and the International Monetary Fund (IMF, 2018).

The production values of agriculture tripled, those of fishing quadrupled, and those of the food-and-beverage industries doubled from 2000 to 2015 (Figure 8.6). The part of production value due to the VA (i.e. the VA rate) was large in the fishing industry during that period, reaching almost 100% by 2015, followed by the VA rate in agriculture, which reached 76% (Figure 8.7). The VA rate of the food and beverage sector stayed at around 26% during the entire period, far lower than the rates for the

other two industries. The food and beverage sector depended on intermediate inputs from within this sector and from other, related sectors; and production in the food and beverage sector would generally induce more production within that sector, and in related sectors, than it would in agriculture and fishing.

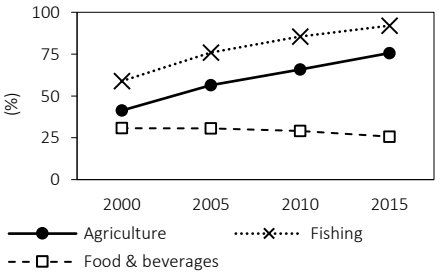
Rapid rises in the VA rates for agriculture and fishing suggest a decrease in their use of intermediate inputs. This change may have been caused by an increase in the number of products with lower cost of sales to revenue ratios, an improvement in the efficiency of the product mix, and/or technical progress that resulted in savings on inputs. The trend toward lower VA rates in the food and beverage industries may indicate a gradual change in the production structures that included the further use of intermediate inputs or a strengthening of ties with other industries.

Figure 8.6. Values of Domestic Production, 2000–2015



Note: The results in the figure are based on real values.
Sources: Estimates based on Eora (2018) and the International Monetary Fund (IMF, 2018).

Figure 8.7. VA Rates, 2000–2015



VA = value added.
Sources: Estimates based on data from Eora

Intermediate Inputs in Agri-food Industries

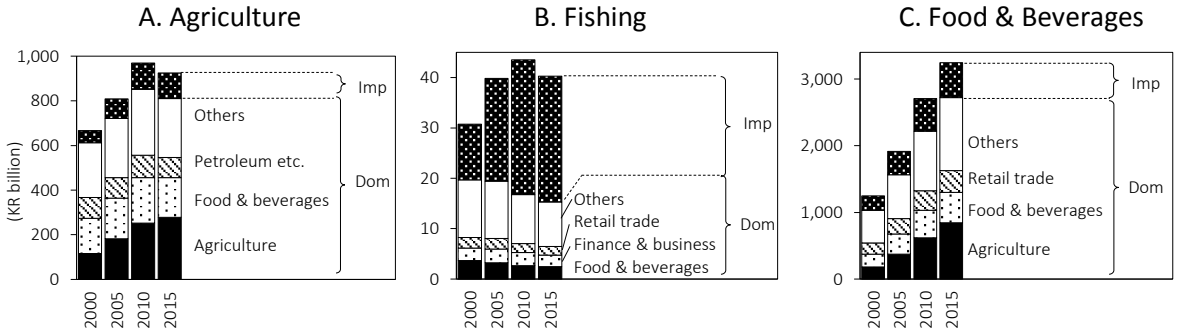
Figure 8.8 shows which industries contributed to the growth of the agriculture, fishing, and food-and-beverage industries from 2000 to 2015. Intermediate inputs into agriculture and the food and beverage industries came mainly from domestic sources, whilst inputs into fishing came mainly from foreign sources. Inputs in agriculture and fishing stagnated after 2010, but inputs in the food and beverage industries steadily increased after 2000.

Agriculture was the largest source of intermediate inputs into agriculture, followed by the food-and-beverage and petroleum, chemical, and non-metallic mineral product ('petroleum etc.') industries.[1] The largest domestic source of inputs into the fishing industry was the food and beverage sector, and the largest domestic source of inputs into the food and beverage sector was agriculture.

The agriculture and food-and-beverage industries were comparatively large sources of intermediate inputs into the food and beverage industries. This implies that growth in the food and beverage industries was largely driven by the supply of raw agricultural products and processed foods. The growth of the food and beverage industries in Cambodia induced a certain degree of development in agriculture through their demand for intermediate inputs.

[1] Table A2.1, in Appendix 2, shows the industry classifications mentioned in this section, including 'petroleum etc.' One major input from the petroleum etc. industry was fuel oil, which was needed for agriculture and for the production of chemical fertilizers.

Figure 8.8. Sources of Intermediate Inputs, 2000–2015



KR = riels (Cambodian currency).

Dom = domestic supply, Imp = imports.

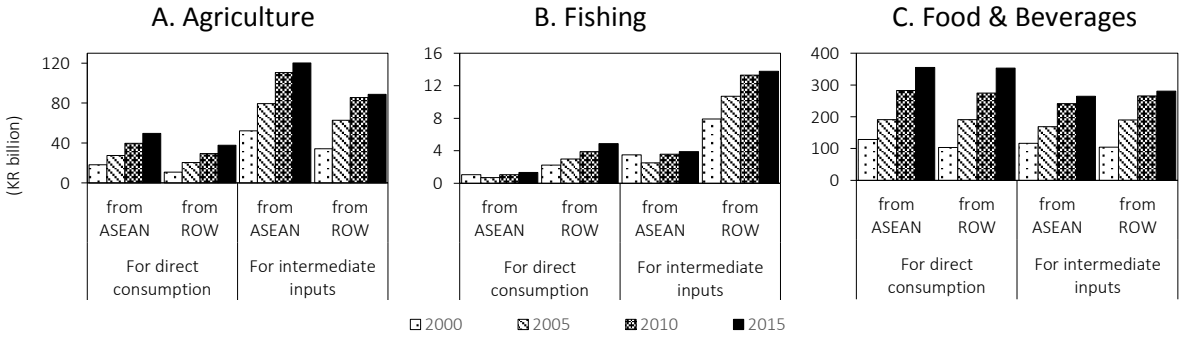
Notes: The values in these graphs are based on constant 2015 prices. 'Petroleum etc.' refers to the petroleum, chemical, and non-metallic mineral product industries.

Sources: Estimates using data from Eora (2018) and the International Monetary Fund (IMF, 2018).

The value of imports from foreign agricultural, fishing, and food-and-beverage sectors steadily increased between 2000 and 2015, reaching levels comparable to that of domestic production (Figure 8.9). The value of imported agricultural and fishery products for use as intermediate inputs was larger than that destined for direct consumption. By contrast, the food and beverage imports were evenly divided between direct consumption and use as intermediate inputs. Put briefly, Cambodia imported agricultural and fishery products mainly for processing, and food-and-beverage products both for processing and direct consumption.

Imports from the fishing industries of other ASEAN countries were smaller than those from the ROW. Meanwhile, imports from the agriculture and food-and-beverage industries of other ASEAN countries exceeded those from the ROW. We can conclude that, as an importer, Cambodia was gradually strengthening its linkages with both the ROW and the rest of the ASEAN region.

Figure 8.9. Values of Imports, by Purpose, 2000–2015



KR = riels (Cambodian currency).

ASEAN = Association of Southeast Asian Nations, ROW = rest of the world.

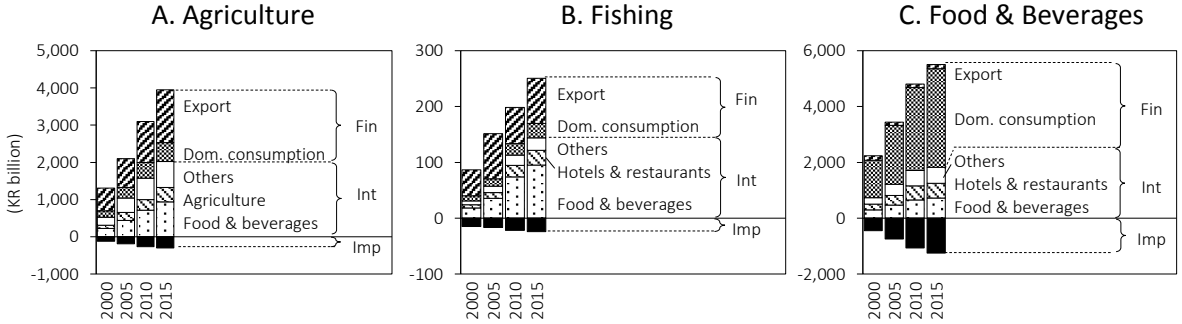
Notes: The values of imports shown in these graphs are based on constant 2015 prices. They include imports from foreign agricultural, fishing, and food-and-beverage sectors destined for domestic final consumption and for use as intermediate inputs in all domestic industries.

Sources: Estimates based on data from Eora (2018) and the International Fund (IMF, 2018).

Destinations of Products of Agri-food Industries

Interindustry transactions involving flows of products from agriculture and fishing to the food-and-beverage industries gently increased during 2000–2015 (Figure 8.10). The flows from fishing to the hotel-and-restaurant industries, and from the food-and-beverage industries to the hotel-and-restaurant industries, also gradually increased. Intra-industry transactions within agriculture and within the food and beverage industries are observable, as well. The FVC grew steadily in Cambodia with regard to both interindustry and intra-industry transactions.

Figure 8.10. Destinations of Domestically Produced and Imported Goods, 2000–2015

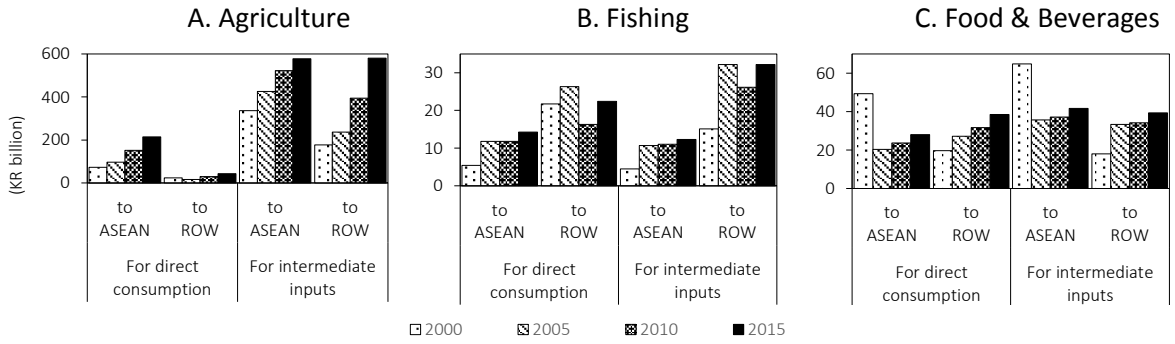


KR = riels (Cambodian currency).
Dom. = domestic.
Notes: The values in these graphs are based on constant 2015 prices. 'Fin' = final demand for domestic and imported goods, 'Int' = intermediate demand for domestic and imported goods, and 'Imp' = the imports of final and intermediate goods. Total demand = Fin + Int. Domestic production = Fin + Int - Imp.
Sources: Estimates based on data from Eora (2018) and the International Monetary Fund (IMF, 2018).

Final demand grew steadily in the agriculture, fishing, and food-and-beverage industries during 2000–2015. Exports dominated final demand for agriculture and fishing, and rapidly increased for agriculture. By contrast, exports from the food and beverage industries were very limited, compared with domestic consumption, and they experienced slower growth after 2005. Figure 8.11 shows that a large part of agricultural exports from Cambodia was consumed as intermediate goods. Meanwhile, the destinations of the exports from the fishing and food-and-beverage industries were almost evenly divided between direct consumption and use as intermediate inputs.

Cambodia exported similar values of goods from the three industries to the other ASEAN countries and to the ROW. During this period, Cambodia deepened its linkages with the rest of the ASEAN region (as an exporter), while also strengthening its linkages with the ROW.

Figure 8.11. Values of Exports, by Purpose, 2000–2015



KR = riels (Cambodian currency).
ASEAN = Association of Southeast Asian Nations, ROW = rest of the world.
Note: The values in these graphs are based on constant 2015 prices.
Sources: Estimates based on data from Eora (2018) and the International Monetary Fund (IMF, 2018).

2. Linkages amongst FVC-related Industries

Final Demand in FVC-related Industries

First, let us see how final demand for domestic FVC-related industries induces the use of intermediate inputs and affects production and VA in each industry.

Table 8.1 shows the composition of final demand during 2000–2015. Final demand was strongest in the retail trade industry, followed by the hotel and restaurant industries, wholesale trade industry, and the food and beverage industries. The average annual growth of final demand in the retail industry, KR204 billion, outstripped the average values for the other FVC-related industries. Growth in final demand in the retail trade industry was driven by household consumption. Similarly, there was a rapid increase of household consumption of products and services from the hotel-and-restaurant industries, wholesale trade industry, and food-and-beverage industries. It is notable that exports to both the ROW and the rest of the ASEAN region accounted for a large part of final demand, and that they increased dramatically for agriculture.

Table 8.1. Final Demand for Products/Services of FVC-related Industries, 2000–2015

(KR billion)

	Domestic production of											
	Agriculture		Fishing		Food & beverages		Wholesale trade		Retail trade		Hotels & restraurants	
Final demand as	Value	Change	Value	Change	Value	Change	Value	Change	Value	Change	Value	Change
Domestic consupmtion												
Household consumption	445	20	21	1	2,834	117	2,235	89	4,743	189	3,470	139
Other consumption	6	0	0	0	54	2	55	2	116	5	62	3
Capital formation	-28	-1	-2	0	-62	-3	459	20	133	6	0	0
Export												
Export to ASEAN	792	26	27	1	70	-3	186	10	5	0	35	2
Export to ROW	623	29	55	1	78	3	175	8	76	4	296	13
Total	1,838	74	101	3	2,973	117	3,110	129	5,074	204	3,863	157
Annual change rate (%)		6.2		3.7		5.9		6.6		6.2		6.3

KR = riels (Cambodian currency).
ASEAN = Association of Southeast Asian Nations, FVC = food value chain, ROW = rest of the world.
Notes: The values in this table are in constant 2015 prices. 'Change' refers to the average annual changes as estimated based on data for 2000–2015. Negative values in capital formation reflect changes in inventories.
Source: Appendix 3.2.

Production and VA Induced by Final Demand

Table 8.2 shows sources of intermediate inputs during 2000–2015 that came from domestic and foreign industries, and were destined for use in production by major FVC-related industries in Cambodia. The table indicates that 10% of intermediate inputs into the hotel and restaurant industries came from the domestic food and beverage sector, and that 20% of inputs into the food and beverage sector came from domestic agriculture. This suggests that the hotel-and-restaurant and food-and-beverage sectors can sequentially induce some agricultural production. The table also shows that the hotel-and-restaurant and food-and-beverage industries in Cambodia used a large value of inputs from foreign sources, unlike the same industries in most other ASEAN countries covered in this report.

The small increments of annual change in the shares of inputs shown in Table 8.2 indicate a stable input–output structure in Cambodia during 2000–2015, except for the linkage between the food and beverage industries and agriculture. The food and beverage sector sharply increased the amount of intermediate inputs drawn from domestic agriculture, a trend that implies a strengthening of inter-sector linkages. If this structural change continues, the growth of final demand in the food and beverage sector will further drive the development of agriculture.

Table 8.2. Sources of Intermediate Inputs in Major FVC-related Industries, 2000–2015

		Domestic production of											
		Agriculture		Fishing		Food & beverages		Wholesale trade		Retail trade		Hotels & restraurants	
Input from		Share (%)	Change	Share (%)	Change	Share (%)	Change	Share (%)	Change	Share (%)	Change	Share (%)	Change
Agriculture	Domestic	8	-0.17	0	0.00	20	0.61	0	0.00	0	0.01	2	0.07
	ASEAN	0	-0.01	0	0.00	2	-0.01	0	0.00	0	0.00	0	0.00
	ROW	0	-0.01	0	-0.02	1	0.00	0	0.00	0	0.00	0	0.00
Fishing	Domestic	0	0.00	1	-0.02	2	0.09	0	0.00	0	0.00	1	0.03
	ASEAN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	ROW	0	0.00	0	-0.01	0	0.00	0	0.00	0	0.00	0	0.00
Food & beverages	Domestic	2	-0.21	1	-0.12	11	-0.02	0	0.00	1	0.01	10	0.05
	ASEAN	0	-0.01	0	-0.02	3	-0.02	0	0.00	0	0.00	2	-0.01
	ROW	0	0.00	1	-0.03	3	0.01	0	0.00	0	0.00	2	0.01
Wholesale trade	Domestic	2	-0.19	1	-0.18	6	-0.04	2	-0.01	1	-0.01	4	-0.03
	ASEAN	0	0.00	0	0.00	0	0.00	3	0.01	0	0.00	0	0.00
	ROW	0	0.00	0	0.00	0	0.00	3	0.07	0	0.00	0	0.00
Retail trade	Domestic	0	-0.02	0	-0.03	0	0.00	0	0.00	0	0.00	1	-0.01
	ASEAN	0	0.00	0	0.00	0	0.00	1	0.02	0	0.00	0	0.00
	ROW	0	0.00	0	0.00	0	0.00	1	0.03	0	0.00	0	0.00
Hotels & restraurants	Domestic	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	0.00
	ASEAN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	ROW	0	0.00	0	-0.01	0	0.00	0	0.00	0	0.00	0	0.00

ASEAN = Association of Southeast Asian Nations, FVC = food value chain, ROW = rest of the world.
Notes: 'Share' refers to the intermediate inputs as a percentage of total inputs in 2015. 'Change' refers to the average annual changes in the shares as estimated based on data for 2000–2015.
Source: Appendix 3.2.

Table 8.3 shows the VA directly and indirectly boosted by a 1% increase over the 2015 value of final demand for domestic products and services through an increase in domestic production and intermediate inputs. For example, a 1% increase in final demand in the food and beverage sector generated a KR5.5 billion increase in the VA of agriculture, as well as a KR7.6 billion increase in the VA of the food-and-beverage sector itself.

Increases in the final demand in the food and beverage industries had some impacts on the VA of upstream sectors, particularly agriculture. This result suggests that interventions into the food and beverage industries do contribute to the development of agriculture.

The food and beverage industries had a notable effect on the VA of fishing, as the size of the fishing market is very limited. For instance, the amount of VA in the fishing sector induced by a 1% increase in final demand over the 2015 value in the food and beverage industries (KR0.59 billion) was large compared with that driven by the final demand in the fishing sector itself (KR0.82 billion). Increasing

final demand in the food and beverage industries could thus be an effective way to promote the development of the fishing sector.

The inducement effect of final demand in the wholesale and retail trade sectors on the other four sectors was very small, as is shown in Table 8.3. Meanwhile, Table 8.2 indicates that FVC-related industries, especially the food and beverage industries, did depend on inputs from the wholesale trade industry during 2000–2015. It is suggested that the services provided by the wholesale/retail trade sectors are necessary, but alone not sufficient, to automatically drive the development of the FVC-related industries.

Table 8.3. VA Induced by a 1% Increase in Final Demand, 2015

(KR billion)

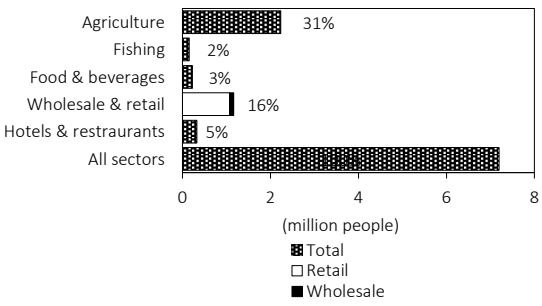
	1% increase in final demand for					
Induced value added in	Agriculture	Fishing	Food & beverages	Wholesale trade	Retail trade	Hotels & restraurants
Agriculture	14.72	0.00	5.45	0.06	0.23	1.31
Fishing	0.01	0.82	0.59	0.00	0.04	0.26
Food & beverages	0.11	0.00	7.55	0.02	0.15	0.96
Wholesale trade	0.27	0.01	1.54	19.14	0.73	1.37
Retail trade	0.03	0.00	0.07	0.06	30.91	0.34
Hotels & restraurants	0.01	0.00	0.06	0.06	0.13	17.34

KR = riels (Cambodian currency).
VA = value added.
Source: Appendix 3.2.

The Relationship amongst the Number of Employees, Per Capita Compensation, and Production

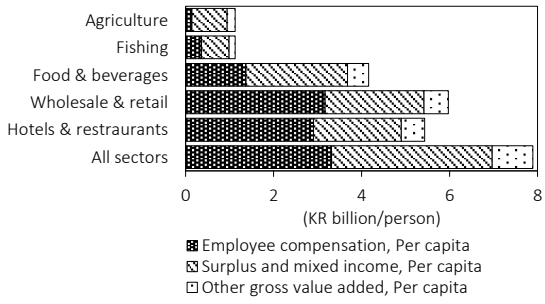
Now let us consider how an increase in production relates to changes in the number of employees and per capita employee compensation in an industry. According to figures 8.12 and 8.13, the agricultural sector in 2015 was characterized by a large number of employees, low labour productivity, and low per capita compensation compared with other FVC-related industries. By contrast, the food and beverage industries had a limited number of employees, but higher labour productivity and per capita compensation than agriculture or fishing.

Figure 8.12. Number of Employees, by Sector, 2015



Sources: International Labour Organization (ILO, 2019); Appendix 3.3.

Figure 8.13. Gross VA per Capita, by Sector, 2015



KR = riels (Cambodian currency).
VA = value added.
Sources: Estimates based on data from Eora (2018) and the International Labour Organization (ILO, 2019); Appendix 3.3.

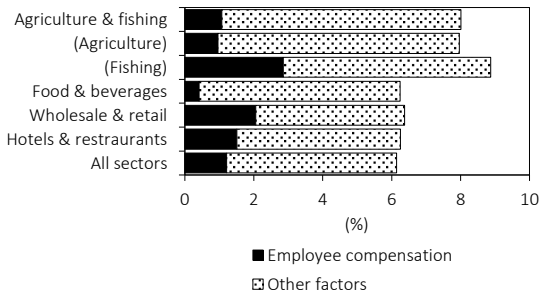
Figure 8.14 illustrates the relationship amongst the number of employees, per capita compensation, and production during 2000–2015. Figure 8.14A depicts the proportion of the average annual rate of change in production in each sector that was attributable to total employee compensation. In agriculture and fishing, production growth, at 8%–9%, was higher than that of the other FVC-related industries, at 6%. The largest contribution of per capita compensation to production growth was in fishing, at 3%, while the smallest was in the food and beverage industries, at 0.5%.

The average annual rates of change in the total value of employee compensation were within the range of 7%–13% in all of the observable FVC-related sectors (Figure 8.14 B). Two factors determine the total value of employee compensation: the number of employees and per capita compensation. In the agricultural sector, the number of employees decreased, while per capita compensation increased. Per capita compensation often grows faster when there is a decrease in the number of employees. Conversely, the fishing industry saw a reduction in per capita compensation and an increase of the number of employees. In other sectors, both per capita compensation and the number of employees steadily increased.

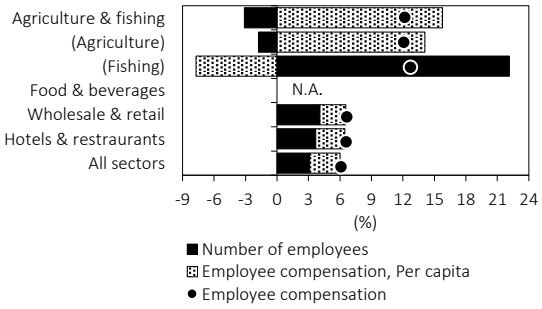
These results suggest the production growth can accompany a rise in per capita compensation in many FVC-related industries, particularly in the agricultural sector. Another notable point is the decline in the number of employees in the agricultural sector. The large number of employees, low-level labour productivity, low per capita compensation, and steep growth in per capita compensation, together with the decrease in the number of employees, suggest the existence of a labour surplus in agriculture. Any interindustry movement of labourers would be deeply connected to the productivity and efficient development of agriculture. The hotel-and-restaurant and wholesale/retail trade industries, which had higher per capita compensation than all the other FVC-related industries, and stable growth in the number of employees, seem to have been attractive sectors in terms of labour absorption.

Figure 8.14. Changes in Production and Employee Compensation, 2000–2015

A. Breakdown of the Average Annual Rates of Change in Production



B. Breakdown of the Average Annual Rates of Change in Employee Compensation



Notes: Other factors include changes in the value added (VA), other than from employee compensation, and changes in intermediate inputs. The data is from selected years during 2000–2015.
Source: Appendix 3.3.

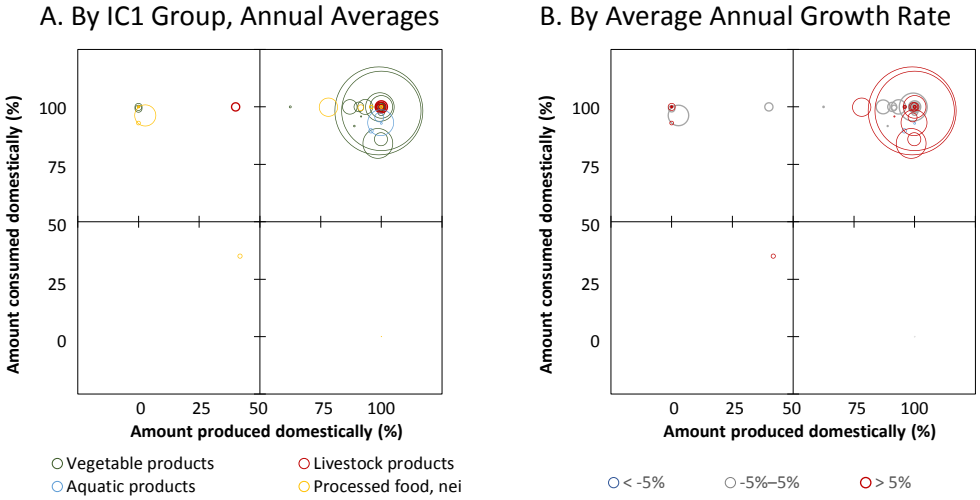
3. Supply–Demand Balance of Agri-food Products

Supply–Demand Structure

Figure 8.15 shows the structure of domestic commerce and foreign trade in 2004–2013. There are two graphs, each of which is divided into four quadrants defined by two criteria: whether agri-food goods were *produced* domestically or in foreign markets and whether they were *consumed* in domestically or in foreign markets. In 8.15 A and 8.15 B, the circles are scattered mainly across the top two quadrants. The circles vary in size according to the volumes produced of the goods they represent. The pattern of circles is the same in both graphs, but the circles in Figure 8.15 A are colour-coded to indicate the agri-food sector, whilst those in Figure 8.15 B are colour-coded to reflect growth rates.

The top side of each graph represents goods that were mostly or completely consumed domestically, and the right side represents goods that were mostly or completely produced domestically. Most of the agri-food products are concentrated in the first (upper-right) quadrant, representing products that were produced and consumed in the domestic market (i.e. domestic-oriented goods). There are a few small circles in the second (upper-left) quadrant, representing goods that were produced in foreign markets and consumed domestically (i.e. import-oriented goods). We can observe one circle in the third (lower-left) quadrant, denoting goods that were imported re-exportation (i.e. trade-oriented goods), but it is very small. And there are no observable circles in the fourth (lower-right) quadrant, which represents goods that were produced domestically and consumed in foreign markets (i.e. export-oriented goods). Briefly said, the agri-food industries in Cambodia, like those in Lao PDR, were more domestic-oriented than the same industries in the other ASEAN countries covered in this report.

Figure 8.15. Classification of Agri-food Products by Supply–Demand Balance, 2004–2013



IC1 = item category level 1, nei = not elsewhere included.

Notes: Each circle represents a Food Balance Sheet (FBS) item as designated by FAOSTAT. The sizes of the circles express the quantity of total supply, with the proportions estimated based on quantitative data. 'IC1' comprises the author's classifications of broad agri-food product categories (see Appendix 2.2). In these graphs, the percentage of goods not produced/consumed domestically are produced/consumed in foreign markets. Data classification: FBS items.

Sources: FAO (2019); Appendix 3.4.

Table 8.4 shows that, during 2004–2013, most agri-food products, particularly cereals (11) and vegetables (13), were produced and consumed mainly in the domestic market. A relatively large amount of sugar (41) was imported, followed by cereals and alcoholic beverages (44). Cereal exports exceeded those of the other IC2 products. The second- and third-largest export goods were vegetables and freshwater fishes (31), respectively.

Annual change data indicates soaring production and domestic supplies of vegetables and cereals. Both the production and domestic supplies of oil and sugar crops (12), freshwater fishes, and alcoholic beverages also grew comparatively large. Increases in the cereal exports and imports, and in the exports of vegetables, were also notable characteristics of the supply–demand balance of agri-food products in Cambodia during this period. Changes in other items and IC2 groups were relatively small.

Table 8.4. Supply–Demand Balance of Agri-food Products, 2004–2013

(1,000 metric tons)

IC1	IC2	2004–2013 average				Average annual change, 2004–2013			
		Production	Domestic supply	Import	Export	Production	Domestic supply	Import	Export
1 Vegetable products	11 Cereals	5,541	5,430	137	179	437	432	12	35
	12 Oil and sugar crops	600	568	1	18	54	66	0	-2
	13 Vegetables	4,714	4,647	6	70	955	934	1	24
	14 Fruits and nuts	364	408	44	0	7	8	0	0
	15 Stimulants and spices	13	18	4	0	0	0	0	0
2 Livestock products	21 Meat	236	237	0	0	-3	-1	0	0
	22 Milk	23	57	35	0	0	-2	-3	0
	23 Eggs	20	20	0	0	1	1	0	0
3 Aquatic products	31 Freshwater fishes	445	416	1	31	29	30	0	-1
	32 Marine fishes	59	59	3	3	7	7	0	0
	33 Crustaceans	16	15	1	2	-1	0	0	-1
	34 Molluscs	9	9	0	0	1	1	0	0
	35 Aquatic animals, nei	0	0	0	0	0	0	0	0
	36 Aquatic plants	4	4	0	0	-2	-2	0	0
4 Processed food, nei	41 Sugar	9	302	326	12	0	2	6	5
	42 Fat and oils	45	52	15	11	4	2	-1	3
	43 Food, nei	0	1	1	0	0	0	0	0
	44 Alcoholic beverages	204	257	54	0	38	41	3	0

IC1 = item category level 1, IC2 = item category level 2, nei = not elsewhere included.

Note: 'IC1' and 'IC2' comprise the author's classifications of broader product categories and more specific groups, respectively (Appendix 2.2). This table is based on an aggregation of all the data available from FAOSTAT's Food Balance Sheet (FBS). Data classification: FBS items.

Sources: FAO (2019); Appendix 3.4.

Table 8.5 shows FBS items (as designated by FAOSTAT) listed in descending order of total supply quantity within each category in 2004–2013, corresponding to the quadrants in Figure 8.15. The products existing in large quantities, such as rice and cassava, are concentrated in the column for domestic-oriented products. Most products are in the cells representing stable or expanding markets for domestic- or import-oriented products; but several products, such as pelagic fish and tea, are in the cell representing shrinking markets for import-oriented products.

Rice and cassava are identifiable as domestic-oriented products by their large quantities of supply undergoing rapid growth. Maize and products, freshwater fish, and sugar cane are also notable for their accelerated growth. Barley and products are examples of rapidly increasing import-oriented items. Although their markets were comparatively stable, the import-oriented items sugar, milk, and wheat and products are conspicuous in Table 8.5 for their large quantities of supply. Another feature of the supply–demand balance in Cambodia during this period was the steep growth in palm oil, which is in the trade-oriented category.

Table 8.5. Total Quantities of Supply for Product Categories, in Descending Order, 2004–2013

(1,000 metric tons)

Category			Domestic-oriented			Export-oriented			Import-oriented			Trade-oriented		
Provided by			Domestic market			Domestic market			Foreign market			Foreign market		
Consumed in			Domestic market			Foreign market			Domestic market			Foreign market		
Change		Rank	IC2	FBS items	Quantity	IC2	FBS items	Quantity	IC2	FBS items	Quantity	IC2	FBS items	Quantity
Annual change rate, 2004–2013 (%)	Expanding r > 5	1	11	Rice (milled equivalent)	4,947				11	Barley and products	38	42	Palm oil	16
		2	13	Cassava and products	4,037				41	Sweeteners, other	13			
		3	11	Maize and products	585				42	Oilcrops oil, other	7			
		4	31	Freshwater fish	446				15	Coffee and products	3			
		5	12	Sugar cane	342				14	Grapes and products (excl wine)	2			
	Stable -5 < r < 5	1	13	Vegetables, other	538	42	Palmkernel oil	0.7	41	Sugar (raw equivalent)	301			
		2	14	Bananas	155				22	Milk - excluding butter	57			
		3	14	Fruits, other	147				11	Wheat and products	38			
		4	21	Pigmeat	116				14	Apples and products	3			
		5	21	Bovine meat	71				43	Infant food	1			
	Shrinking r < -5	1	33	Crustaceans	16				32	Pelagic fish	2			
		2	36	Aquatic plants	4				15	Tea (including mate)	2			
		3							11	Cereals, other	1			
		4							44	Wine	1			
		5							13	Peas	0.5			

FBS = Food Balance Sheet (FAOSTAT), IC2 = item category level 2, r = average annual change rate.
Notes: The values in this table represent the averages for 2004–2013. Data classification: FBS items.
Sources: FAO (2019); Appendix 3.4.

Trade Prices and Volumes

The export prices of raw stimulants and spices (15) were unexpectedly high, but still limited, during 2014–2016 (Table 8.6). The exports of relatively high-priced products in the IC2 groups did not have a high total value. The import prices of raw and processed crustaceans (33), raw aquatic plants (36), raw sugar (41), and food, nei (43), exceeded those of many other products. The import values of most of these high-priced products were quite small, however, with the exception of food, nei. We can conclude that those items classified as processed food, nei, that were imported in large quantities had high enough values to induce active trade. Overall, the export and import prices of processed products tended to be higher than those of primary products, except for some items, including several vegetable products exported in small amounts and imported sugar.

Table 8.6. Prices and Values of Exported/Imported Agri-food Products, 2014–2016

			Price ($/kg)				Value ($ million)			
			Export		Import		Export		Import	
IC1		IC2	Primary products	Processed products	Primary products	Processed products	Primary products	Processed products	Primary products	Processed products
1	Vegetable products	11 Cereals	0.4	0.6	0.3	0.6	0.4	269	9	86
		12 Oil and sugar crops	0.7	0.4	0.1	0.7	1	0.1	0.2	1
		13 Vegetables	0.2	0.4	0.4	0.9	20	0.1	3	3
		14 Fruits and nuts	1.2	1.2	0.5	0.7	1.0	0.1	10	6
		15 Stimulants and spices	6.4	0.7	1.1	3.9	4	0.4	2	10
2	Livestock products	21 Meat	—	4.3	—	2.9	0.0	0.2	0.0	5
		22 Milk	—	—	1.1	1.6	0.0	0.0	12	8
		23 Eggs	—	—	2.1	—	0.0	0.0	0.0	0.0
3	Aquatic products	31 Freshwater fishes	—	—	0.5	3.5	0.0	0.0	0.9	0.2
		32 Marine fishes	1.6	—	1.5	1.5	0.0	0.0	0.1	3
		33 Crustaceans	3.4	—	7.5	7.4	0.6	0.0	0.1	0.9
		34 Molluscs	—	—	3.0	—	0.0	0.0	0.0	0.0
		35 Aquatic animals, nei	—	—	—	1.2	0.0	0.0	0.0	14
		36 Aquatic plants	—	—	4.7	—	0.0	0.0	0.3	0.0
		38 Fishes, nei	0.3	1.0	0.5	2.2	0.0	0.0	1.0	0.6
4	Processed food, nei	41 Sugar	—	0.3	4.4	0.5	0.0	43	0.1	93
		42 Fat and oils	—	0.6	—	0.8	0.0	15	0.0	10
		43 Food, nei	—	1.4	—	4.0	0.0	0.9	0.0	59
		44 Alcoholic beverages	—	2.0	—	0.8	0.0	6	0.0	42

IC1 = item category level 1, IC2 = item category level 2, kg = kilogram, nei = not elsewhere included.
Notes: This table shows the averages for 2014–2016. The values indicated for exports are based on 'free on board' (FOB) prices, and those for imports are based on 'cost, insurance, and freight' (CIF) prices. Data category: IC2 groups based on the Broad Economic Categories (BEC) classifications of primary products (11) and processed products (12).
Sources: UNSD (2017); Appendix 3.6.

4. The Competitiveness of Each Product in the ASEAN Region

Commodities Imported by ASEAN Countries

Tables 8.7 and 8.8 provide information about the agri-food products imported by ASEAN countries from Cambodia in 2014–2016. These products varied in price, depending on the IC2 group. Most of the vegetable, livestock, and aquatic products were low-priced compared with similar products from other ASEAN+6 countries (Table 8.7). However, a few products in the processed food, nei, category—such as sugar (41); food, nei (43); and alcoholic beverages (44)—were in the mid-price or high-price ranges. Cambodia's exports to Viet Nam were notably high in total value compared with those to other ASEAN countries, with the next-largest volumes of exports going to Thailand and Malaysia (Table 8.8). The total import values of Cambodian products in the other ASEAN countries were minimal.

As shown in Table 8.7, 10% of Cambodia's oil and sugar crops (12) in the low-price range were imported by other ASEAN countries, a significantly larger amount than had been estimated based on approximate lines. Meanwhile, most products were imported by other ASEAN countries in smaller quantities than estimated, including stimulants and spices (15) in the low-price range and fruits and nuts (14) in low- and mid-price ranges.[2]

Table 8.7. Prices and Values of Products Imported by ASEAN Countries, by IC2 Group, 2014–2016

IC1	IC2	Price ($/kg)	Value ($ million)	Number of imported products by price ranges (%)			Number of products deviated from approx. lines (%) Imported larger			Imported smaller			Obs.
				Price ranges			Price ranges			Price ranges			
				Low	Mid	High	Low	Mid	High	Low	Mid	High	
1 Vegetable products	11 Cereals	1.0	46	68	21	11	0	0	0	5	0	0	19
	12 Oil and sugar crops	0.8	34	70	10	20	10	0	0	0	0	10	10
	13 Vegetables	0.5	368	81	13	6	0	0	0	0	0	0	16
	14 Fruits and nuts	1.3	101	95	5	0	0	0	0	14	5	0	21
	15 Stimulants and spices	8.4	5	46	31	23	0	0	0	15	0	0	13
2 Livestock products	21 Meat	2.2	0.0	100	0	0	0	0	0	0	0	0	3
	22 Milk	5.5	0.0	—	—	—	—	—	—	—	—	—	0
	23 Eggs	—	—	—	—	—	—	—	—	—	—	—	0
3 Aquatic products	31 Freshwater fishes	1.4	0.7	100	0	0	0	0	0	0	0	0	3
	32 Marine fishes	1.2	0.9	100	0	0	0	0	0	0	0	0	4
	33 Crustaceans	1.4	0.7	100	0	0	0	0	0	0	0	0	10
	34 Molluscs	1.1	0.9	100	0	0	0	0	0	0	0	0	7
	35 Aquatic animals, nei	0.2	0.1	67	0	33	0	0	0	0	0	33	3
	36 Aquatic plants	22.7	0.0	—	—	—	—	—	—	—	—	—	0
	38 Fishes, nei	1.1	2	86	14	0	0	0	0	0	14	0	7
4 Processed food, nei	41 Sugar	1.5	10	50	0	50	0	0	0	0	0	0	4
	42 Fat and oils	0.7	8	100	0	0	0	0	0	0	0	0	5
	43 Food, nei	8.5	0.0	0	67	33	0	0	0	0	33	0	3
	44 Alcoholic beverages	1.6	0.6	40	40	20	0	0	0	0	20	0	5

ASEAN = Association of Southeast Asian Nations, IC1 = item category level 1, IC2 = item category level 2, kg = kilogram, nei = not elsewhere included.

Notes: The prices and values represent the averages for 2014–2016. 'Price' refers to the import price, including cost, insurance, and freight (CIF) added to the tariff established by the ASEAN *Trade* in Goods Agreement (ATIGA). 'Value' refers to the imported value (CIF) without the tariff. See Appendix 3.6 for price ranges and approximate lines. The products for which the externally studentized residual was significantly large or small at the 10% level were counted. 'Obs.' refers to the number of detailed commodities classified according to the Broad Economic Categories (BEC) three-digit category numbers and used for applying approximation lines. Data category: FAOSTAT Commodity List (FCL) and adjusted groups under the International Standard Statistical Classification of Aquatic Animals and Plants (ISSCAAP), classified under BEC 111, 112, 121, and 122.

Sources: UNSD (2017); Appendix 3.6.

[2] Although aquatic animals, nei (35), food, nei (43), and alcoholic beverages (44) show large values, the number of observed data is limited.

Table 8.8. Prices and Values of Products Imported into the ASEAN Region, by Country, 2014–2016

Importer	Price ($/kg)	Value ($ million)	Number of imported products by price ranges (%) Price ranges Low	Mid	High	Number of products deviated from approx. lines (%) Imported larger Price ranges Low	Mid	High	Imported smaller Price ranges Low	Mid	High	Obs.
Singapore	4.4	4	55	15	30	0	0	0	10	0	10	20
Brunei	2.7	5	56	44	0	0	0	0	0	0	0	9
Malaysia	1.4	44	65	26	9	0	0	0	0	9	4	23
Thailand	0.9	187	91	4	4	1	0	0	0	6	1	70
Indonesia	0.6	0.2	100	0	0	0	0	0	0	0	0	1
Philippines	—	0.0	—	—	—	—	—	—	—	—	—	0
Viet Nam	1.5	336	86	14	0	0	0	0	0	0	0	7
Lao PDR	—	0.0	—	—	—	—	—	—	—	—	—	0
Camboodia	0.7	0.2	50	0	50	0	0	0	0	0	0	2
Myanmar	1.4	0.0	0	0	100	0	0	0	0	0	0	1

ASEAN = Association of Southeast Asian Nations, kg = kilogram, nei = not elsewhere included.
Notes: The prices and values represent the averages for 2014–2016. 'Price' refers to the import price, including cost, insurance, and freight (CIF) added to the tariff established by the ASEAN *Trade* in Goods Agreement (ATIGA). 'Value' refers to the imported value (CIF) without the tariff. See Appendix 3.6 for price ranges and approximate lines. The products for which the externally studentized residual was significantly large or small at the 10% level were counted. 'Obs.' refers to the number of detailed commodities classified according to the Broad Economic Categories (BEC) three-digit category numbers and used for applying approximation lines. Data category: FAOSTAT Commodity List (FCL) and adjusted groups under the International Standard Statistical Classification of Aquatic Animals and Plants (ISSCAAP), classified under BEC 111, 112, 121, and 122.
Sources: UNSD (2017); Appendix 3.6.

Goods Imported in Smaller/Larger Quantities than Estimated Based on Prices: Non-price Competitiveness in the ASEAN Region

Soybeans imported by Thailand and Viet Nam were the only Cambodian product imported in significantly larger quantities in 2014–2016 than had been estimated based on their import prices (Table 8.9). It might be beneficial to seek opportunities to develop further export markets for this product. Moreover, research on the causes of this one case of active import demand, including production and sales methods, would help identify pathways toward increasing the sales of other items.

Research on the characteristics of the goods actively exported by other countries to Cambodia might also trigger a reconsideration of production and marketing strategies for domestic products that could compete with goods produced by other states in the ASEAN region, for instance: tea, beef and veal sausages, fresh whole cow's milk, buttermilk/curdled milk/acidified milk, skimmed dried milk, short margarine, and refined sugar from Thailand; maize flour from Viet Nam; and single strength orange juice, natural honey, distilled alcoholic beverages, and beer of barley from Singapore.[3]

There are also many products for which import quantities were significantly smaller during 2014–2016, considering their prices, such as vegetable products in the low- and mid-price ranges; aquatic products in the low-price range; and processed food, nei, in all price ranges. Although these products were certainly exported to other ASEAN countries, they might not have been as competitive as the same products from other ASEAN and +6 countries. If these items are to be promoted as export goods destined for other ASEAN countries, active and intensive product differentiation will be necessary.

[3] For reference, see tables 2.9 to 9.9. See also Table A4.2 on major exports from the +6 countries.

Table 8.9. Goods Imported by ASEAN Countries in Smaller/Larger Quantities than Estimated Based on Prices, in Ascending Order of P-values, 2014–2016

A. Larger Quantities of Imports than Estimated Based on Prices

IC1	Rank	Price ranges																	
		Low							Mid							High						
		Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value
1 Vegetable products	1	THA	12	111	Soybeans	0.4	8	0.09														
	2	VNM	12	111	Soybeans	0.6	20	0.16														
	3																					
	4																					
	5																					
2 Livestock products	1																					
	2																					
	3																					
	4																					
	5																					
3 Aquatic products	1																					
	2																					
	3																					
	4																					
	5																					
4 Processed food, nei	1																					
	2																					
	3																					
	4																					
	5																					

B. Smaller Quantities of Imports than Estimated Based on Prices

IC1	Rank	Price ranges																					
		Low							Mid							High							
		Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value
1 Vegetable products	1	MYS	14	122	Nuts, prepared (exc. groundnuts)	0.8	0.003	0.02	SGP	14	122	Fruits, nuts, peel, sugar preserved	7.0	0.000	0.02	SGP	12	122	Soya paste	18.5	0.000	0.05
	2	THA	15	122	Coffee, roasted	8.3	0.000	0.03	VNM	11	122	Rice, milled/husked	1.5	0.000	0.15							
	3	THA	15	112	Tea	18.3	0.000	0.04	MYS	11	122	Bread	2.6	0.019	0.17							
	4	MYS	11	122	Pastry	2.8	0.020	0.05	SGP	12	122	Peanut butter	5.6	0.004	0.18							
	5	THA	14	112	Fruit, stone nes	0.6	0.000	0.06														
2 Livestock products	1																					
	2																					
	3																					
	4																					
	5																					
3 Aquatic products	1	THA	38	122	Fish and fish products, nei	0.9	0.097	0.12	MYS	38	122	Fish and fish products, nei	4.8	0.001	0.07	SGP	35	122	Miscellaneous aquatic products, food	18.5	0.000	0.06
	2	THA	32	112	Tunas, bonitos, billfishes	0.3	0.002	0.12														
	3	MYS	38	112	Fish and fish products, nei	4.7	0.000	0.12														
	4																					
	5																					
4 Processed food, nei	1	SGP	41	122	Beverages, non alcoholic	0.6	0.012	0.14	SGP	44	122	Beverages, distilled alcoholic	31.1	0.007	0.05	SGP	44	122	Wine	21.1	0.000	0.13
	2	SGP	44	122	Beverages, fermented rice	2.7	0.000	0.16	THA	43	122	Food preparations, nes	5.4	0.000	0.06	THA	41	122	Beverages, non alcoholic	5.6	0.000	0.15
	3	SGP	42	121	Oil, coconut (copra)	6.2	0.000	0.18	MYS	43	122	Infant food	11.7	0.000	0.10							
	4																					
	5																					

BEC = Broad Economic Categories, United Nations Statistics Division (UNSD), IC1 = item category level 1, IC2 = item category level 2, kg = kilogram, MYS = Malaysia, nei = not elsewhere included, nes = not elsewhere specified, SGP = Singapore, THA = Thailand, VNM = Viet Nam.

Notes: The values listed in this table represent the averages for 2014–2016. The top five agri-food products within each IC1 grouping are listed in ascending order of p-value < 0.2, under the BEC as follows: primary products mainly for industry (111), primary products mainly for household consumption (112), processed products mainly for industry (121), and processed products mainly for household consumption (122). 'Price' refers to the CIF (cost, insurance, and freight) import price added to the tariff set by the ASEAN *Trade* in Goods Agreement (ATIGA). 'Value' refers to the imported value (CIF) without the tariff. The expression 'p-value' refers to the p-value of the t-stat against the externally studentized residual. See Appendix 3.6. Data category: FAOSTAT Commodity List and the adjusted groups under the International Standard Statistical Classification of Aquatic Animals and Plants (ISSCAAP) classified under BEC 111, 112, 121, and 122.

Sources: UNSD (2017); Appendix 3.6

Inter-commodity and Inter-country Comparisons of Land/Feed Productivity

The median land productivity of stimulants and spices (15) were the highest, followed by that of fruits and nuts (14), in 2011–2015 (Table 8.10). The ratios of the yield, an indicator of comparative advantage in the ASEAN region, were roughly the same for all IC2 groups in the category of vegetables.

Table 8.10. Median Levels of Productivity and Resource Allocation in Each IC2 Group

IC1	IC2	Land productivity (KR million/ha)	Chg (%)	Ratio of the yield Index (Yi/Yi')	Chg (%)	Area harvested (1,000 ha)	Chg (%)	Obs.
1 Vegetable products	11 Cereals	5	6	0.9	1	1,540	0	2
	12 Oil and sugar crops	8	4	1.0	-1	14	1	9
	13 Vegetables	14	2	0.8	0	66	2	5
	14 Fruits and nuts	17	2	0.9	0	5	1	9
	15 Stimulants and spices	23	2	0.7	-2	0	1	3
	Total	13	3	0.9	0	12	1	28
IC1	IC2	Feed productivity (KR million/100 PU)	Chg (%)	Ratio of the yield Index (Yi/Yi')	Chg (%)	Producing animals (million PU)	Chg (%)	Obs.
2 Livestock products	21 Meat	5	—	0.8	—	2	-1	5
	22 Milk	4	—	1.5	—	2	-1	1
	23 Eggs	9	—	0.7	—	1	2	2
	Total	6	—	0.8	—	2	-1	8

KR = riels (Cambodian currency).

ha = hectare, IC1 = item category level 1, IC2 = item category level 2, PU = unit of pig feed requirements, Yi = yield in Cambodia, Yi' = average yield in other ASEAN countries.

Notes: Land/feed productivity, ratio of the yield, and area harvested/producing animals represent the average values for 2011–2015. 'Chg' refers to the average annual rates of change during 2006–2015 (%). 'Obs.' refers to the number of items in the FAOSTAT Commodity List (FCL). The data on land productivity was deflated to constant 2015 riel prices. The figures are estimates based on all the FAOSTAT data under the 'Production' rubric. Data category: FCL.

Sources: FAO (2019); Appendix 3.7.

In the category of stimulants and spices (15), pepper had the highest land productivity and ratio of the yield during the same period (Table 8.11); its productivity increased slightly, while its ratio of the yield declined. Meanwhile, the harvested land area for pepper was quite small, at 0.38 million hectares (ha), and did not expand. Note that high productivity and ratio of the yield can be achieved in a limited land area. In the vegetable products category, the productivity and ratios of the yield of oilseed, nes, or minor oilseeds, and of mangoes/mangosteens/guavas were relatively high.[4] Similarly, pork and buffalo meat had high feed productivity and ratios of the yield, compared with those of other the livestock products. Although the harvested areas or number of producing animals for the products mentioned above were small, and did not necessarily increase, the potential of these items as exports to other ASEAN countries could be high if they became competitive with the same products from those other countries by means of greater physical productivity.

As indicated in the second column from the right in Table 8.11, which lists examples of products imported by other ASEAN countries from Cambodia during 2014–2016 in greater quantities than would be expected based on their prices, it is suggested that only soybeans had non-price competitiveness or were differentiated from the same item produced in other countries. Agri-food products in Cambodia should be actively improved for the sake of developing the FVC in that country.

[4] While the land productivity of sugar cane, as shown in Table 10.11, was quite high in 2011–2015, that value is questionable. The producer price of sugar cane in Cambodia was $3,649 per metric ton in 2015, according to FAOSTAT. Meanwhile, the producer prices in Malaysia and Lao PDR, the second- and third-highest producing countries, were $218/t and $181/t, respectively.

Table 8.11. Levels of Productivity and Resource Allocation for Individual Items

No.	IC2	FCL name	Land or feed productivity (KR million/ha or KR million/100 PU)	Chg (%)	Ratio of the yield Index (Yi/Yi')	Chg (%)	Area or producing animals (1,000 ha or million PU)	Chg (%)	Intpn. A	Intpn. B	Items imported larger or smaller compared with the price (p<0.2) Imported larger	in	Imported smaller	in
1	11	Maize	6	6	1.1	0	161	-1	iii	i				
2		Rice, paddy	4	6	0.7	2	2,918	2	iv	iv				
3	12	Sugar cane	305	7	0.3	-2	26	15	ii	ii				
4		Oilseeds nes	20	3	2.2	-2	0	1	i	i				
5		Coconuts	13	4	1.0	2	12	-2	iii	i			Oil, coconut (copra)	SGP
6		Groundnuts, with shell	11	5	0.9	2	18	1	iii	ii				
7		Seed cotton	5	3	0.7	-8	0	-1	iv	iv				
8		Soybeans	5	4	1.1	0	89	4	iii	iii	Soybeans	THA	Soya paste	SGP
9		Sesame seed	4	1	1.3	-1	39	-3	iii	iii				
10		Castor oil seed	1	2	1.2	-2	1	0	iii	iii				
11		Oil, palm fruit	—	—	0.6	0	14	1	—	—				
12	13	Cassava	18	-3	1.2	0	347	17	i	i				
13		Vegetables, fresh nes	18	2	0.5	-1	89	2	ii	ii				
14		Roots and tubers, nes	14	1	1.6	0	3	4	i	i				
15		Sweet potatoes	6	10	0.5	-5	9	0	iv	iv				
16		Beans, dry	6	7	0.8	0	66	1	iv	iii				
17	14	Oranges	53	1	0.3	-1	11	1	ii	ii				
18		Mangoes, mangosteens, guavas	22	3	1.6	0	5	2	i	i			Mangoes, mangosteens, guavas	MYS
19		Pineapples	18	-2	0.3	-2	2	2	ii	ii				
20		Fruit, fresh nes	17	1	0.9	2	12	1	ii	i				
21		Grapefruit (inc. pomelos)	16	3	1.0	0	0	0	i	iii				
22		Lemons and limes	14	3	1.1	2	0	1	i	iii				
23		Bananas	8	2	0.2	-1	32	0	iv	iv				
24		Nuts, nes	2	3	3.0	0	2	0	iii	iii			Nuts, prepared (exc. groundnuts)	MYS
25		Cashew nuts, with shell	—	—	—	—	5	6	—	—				
26	15	Pepper (piper spp.)	97	2	6.1	-2	0	0	i	i				
27		Coffee, green	23	2	0.7	-2	0	1	ii	i			Coffee, roasted	THA
28		Chillies and peppers, dry	3	2	0.5	-5	13	2	iv	iv				
29	21	Meat, pig	170	—	1.1	—	2	-2	i	i				
30		Meat, buffalo	18	—	0.8	—	1	-2	i	i				
31		Meat, chicken	5	—	0.7	—	5	-1	iv	ii				
32		Meat, cattle	5	—	0.6	—	10	-1	iv	iv				
33		Meat, duck	5	—	0.8	—	2	2	iii	iii				
34	22	Milk, whole fresh cow	4	—	1.5	—	2	-1	iii	i				
35	23	Eggs, other bird, in shell	11	—	0.7	—	0	2	ii	ii				
36		Eggs, hen, in shell	7	—	0.7	—	2	2	ii	iii				

KR = riels (Cambodian currency).

FCL = FAOSTAT Commodity List, ha = hectare, IC2 = item category level 2, Intpn. = interpretation, MYS = Malaysia, nes = not elsewhere specified, p = p-value, PU = unit of pig feed requirements, SGP = Singapore, THA = Thailand, Yi = yield in Cambodia, Yi' = average yield in other ASEAN countries.

Notes: 'Area' refers to the total harvested area, and 'producing animals' refers to the number of producing animals. Land/feed productivity, ratio of the yield, and area harvested/producing animals represent the average values for 2011–2015. 'Chg' refers to the average annual rates of change during 2006–2015 (%). The data on land productivity was deflated to constant 2015 riel prices. The figures are estimates based on all the FAOSTAT data provided under the 'Production' rubric. In the 'Intpn' column, the codes are as follows: i = both productivity and ratio of the yield are high; ii = productivity is high, but the ratio of the yield is low; iii = productivity is low, but the ratio of the yield is high; and iv = both productivity and ratio of the yield are low. The codes under 'A' reflect the median of the broader product categories in IC1 (item category level 1), and those under 'B' reflect the median of the specific products in IC2 included here. Regarding the items imported in larger or smaller quantities compared with their prices (p<0.2), the names of the FCL items (classified according to the Broad Economic Categories) listed in the table are those with the smallest p-value < 0.2 estimated based on data during 2014–2016. Data category: FCL.

Source: Appendix 3.7.

Table 8.12 shows weak or non-existent correlations between the land/feed productivity and ratios of the yield of the FCL items in each IC2 group during 2011–2015. In other words, the profitability per unit area of FCL items was not necessarily high when they had a comparative advantage in terms of physical productivity within the ASEAN region.

Negative or non-existent correlations are observed between land/feed productivity or ratio of the yield and the extent of harvested areas or number of producing animals for all IC2 product groups. Such results show that most of the land and producing animals in Cambodia were simply not allocated to products characterized by high productivity or competitiveness.

Table 8.12. Correlation Matrix of Comparative Advantage, Productivity, and Resource Allocation, 2011–2015

IC2	Land or feed productivity						Ratio of the yield					
	11 Cereals	12 Oil and sugar crops	13 Vegetables	14 Fruits and nuts	15 Stimulants and spices	21 Meat	11 Cereals	12 Oil and sugar crops	13 Vegetables	14 Fruits and nuts	15 Stimulants and spices	21 Meat
Ratio of the yield	—	-0.38	0.30	-0.26	—	0.40	—	—	—	—	—	—
Area or producing animals	—	-0.14	0.60	0.24	—	-0.60	—	0.00	-0.10	-0.64	—	-0.70
Obs.	2	8	5	8	3	5	2	8	5	8	3	5

IC2 = item category level 2.

Notes: 'Area' refers to the total harvested area, and 'producing animals' refers to the number of producing animals. This table uses Spearman's rank correlation coefficient of average values during 2011–2015. The values were estimated based on the data for items on the FAOSTAT Commodities List (FCL) relating to land/feed productivity, the ratio of the yield, and the number of producing animals and the land area they used. FCL items with correlation coefficients less than 4 were omitted. 'Obs.' refers to the number of FCL items. Data category: FCL.

Source: Author's calculations, see Appendix 3.7.

5. Summary

Social and Economic Conditions

- In spite of Cambodia's strong prospect of long-term population and economic growth, the small size of its population implies only a limited potential for the country's domestic consumption market. Foreign markets, especially in the ASEAN area, where regional integration is in progress, will likely become important destinations for Cambodian agri-food products.
- The VA of the wholesale and retail trade industries has been a major component of Cambodia's GDP; for instance, it accounted for about 12% of GDP in 2015. While the proportion of GDP due to the VA of the food and beverage sector shrank, that due to the VA of most FVC-related industries, particularly fishing and agriculture, expanded.
- Interindustry transactions involving product flows from agriculture and fishing to the food-and-beverage industries increased gently. Transactions from fishing to the hotel-and-restaurant industries also gradually increased, as did transactions from the food-and-beverage to the hotel-and-restaurant industries. Intra-industry transactions within agriculture and the food-and-beverage sector were observable, as well.

Linkages amongst FVC-related Industries

- The increase in final demand in the food and beverage industries had some impacts on the VA of upstream sectors, particularly agriculture. This result suggests that interventions into the food and beverage industries do contribute to the development of agriculture.
- Effects of the food and beverage industries on the VA of fishing was notable, as the size of the fishing sector is very limited. It is also suggested the services provided by the wholesale/retail trade sectors are necessary, but alone not sufficient, to automatically drive the development of the FVC-related industries.
- Production growth can accompany a rise in per capita employee compensation in many FVC-related industries, particularly agriculture.

- The wholesale/retail trade and hotel-and-restaurant industries, which had higher per capita compensation than the other FVC-related industries, and a stable growth in the number of employees, seemed to have been attractive sectors in terms of labour absorption.

Supply–Demand Balance of Agri-food Products

- Most agri-food products, particularly cereals and vegetables, were produced and consumed mainly in the domestic market. A comparatively large amount of sugar was imported, followed by cereals and alcoholic beverages. The exports of cereals exceeded those of other IC2 goods. The second- and third-largest export goods were vegetables and freshwater fishes, respectively. Even though cereals were mainly produced/consumed at home, the little that was produced/consumed in foreign markets were in large enough volumes to rank high compared with other exports and imports.
- The export prices of raw stimulants and spices were unexpectedly high, but still limited. None of the exports of relatively high-priced IC2 products had large values. We can conclude that the high-priced processed food, nei, imported in large amounts had high enough values to generate active trade in Cambodia.

The Competitiveness of Each Product in the ASEAN Region

- Soybeans imported by Thailand and Viet Nam were the only Cambodian items imported in significantly larger quantities than had been estimated based on their import prices.
- Research on the characteristics of the goods actively exported by other ASEAN countries to Cambodia might trigger a reconsideration of production and marketing strategies for domestic products that could compete with goods produced by other ASEAN states, for instance: tea, beef and veal sausages, fresh whole cow's milk, buttermilk/curdled milk/acidified milk, skimmed dried milk, short margarine, and refined sugar from Thailand; maize flour from Viet Nam; and single-strength orange juice, natural honey, distilled alcoholic beverages, and beer of barley from Singapore.
- Among the stimulants and spices, the land productivity and ratio of the yield of pepper exceeded those values for all the other products in that category. In the vegetable products category, the productivity and the ratios of the yield of oilseed, nes, or minor oilseeds, and of mangoes/mangosteens/guavas were relatively high. Similarly, pork and buffalo meat had high feed productivity and ratios of the yield, compared with those values for the other livestock products. The potential of these products as exports to other ASEAN countries could be high if they became competitive with the same products from those other countries by means of greater physical productivity.

Chapter 9

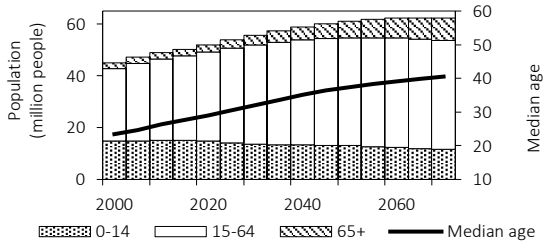
Myanmar

1. Social and Economic Conditions

Population and Per Capita GDP

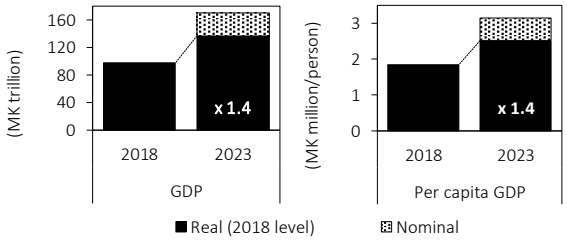
The population in Myanmar, 54 million people in 2018, accounts for 8% of the total population of the ASEAN region, placing it fifth amongst the ASEAN countries. It is expected to reach 62 million people by 2050 (Figure 9.1). The working-age people, between 15 and 65, are the majority of the country's population, and their numbers are expected to steadily increase until 2050. This trend may imply long-term economic growth. Although Myanmar's population is middling in size compared with the populations of the other ASEAN states, the country's strong prospect of population and economic growth suggests a high potential as a consumption market for agri-food products.

Figure 9.1. Population by Age Group, 2000–2060



Source: United Nations Department of Economic and Social Affairs (UN DESA, 2017).

Figure 9.2. Changes in GDP and Per Capita GDP, 2018 and 2023

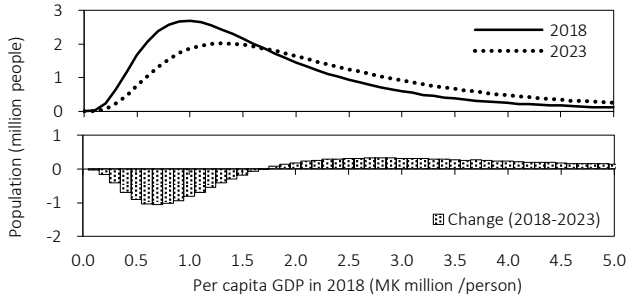


MK = kyats (Myanmar currency).
GDP = gross domestic product,
Source: Estimates based on data from the International Monetary Fund (IMF, 2018).

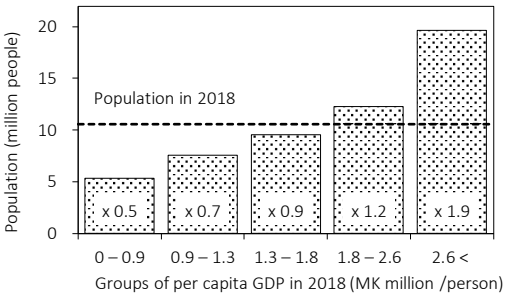
Real GDP and per capita real GDP are both expected to increase rapidly by 1.4 times from 2018 to 2023, (Figure 9.2). According to a projection of Myanmar's population based on the level of per capita GDP (Figure 9.3, Appendix 3.1), as per capita GDP approaches MK1.7 million, a boundary is crossed whereby the number of people whose annual contributions to GDP are below that value will decrease. By contrast, the number of people with per capita GDP above MK1.7 million will increase across a wide range of the distribution. In particular, the population with personal incomes above MK2.6 million (i.e. the 80th percentile) will expand by 1.9 times by 2023. This projection implies a rapid increase in the number of high-income people. It will thus be necessary to establish a system for supplying agri-food products to match the demand of this rapidly growing upper-income bracket.

Figure 9.3. Estimated Population of Myanmar by Per Capita GDP, 2018 and 2023

A. Distribution of Population Changes



B. Population Divided into Five GDP Groups



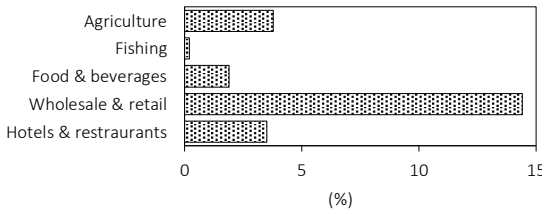
MK = kyats (Myanmar currency).
GDP = gross domestic product.
Note: The per capita GDP is based on constant 2018 prices. The bars in Figure B show the estimated populations of the GDP groups in 2023. The numbers in the bars show the changes in these populations from 2018 to 2023.
Source: Appendix 3.1.

The VA of FVC-related Industries

The VA of the wholesale and retail trade sectors has been a major component of Myanmar's GDP; for instance, it accounted for about 14% of GDP in 2015 (Figure 9.4). Meanwhile, VA of the other FVC-related sectors, including agriculture, was comparatively small.

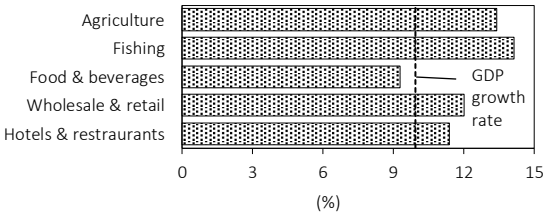
The annual growth rates of real VA in the fishing and agriculture industries were high, averaging 13% –14% during 2000–2015, followed by the growth rates for the wholesale/retail and hotel-and-restaurant industries (Figure 9.5). The growth rates of the FVC-related industries were higher than the GDP growth rate, except for the food and beverage sector, which averaged about 9%. While the proportion of GDP due to the VA of the food and beverage industries shrank, the proportions of GDP due to the VA of most FVC-related industries expanded, especially those for fishing and agriculture.

Figure 9.4. The Proportion of VA in GDP, 2015



GDP = gross domestic product, VA = value added.
Sources: Estimates based on data from Eora (2018).

Figure 9.5. Average Annual Change in Real VA, 2000–2015



GDP = gross domestic product, VA = value added.
Sources: Estimates based on data from Eora (2018) and the Internatioanl Monetary Fund (IMF, 2018).

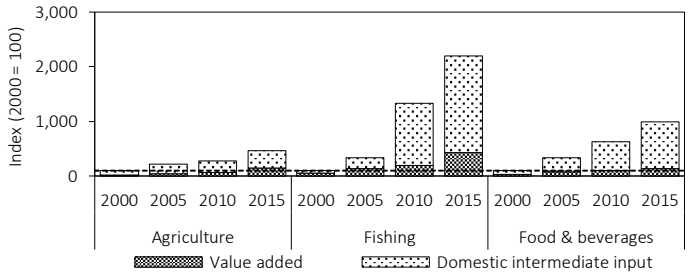
The production values of the agriculture, fishing, and food-and-beverage industries increased drastically during 2000–2015, with those of agriculture increasing by 5 times, those of fishing by 21 times, and those of food and beverages by 9 times (Figure 9.6). The part of production value due to

the VA (i.e. the VA rate) of these three industries remained low after 2010, at 10%–30%, unlike the VA rates for the same industries in the other ASEAN countries covered in this report (Figure 9.7). By 2015, the VA rate of agriculture in Myanmar reached 32%, that of fishing reached 20%, and that of the food and beverage sector reached 14%. All three industries were highly dependent on intermediate inputs from within their sectors and from other, related sectors; and their production did induce to a large degree further production within those same industries.

The growth trend in the VA rate of agriculture suggests a decrease in that industry's use of intermediate inputs. Such a change may have been caused by an increase in the number of products with lower cost of sales to revenue ratios, an improvement in the efficiency of the product mix, and/or technical progress that resulted in savings on inputs.

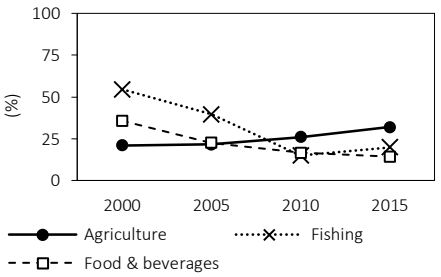
The trend toward lower VA rates in the fishing and food-and-beverage industries during 2000–2010 may indicate a change in the production structure that included the further use of intermediate inputs or a strengthening of ties with other industries.

Figure 9.6. Values of Domestic Production, 2000–2015



Note: The results in the figure are based on real values.
Sources: Estimates based on Eora (2018) and the International Monetary Fund (IMF, 2018).

Figure 9.7. VA Rates, 2000–2015



VA = value added.
Sources: Estimates based on data from Eora (2018).

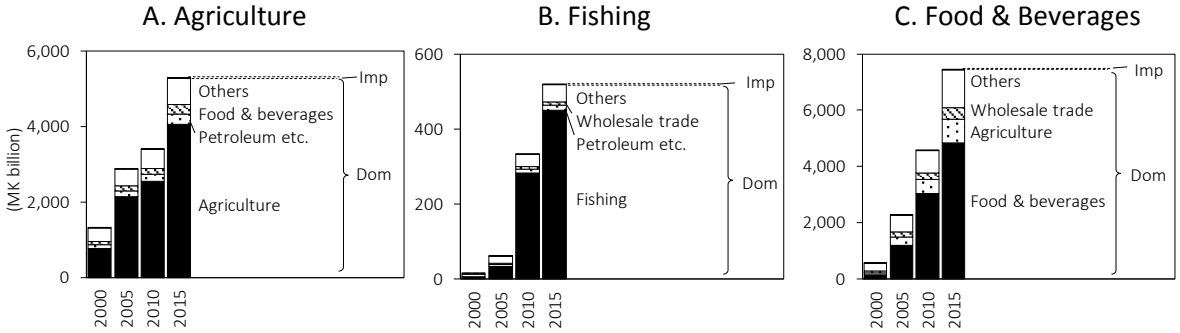
Intermediate Inputs in Agri-food Industries

Figure 9.8 shows which industries contributed to the growth of the agriculture, fishing, and food-and-beverage industries from 2000 to 2015. Intermediate inputs into all three agri-food production sectors came mostly from domestic sources, and increased drastically during that period. It is worth noting that Myanmar rarely imported intermediate inputs for agri-food production.

Myanmar's input structure largely differed from those of the other ASEAN countries. Most of the intermediate inputs for agriculture, fishing, and food and beverages came from within those same sectors.

The fact that, as in Malaysia, the food and beverage industries in Myanmar supplied most of their own intermediate inputs suggests that the development of this sector was largely driven by the supply of processed foods, rather than raw agricultural products. The growth of the food and beverage industries in Myanmar induced a certain degree of development in agriculture through the industries' demand for intermediate inputs.

Figure 9.8. Sources of Intermediate Inputs, 2000–2015

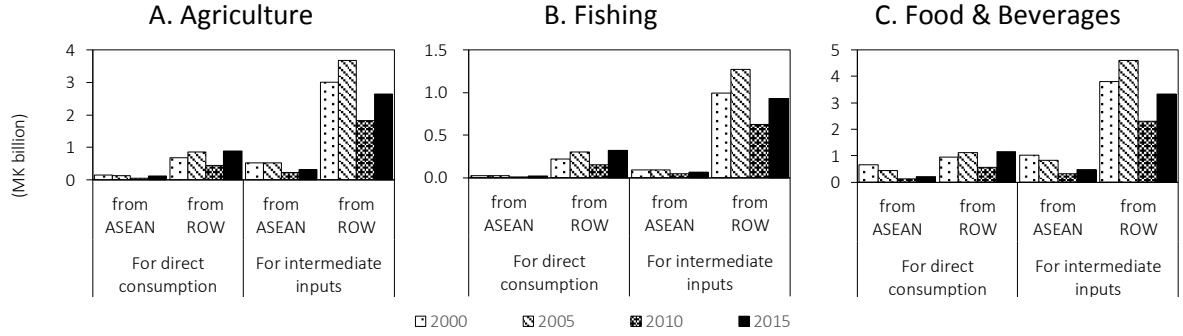


MK = kyats (Myanmar currency).
Dom = domestic supply, Imp = imports.
Notes: The values in these graphs are based on constant 2015 prices. 'Petroleum etc.' refers to the petroleum, chemical, and non-metallic mineral product industries.
Sources: Estimates using data from Eora (2018) and the International Monetary Fund (IMF, 2018).

The value of imports from foreign agricultural, fishing, and food-and-beverage sectors hovered around the same levels between 2000 and 2015, and was very limited compared with the value of domestic production (Figure 9.9). The value of imported agricultural, fishery, and food-and-beverage products for use as intermediate inputs was larger than that destined for direct consumption. In other words, Myanmar was more of an importer of raw materials than of final goods.

Imports from the other ASEAN countries were very limited compared with those from the ROW. We can conclude that, as an importer, Myanmar had stronger linkages with the ROW than with the ASEAN region, although even these linkages did not develop to a significant degree.

Figure 9.9. Values of Imports, by Purpose, 2000–2015



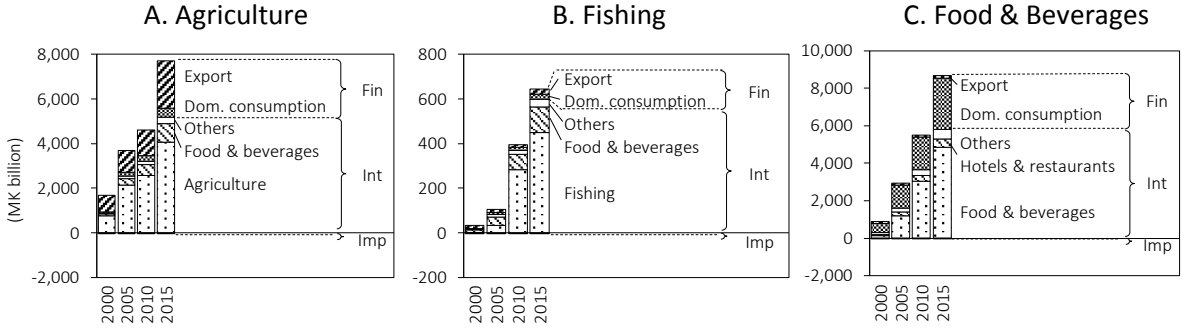
MK = kyats (Myanmar currency).
ASEAN = Association of Southeast Asian Nations, ROW = rest of the world.
Notes: The values of imports shown in these graphs are based on constant 2015 prices. They include imports from foreign agricultural, fishing, and food-and-beverage sectors destined for domestic final consumption and for use as intermediate inputs in all domestic industries.
Sources: Estimates based on data from Eora (2018) and the International Fund (IMF, 2018).

Destinations of Products of Agri-food Industries

Interindustry and intra-industry transactions in Myanmar had special characteristics during 2000–2015, compared with those of the other countries covered in this report. Intra-industry transactions

accounted for the majority product flows in the agriculture, fishing, and food-and-beverage industries (Figure 9.10). Interindustry transactions involving product flows from agriculture and fishing to the food-and-beverage industries, and from the food-and-beverage to the hotel-and-restaurant industries, gradually increased. The FVC in Myanmar expanded rapidly with regard to intra-industry transactions, but increased only gently with regard to interindustry transactions.

Figure 9.10. Destinations of Domestically Produced and Imported Goods, 2000–2015

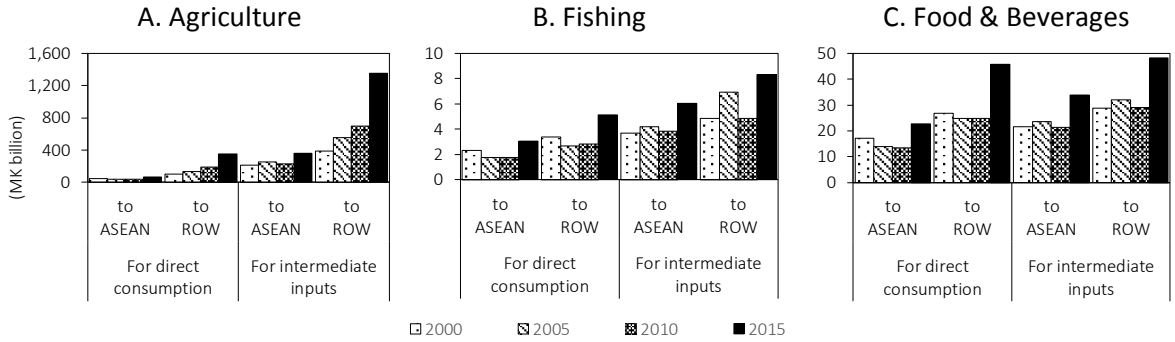


MK = kyats (Myanmar currency).
Dom. = domestic.
Notes: The values in these graphs are based on constant 2015 prices. 'Fin' = final demand for domestic and imported goods, 'Int' = intermediate demand for domestic and imported goods, and 'Imp' = the imports of final and intermediate goods. Total demand = Fin + Int. Domestic production = Fin + Int - Imp.
Sources: Estimates based on data from Eora (2018) and the International Monetary Fund (IMF, 2018).

Both final and intermediate demand grew steadily in the agriculture, fishing, and food-and-beverage industries during 2000–2015. Exports dominated the final demand for agriculture, having increased rapidly. By contrast, exports from the food and beverage industries were very limited in value compared with the goods consumed domestically, although they did jump between 2010 and 2015. Figure 9.11 shows that, between 2000 and 2015, comparatively large quantities of agricultural and fishery products exported from Myanmar were used as intermediate inputs. The destinations of the exports from the food and beverage industries were almost evenly divided between direct consumption and use as intermediate inputs.

The primary destination of agricultural exports was the ROW, so we can conclude that Myanmar was deepening its linkages with the ROW as an exporter of these products. Meanwhile, Myanmar exported similar quantities of goods from the fishing and food-and-beverage industries to other ASEAN countries and to the ROW. With regard to the fishing and food-and-beverage industries, Myanmar contributed to the integration of the ASEAN region, and deepened its global linkages, as well.

Figure 9.11. Values of Exports, by Purpose, 2000–2015



MK = kyats (Myanmar currency).
ASEAN = Association of Southeast Asian Nations, ROW = rest of the world.
Note: The values in these graphs are based on constant 2015 prices.
Sources: Estimates based on data from Eora (2018) and the International Monetary Fund (IMF, 2018).

2. Linkages amongst FVC-related Industries

Final Demand in FVC-related Industries

First, let us see how final demand for domestic FVC-related industries induces the use of intermediate inputs and affects production and VA in each industry.

Table 9.1 shows the composition of final demand during 2000–2015. Final demand was strongest in the retail trade industry, followed by the hotel-and-restaurant, wholesale trade, and food-and-beverage industries. The average annual growth of final demand in the retail trade industry, MK260 billion, outstripped the average rates in all the other FVC-related industries. The growth of final demand in the retail trade industry was driven by household consumption. Similarly, household consumption rapidly increased as a source of final demand in the hotel-and-restaurant, wholesale trade, and food-and-beverage industries. It is worth noting that Myanmar's agricultural exports to both the ROW and the other ASEAN countries accounted for a large portion of final demand in that sector; indeed, the role of exports in final demand in agriculture increased dramatically.

Table 9.1. Final Demand for Products/Services of FVC-related Industries, 2000–2015
(MK billion)

	Domestic production of											
	Agriculture		Fishing		Food & beverages		Wholesale trade		Retail trade		Hotels & restraurants	
Final demand as	Value	Change	Value	Change	Value	Change	Value	Change	Value	Change	Value	Change
Domestic consupmtion												
Household consumption	369	20	19	1	2,655	141	2,170	112	4,744	246	3,460	182
Other consumption	5	0	1	0	37	2	76	4	87	5	46	2
Capital formation	25	1	2	0	38	2	675	39	180	10	0	0
Export												
Export to ASEAN	423	10	9	0	57	1	2	0	2	0	12	0
Export to ROW	1,705	77	13	0	94	2	21	0	10	-1	45	1
Total	2,527	109	44	2	2,880	148	2,945	155	5,022	260	3,562	185
Annual change rate (%)		7.6		5.7		10.8		11.5		11.0		11.1

MK = kyats (Myanmar currency).
ASEAN = Association of Southeast Asian Nations, FVC = food value chain, ROW = rest of the world.
Notes: The values in this table are in constant 2015 prices. 'Change' refers to the average annual changes estimated based on data for 2000–2015.
Source: Appendix 3.2.

Production and VA Induced by Final Demand

Table 9.2 shows sources of intermediate inputs during 2000–2015 that came from domestic and foreign industries, and were destined for use in production in major FVC-related industries in Myanmar. The table indicates that 10% of intermediate inputs in the hotel-and-restaurant industries came from the domestic food-and-beverage industries, and 10% of the inputs in the food-and-beverage industries came from domestic agriculture. This suggests that the hotel-and-restaurant and food-and-beverage sectors can sequentially induce some agricultural production. The table also shows that FVC-related industries in Myanmar rarely used inputs from foreign countries, compared with domestically sourced inputs.

The data in Table 9.2 suggests stability in the country's structure of inter-sector linkages. Meanwhile, the intra-sector linkages could change significantly amongst all the FVC-related industries, other than retail trade, in the medium to long term. In these industries, particularly fishing and food and beverages, the intermediate inputs sourced from within each industry increased sharply, which implies a strengthening of intra-sector linkages. If this structural change continues, the growth of final demand in each FVC-related industry will further drive the development of that industry in the future.

Table 9.2. Sources of Intermediate Inputs in Major FVC-related Industries, 2000–2015

Input from		Domestic production of: Agriculture Share (%)	Agriculture Change	Fishing Share (%)	Fishing Change	Food & beverages Share (%)	Food & beverages Change	Wholesale trade Share (%)	Wholesale trade Change	Retail trade Share (%)	Retail trade Change	Hotels & restraurants Share (%)	Hotels & restraurants Change
Agriculture	Domestic	52	0.31	0	0.00	10	0.08	0	0.00	0	0.00	1	0.05
	ASEAN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	ROW	0	0.00	0	-0.02	0	0.00	0	0.00	0	0.00	0	0.00
Fishing	Domestic	0	0.00	70	4.51	1	0.00	0	0.00	0	0.00	1	0.02
	ASEAN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	ROW	0	0.00	0	-0.01	0	0.00	0	0.00	0	0.00	0	0.00
Food & beverages	Domestic	3	-0.08	1	-0.11	56	2.67	0	0.00	1	0.02	10	0.20
	ASEAN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	ROW	0	0.00	0	-0.03	0	0.00	0	0.00	0	0.00	0	0.00
Wholesale trade	Domestic	2	-0.11	2	-0.30	5	-0.25	22	1.30	1	-0.01	5	-0.01
	ASEAN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	ROW	0	0.00	0	-0.01	0	0.00	0	0.00	0	0.00	0	0.00
Retail trade	Domestic	0	-0.02	0	-0.06	0	-0.01	0	0.00	0	0.00	1	-0.01
	ASEAN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	ROW	0	0.00	0	-0.01	0	0.00	0	0.00	0	0.00	0	0.00
Hotels & restraurants	Domestic	0	0.00	0	0.00	0	-0.01	0	0.00	0	0.01	11	0.63
	ASEAN	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	ROW	0	0.00	0	-0.01	0	0.00	0	0.00	0	0.00	0	0.00

ASEAN = Association of Southeast Asian Nations, FVC = food value chain, ROW = rest of the world.
Notes: 'Share' refers to the intermediate inputs as a percentage of total inputs in 2015. 'Change' refers to the average annual changes in the shares as estimated based on data for 2000–2015.
Source: Appendix 3.2.

Table 9.3 shows the VA directly and indirectly boosted by a 1% increase over the 2015 value in final demand for domestic products and services through an increase in domestic production and intermediate inputs. For example, a 1% increase in final demand in the food and beverage sector generated a MK4.4 billion increase in the VA of agriculture, as well as a MK9.5 billion increase in the VA of the food-and-beverage sector itself.

Increases in final demand in downstream sectors of the FVC, particularly in the food and beverage industries, had some impact on the VA of upstream sectors. This result suggests that interventions in the food and beverage industries do contribute to the development of agriculture.

Final demand in downstream industries had a notable effect on the VA of fishing, as the size of the fishing market is very limited. For instance, the amount of VA in the fishing sector induced by a 1% increase in final demand in the food and beverage industries (MK0.57 billion) exceeded VA driven by the final demand in the fishing sector itself (MK0.28 billion). Similarly, the hotel and restaurant industries can also have a measurable effect on fishing. An increase in final demand in these downstream sectors can thus be an effective way to develop the fishing sector.

The inducement effect of final demand in the wholesale and retail trade sectors on the other four sectors discussed above was very small, as is shown in Table 9.3. Meanwhile, Table 9.2 indicates that FVC-related industries, especially the food-and-beverage and hotel-and-restaurant industries, did depend on inputs from the wholesale trade industry. It is suggested the services provided by the wholesale/retail trade sectors are necessary, but alone not sufficient, to automatically drive the development of the FVC-related industries.

Table 9.3. VA Induced by a 1% Increase in Final Demand, 2015

(MK billion)

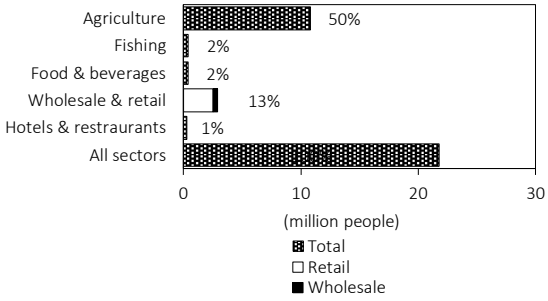
	1% increase in final demand for					
Induced value added in	Agriculture	Fishing	Food & beverages	Wholesale trade	Retail trade	Hotels & restraurants
Agriculture	17.26	0.00	4.39	0.04	0.13	0.98
Fishing	0.04	0.28	0.57	0.00	0.03	0.22
Food & beverages	0.57	0.01	9.50	0.02	0.16	1.34
Wholesale trade	1.51	0.03	3.53	23.06	0.95	2.35
Retail trade	0.15	0.00	0.16	0.10	39.66	0.54
Hotels & restraurants	0.05	0.00	0.14	0.09	0.14	20.69

MK = kyats (Myanmar currency).
VA = value added.
Source: Appendix 3.2.

The Relationship amongst the Number of Employees, Per Capita Compensation, and Production

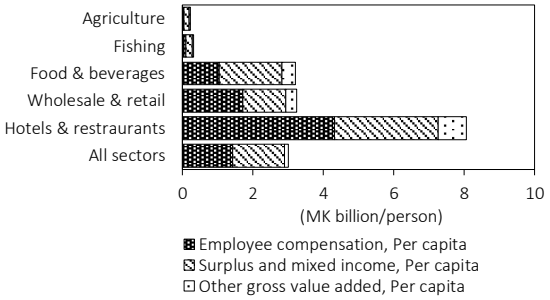
Now let us consider how an increase in production relates to changes in the number of employees and per capita employee compensation in an industry. According to figures 9.12 and 9.13, the agricultural sector in 2015 was characterized by a considerably large number of employees, low labour productivity, and low per capita compensation compared with other FVC-related industries. By contrast, the food and beverage industries had a limited number of employees, and the same levels of labour productivity and per capita compensation as the average levels in Myanmar.

Figure 9.12. Number of Employees, by Sector, 2015



Sources: International Labour Organization (ILO, 2019); Appendix 3.3.

Figure 9.13. Gross VA per Capita, by Sector, 2015



MK = kyats (Myanmar currency).
VA = value added.
Sources: Estimates based on data from Eora (2018) and the International Labour Organization (ILO, 2019); Appendix 3.3.

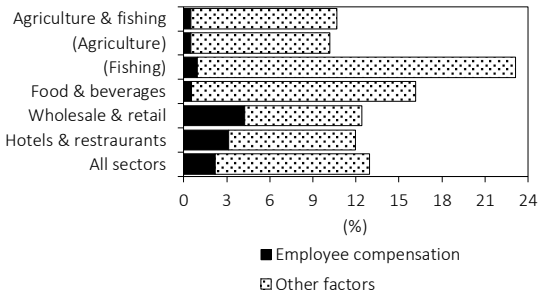
Figure 9.14 illustrates the relationship amongst the number of employees, per capita compensation, and production during 2000–2015. Figure 9.14 A depicts the proportion of the average annual rate of change in production in each sector that was attributable to total employee compensation. The values in the figure differ by industry. For instance, there was a rapid increase of production in fishing (22%) and a slower rise of production in agriculture (10%). The contribution of employee compensation to production was about 0.5%–1.0% in the agriculture, fishing, and food-and-beverage industries, whilst that for the wholesale/retail trade and hotel-and-restaurant industries was in a higher range: 3%–4%.

The average annual rates of change in the total value of employee compensation were within the range of 11%–13% in all of the observable FVC-related sectors (Figure 9.14 B). There are two factors that determine the changes in the total value of employee compensation: the number of employees and per capita compensation. In the agricultural sector, the number of employees decreased, while per capita compensation increased. Although the growth rate of total compensation was similar to the rates of other industries, per capita compensation grew faster, accompanied by a decrease in the number of employees. In other sectors, both per capita compensation and the number of employees steadily increased.

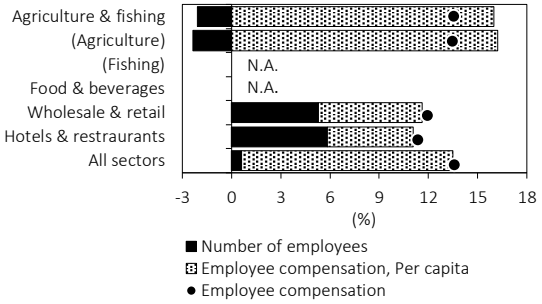
These results suggest the production growth can accompany a rise in per capita compensation in many FVC-related industries, particularly the agricultural sector. Another notable point is the decline in the size of the agricultural workforce. A large number of employees, low-level labour productivity, low per capita compensation, and steep growth in per capita compensation, together with a decrease in the number of employees, all imply the existence of a labour surplus in the agricultural sector. Any interindustry movement of labourers would be deeply connected to the productivity and efficient development of agriculture. The hotel and restaurant industries, which had a remarkably high per capita compensation and a sharp increase in the number of employees, seemed to have been one of the more attractive sectors in terms of labour absorption, although the number of employees was actually very limited.

Figure 9.14. Changes in Production and Employee Compensation, 2000–2015

A. Breakdown of the Average Annual Rates of Change in Production



B. Breakdown of the Average Annual Rates of Change in Employee Compensation



Notes: Other factors include changes in the value added (VA), other than from employee compensation, and changes in intermediate inputs. The data is from selected years during 2000–2015.
Source: Appendix 3.3.

3. Supply–Demand Balance of Agri-food Products

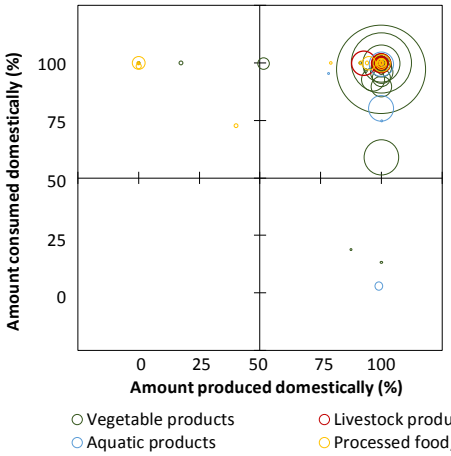
Supply–Demand Structure

Figure 9.15 shows the structure of domestic commerce and foreign trade in 2004–2013. There are two graphs, each of which is divided into four quadrants defined by two criteria: whether agri-food goods were *produced* domestically or in foreign markets and whether they were *consumed* domestically or in foreign markets. In 9.15 A and 9.15 B, the circles are scattered across three of the four quadrants. The circles vary in size according to the volumes produced of the goods they represent. The pattern of circles is the same in both graphs, but the circles in Figure 9.15 A are colour-coded to indicate the agri-food sector, whilst those in Figure 9.15 B are colour-coded to reflect growth rates.

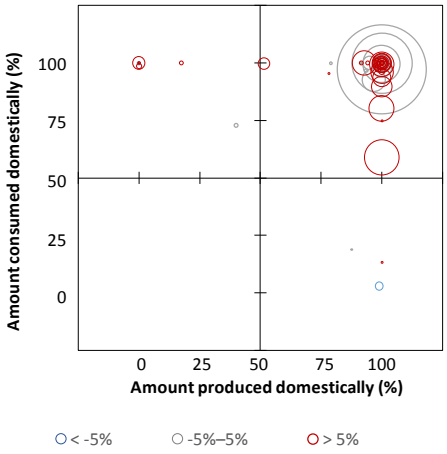
The top side of each graph represents goods that were mostly or completely consumed domestically, and the right side represents goods that were mostly or completely produced domestically. Most of the agri-food products are concentrated in the first (upper-right) quadrant, representing products that were produced and consumed in the domestic market (i.e. domestic-oriented goods). There is also a few circles scattered in the second (upper-left) quadrant, representing goods that were produced in foreign markets and consumed domestically (i.e. import-oriented goods), and in the fourth (lower-left) quadrant, representing goods that were produced domestically and consumed in foreign markets (i.e. export-oriented goods. Circles are unobservable in the third quadrant, representing goods that were imported for re-exportation (i.e. trade-oriented goods). The graphs show that the agri-food industry in Myanmar was domestic-oriented, similar to the agri-food industries in Lao PDR and Cambodia, but with more export activity than in those two countries.

Figure 9.15. Classification of Agri-food Products by Supply–Demand Balance, 2004–2013

A. By IC1 Group, Annual Averages



B. By Average Annual Growth Rate



IC1 = item category level 1, nei = not elsewhere included.

Notes: Each circle represents a Food Balance Sheet (FBS) item as designated by FAOSTAT. The sizes of the circles express the quantity of total supply, with the proportions estimated based on quantitative data. 'IC1' comprises the author's classifications of broad agri-food product categories (see Appendix 2.2). In these graphs, the percentage of goods not produced/consumed domestically are produced/consumed in foreign markets. Data classification: FBS items.

Sources: FAO (2019); Appendix 3.4.

Table 9.4 shows that, during 2004–2013, most agri-food products, particularly cereals (11), oil and sugar crops (12), and vegetables (13), were produced and consumed mainly in the domestic market. A comparatively large quantity of fat and oils (42) was imported, followed by cereals and milk (22). The exportation of vegetables (13), mainly beans, was relatively large. The second- and third-largest export goods were cereals and marine fishes (32), respectively. The supply–demand structure in Myanmar had some peculiar features, such as a high self-sufficiency in milk (22) and a high import dependency for alcoholic beverages (44), unlike the other ASEAN countries covered in this report.

Annual change data indicates a soaring production and domestic supply of vegetables, oil and sugar crops, and cereals. Both the production and domestic supply of meat (21), marine fishes, and freshwater fishes (31) grew to comparatively large volumes. The increases in the importation of processed food, nei—such as fat and oils, sugar, and alcoholic beverages—were notable compared with the changes in the amounts of production of these items.

Table 9.4. Supply–Demand Balance of Agri-food Products, 2004–2013

(1,000 metric tons)

IC1	IC2	2004–2013 average				Average annual change, 2004–2013			
		Production	Domestic supply	Import	Export	Production	Domestic supply	Import	Export
1 Vegetable products	11 Cereals	21,732	20,832	201	636	227	325	21	35
	12 Oil and sugar crops	12,071	12,009	2	64	411	410	0	0
	13 Vegetables	9,826	8,503	7	1,331	475	417	-1	56
	14 Fruits and nuts	2,195	2,147	52	101	77	64	-11	2
	15 Stimulants and spices	155	176	32	12	7	15	7	-1
2 Livestock products	21 Meat	1,694	1,700	6	0	153	154	1	0
	22 Milk	1,363	1,471	107	0	97	90	-7	0
	23 Eggs	315	316	0	0	31	31	0	0
3 Aquatic products	31 Freshwater fishes	1,476	1,469	0	8	135	135	0	0
	32 Marine fishes	1,636	1,318	5	323	149	111	1	39
	33 Crustaceans	149	4	2	147	-16	1	1	-17
	34 Molluscs	0	0	0	0	0	0	0	0
	35 Aquatic animals, nei	9	7	0	2	1	0	0	1
	36 Aquatic plants	0	0	0	0	0	0	0	0
4 Processed food, nei	41 Sugar	1,190	1,213	66	11	27	33	18	1
	42 Fat and oils	865	1,290	426	1	36	61	25	0
	43 Food, nei	0	1	1	0	0	0	0	0
	44 Alcoholic beverages	14	83	71	1	0	18	18	0

IC1 = item category level 1, IC2 = item category level 2, nei = not elsewhere included.

Note: 'IC1' and 'IC2' comprise the author's classifications of broader product categories and more specific groups, respectively (Appendix 2.2). This table is based on an aggregation of all the data available from FAOSTAT's Food Balance Sheet (FBS). Data classification: FBS items.

Sources: FAO (2019); Appendix 3.4.

Table 9.5 shows FBS items (as designated by FAOSTAT) listed in descending order of total supply quantity within each category in 2004–2013, corresponding to the quadrants in Figure 9.15. The products existing in large quantities—such as rice, sugar cane, other vegetables, and beans—are concentrated in the column for domestic-oriented products. Most products are in the cells representing stable or expanding markets of domestic- or import-oriented products.

Beans were notable as a domestic-oriented product by its large quantity of supply and rapid growth. Aquatic products such as marine fishes (other than demersal and pelagic fishes), milk, and pulses (other than beans and peas) were also remarkable for their accelerated growth. With regard to export-oriented products, the supply of minor oil crops rose sharply, while that of crustaceans dramatically decreased. Palm oil, followed by beer and coffee, are examples of rapidly expanding import-oriented products during that period.

Table 9.5. Total Quantities of Supply for Product Categories, in Descending Order, 2004–2013

(1,000 metric tons)

Category		Domestic-oriented			Export-oriented			Import-oriented			Trade-oriented		
Provided by		Domestic market			Domestic market			Foreign market					
Consumed in		Domestic market			Foreign market			Domestic market			Foreign market		
Change	Rank	IC2	FBS items	Quantity	IC2	FBS items	Quantity	IC2	FBS items	Quantity	IC2	FBS items	Quantity
Annual change rate, 2004–2013 (%) r > 5 Expanding	1	13	Beans	3,058	12	Oilcrops, other	11	42	Palm oil	393			
	2	32	Marine fish, other	1,632				44	Beer	65			
	3	31	Freshwater fish	1,476				15	Coffee and products	34			
	4	22	Milk - excluding butter	1,471				11	Barley and products	19			
	5	13	Pulses, other and products	1,241				44	Wine	2			
-5 < r < 5 Stable	1	11	Rice (milled equivalent)	19,654	15	Spices, other	7	41	Sugar (raw equivalent)	40			
	2	12	Sugar cane	9,004				14	Apples and products	4			
	3	13	Vegetables, other	3,457				43	Infant food	1			
	4	14	Fruits, other	1,341				15	Cocoa beans and products	0.9			
	5	13	Onions	1,008				21	Meat, other	0.5			
r < -5 Shrinking	1	42	Ricebran oil	70	33	Crustaceans	151	42	Oilcrops oil, other	26			
	2							42	Palmkernel oil	1			
	3												
	4												
	5												

FBS = Food Balance Sheet (FAOSTAT), IC2 = item category level 2, r = average annual change rate.
Notes: The values in this table represent the averages for 2004–2013. Data classification: FBS items.
Sources: FAO (2019); Appendix 3.4.

Trade Prices and Volumes

The export prices of aquatic products such as raw and processed molluscs (34), raw aquatic animals, nei (35), and raw crustaceans (33) were remarkably high during 2014–2016 (Table 9.6). The export values of raw crustaceans were relatively high, compared with the values of these other products. A comparatively large amount of raw marine fishes (32) were also exported at high prices. We can conclude that raw crustaceans and marine fishes that were exported in large quantities had high enough values to induce active trade.

The import prices of some aquatic products (including raw fishes, nei [38]; raw marine fishes; and processed freshwater fishes [31]), raw sugar (41), alcoholic beverages (44), and processed stimulants and spices (15) exceeded those of many other products. The import values of most of these high-priced products were quite small.

It is not clear from Table 9.6 whether primary or processed products were traded at higher prices. That would have basically depended on the differences between exports and imports, amongst IC2 product groups, and in the composition of the more complex products within each IC2 group. As with the other ASEAN countries, however, it is evident that Myanmar's import prices for sugar and for a few raw aquatic products were higher than those for processed products.

Table 9.6. Prices and Values of Exported/Imported Agri-food Products, 2014–2016

IC1	IC2	Price ($/kg)				Value ($ million)			
		Export		Import		Export		Import	
		Primary products	Processed products	Primary products	Processed products	Primary products	Processed products	Primary products	Processed products
1 Vegetable products	11 Cereals	0.8	0.5	0.3	0.9	439	107	4	187
	12 Oil and sugar crops	1.4	1.0	1.3	1.1	271	1	6	1
	13 Vegetables	1.3	1.8	0.6	1.3	1,138	15	17	6
	14 Fruits and nuts	0.8	1.1	0.8	1.6	234	0.3	43	6
	15 Stimulants and spices	2.8	2.3	3.7	4.4	53	0.5	7	48
2 Livestock products	21 Meat	—	3.4	—	3.9	0.0	0.5	0.0	4
	22 Milk	0.9	—	1.1	2.4	0.0	0.0	9	94
	23 Eggs	—	—	1.5	—	0.0	0.0	0.5	0.0
3 Aquatic products	31 Freshwater fishes	1.8	2.1	1.1	5.2	141	4	0.2	1
	32 Marine fishes	3.1	1.4	5.9	0.2	168	2	3	3
	33 Crustaceans	4.0	1.9	0.4	—	117	15	0.2	0.0
	34 Molluscs	4.0	5.3	2.9	—	22	0.6	0.2	0.1
	35 Aquatic animals, nei	4.8	—	—	3.2	0.2	0.0	0.1	32
	36 Aquatic plants	—	—	3.9	—	0.0	0.0	0.1	0.0
	38 Fishes, nei	2.1	2.6	7.7	3.0	24	6	0.1	0.2
4 Processed food, nei	41 Sugar	2.7	0.8	5.9	1.0	4	349	0.1	503
	42 Fat and oils	—	1.7	—	1.3	0.0	2	0.0	532
	43 Food, nei	—	0.1	—	2.5	0.0	0.6	0.0	100
	44 Alcoholic beverages	—	0.1	—	5.4	0.0	2	0.0	6

IC1 = item category level 1, IC2 = item category level 2, kg = kilogram, nei = not elsewhere included.
Notes: This table shows the averages for 2014–2016. The values indicated for exports are based on 'free on board' (FOB) prices, and those for imports are based on 'cost, insurance, and freight' (CIF) prices. Data category: IC2 groups based on the Broad Economic Categories (BEC) classifications of primary products (11) and processed products (12).
Sources: UNSD (2017); Appendix 3.6.

4. The Competitiveness of Each Product in the ASEAN Region

Commodities Imported by ASEAN Countries

Tables 9.7 and 9.8 provide information about the agri-food products imported by ASEAN countries from Myanmar in 2014–2016. ASEAN countries imported many of these products from Myanmar more cheaply than they did from other ASEAN+6 countries (Table 9.7). Roughly 70%–100% of items in the IC2 groups were imported as low-priced products. Myanmar exported notably more to Thailand and Malaysia than to the other ASEAN states; its next-largest exports went to countries with similar values, except for Brunei, Lao PDR, and Cambodia (Table 9.8).

As shown in Table 9.7, other ASEAN countries imported 2% of the vegetables (13) in the low-price range in 2014–2016, a significantly greater quantity than had been estimated based on approximate lines. Meanwhile, the products imported by other ASEAN countries in smaller quantities than had been estimated are more conspicuous in Table 9.7. Such products include milk (22) and fat and oils (42) in the low-price range; cereals (11) and sugar (41) in low- and mid-price ranges; and food, nei (43), in low- and high-price ranges.

Table 9.7. Prices and Values of Products Imported by ASEAN Countries, by IC2 Group, 2014–2016

IC1	IC2	Price ($/kg)	Value ($ million)	Number of imported products by price ranges (%)			Number of products deviated from approx. lines (%)						Obs.
							Imported larger			Imported smaller			
				Price ranges			Price ranges			Price ranges			
				Low	Mid	High	Low	Mid	High	Low	Mid	High	
1 Vegetable products	11 Cereals	0.9	9	72	14	14	0	0	0	28	7	0	29
	12 Oil and sugar crops	1.1	23	91	0	9	0	0	0	17	0	0	23
	13 Vegetables	1.0	182	85	6	9	2	0	0	7	1	0	85
	14 Fruits and nuts	1.1	11	84	11	5	0	0	0	18	2	2	57
	15 Stimulants and spices	1.7	9	94	3	3	0	0	0	12	3	0	34
2 Livestock products	21 Meat	0.9	0.0	—	—	—	—	—	—	—	—	—	0
	22 Milk	1.8	0.1	100	0	0	0	0	0	57	0	0	7
	23 Eggs	—	—	—	—	—	—	—	—	—	—	—	0
3 Aquatic products	31 Freshwater fishes	1.7	1	100	0	0	0	0	0	0	0	0	12
	32 Marine fishes	2.0	10	89	7	4	0	0	0	7	0	0	28
	33 Crustaceans	6.7	30	70	20	10	0	0	0	3	0	0	30
	34 Molluscs	2.2	8	90	5	5	0	0	0	15	0	0	20
	35 Aquatic animals, nei	1.4	0.1	100	0	0	0	0	0	17	0	0	6
	36 Aquatic plants	0.9	0.0	100	0	0	0	0	0	0	0	0	1
	38 Fishes, nei	2.1	39	95	5	0	0	0	0	24	0	0	21
4 Processed food, nei	41 Sugar	1.2	4	83	11	6	0	0	0	28	6	0	18
	42 Fat and oils	1.1	0.2	100	0	0	0	0	0	38	0	0	8
	43 Food, nei	4.9	1.0	75	0	25	0	0	0	25	0	13	8
	44 Alcoholic beverages	1.4	0.7	100	0	0	0	0	0	25	0	0	8

ASEAN = Association of Southeast Asian Nations, IC1 = item category level 1, IC2 = item category level 2, kg = kilogram, nei = not elsewhere included.

Notes: The prices and values represent the averages for 2014–2016. 'Price' refers to the import price, including cost, insurance, and freight (CIF) added to the tariff established by the ASEAN *Trade* in Goods Agreement (ATIGA). 'Value' refers to the imported value (CIF) without the tariff. See Appendix 3.6 for price ranges and approximate lines. The products for which the externally studentized residual was significantly large or small at the 10% level were counted. 'Obs.' refers to the number of detailed commodities classified according to the Broad Economic Categories (BEC) three-digit category numbers and used for applying approximation lines. Data category: FAOSTAT Commodity List (FCL) and adjusted groups under the International Standard Statistical Classification of Aquatic Animals and Plants (ISSCAAP), classified under BEC 111, 112, 121, and 122.

Sources: UNSD (2017); Appendix 3.6.

Table 9.8. Prices and Values of Products Imported into the ASEAN Region, by Country, 2014–2016

Importer	Price ($/kg)	Value ($ million)	Number of imported products by price ranges (%)			Number of products deviated from approx. lines (%)						Obs.
						Imported larger			Imported smaller			
			Price ranges			Price ranges			Price ranges			
			Low	Mid	High	Low	Mid	High	Low	Mid	High	
Singapore	1.2	24	93	5	2	0	0	0	0	28	1	122
Brunei	1.8	0.3	75	25	0	0	0	0	0	13	0	8
Malaysia	1.3	86	87	6	6	1	0	0	0	9	0	108
Thailand	1.4	108	81	10	9	0	0	0	1	10	5	111
Indonesia	0.7	51	89	6	6	6	0	0	6	11	0	18
Philippines	0.9	10	83	0	17	0	0	0	0	0	0	6
Viet Nam	2.5	50	69	6	25	0	0	0	0	6	0	16
Lao PDR	—	0.0	—	—	—	—	—	—	—	—	—	0
Camboodia	0.9	0.1	100	0	0	0	0	0	0	50	0	2
Myanmar	1.6	0.0	75	0	25	0	0	0	0	0	0	4

ASEAN = Association of Southeast Asian Nations, kg = kilogram, nei = not elsewhere included.

Notes: The prices and values represent the averages for 2014–2016. 'Price' refers to the import price, including cost, insurance, and freight (CIF) added to the tariff established by the ASEAN *Trade* in Goods Agreement (ATIGA). 'Value' refers to the imported value (CIF) without the tariff. See Appendix 3.6 for price ranges and approximate lines. The products for which the externally studentized residual was significantly large or small at the 10% level were counted. 'Obs.' refers to the number of detailed commodities classified according to the Broad Economic Categories (BEC) three-digit category numbers and used for applying approximation lines. Data category: FAOSTAT Commodity List (FCL) and adjusted groups under the International Standard Statistical Classification of Aquatic Animals and Plants (ISSCAAP), classified under BEC 111, 112, 121, and 122.

Sources: UNSD (2017); Appendix 3.6.

Goods Imported in Smaller/Larger Quantities than Estimated Based on Prices: Non-price Competitiveness in the ASEAN Region

Myanmar's vegetable products in the low-price range, especially vegetables (13) such as dried beans, pulses, nes, and bambara beans, tended to be imported in great quantities by other ASEAN countries in 2014–2016, considering their prices (Table 9.9). Regarding aquatic products, crustaceans (33) such as shrimps, prawns, and crabs, nei, and fishes, nei (38), were imported in significantly larger volumes than had been estimated based on their import prices. It might be beneficial to seek opportunities to develop further export markets for these products. Moreover, research on the causes of such active import demand, including production and sales methods, would help identify pathways toward increasing the sales of other items.

Research on the characteristics of the goods actively exported by other countries to Myanmar might also trigger a reconsideration of production and marketing strategies for domestic products that could compete with goods produced by other states in the ASEAN region, for instance: soya paste, miscellaneous aquatic products, and infant food from Malaysia; breakfast cereals from Thailand; sugar confectionery from Viet Nam; and potatoes, nutmeg/mace/cardamons, condensed whey, whole condensed milk, salmons/trouts/smelts, food preparations, nes, and sesame oil from Singapore.[1]

There were also many products for which import quantities were significantly smaller during 2014–2016, considering their prices. Examples included vegetable products in all price ranges; and livestock and aquatic products and processed food, nei, in the low-price range. Although these products were certainly exported to other ASEAN countries, they might not have been as competitive as the same products from other ASEAN and +6 countries. If these items are to be promoted as export goods destined for other ASEAN countries, active and intensive product differentiation will be necessary.

[1] For reference, see tables 2.9 to 9.9. See also Table A4.2 on major exports from the +6 countries.

Table 9.9. Goods Imported by ASEAN Countries in Smaller/Larger Quantities than Estimated Based on Prices, in Ascending Order of P-values, 2014–2016

A. Larger Quantities of Exports than Estimated Based on Prices

IC1	Rank	Price ranges																			
		Low							Mid							High					
		Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value
1 Vegetable products	1	IDN	13	112	Beans, dry	1.0	41	0.05													
	2	MYS	13	112	Pulses, nes	1.0	8	0.10													
	3	THA	13	112	Beans, dry	1.1	28	0.13													
	4	PHL	13	112	Bambara beans	0.5	0.2	0.17													
	5	SGP	13	112	Pulses, nes	1.7	2	0.18													
2 Livestock products	1																				
	2																				
	3																				
	4																				
	5																				
3 Aquatic products	1	THA	38	112	Fish and fish products, nei	0.4	22	0.13	MYS	33	112	Shrimps, prawns	6.7	6	0.12	VNM	33	112	Crabs, nei	10.2	0.9	0.11
	2	MYS	33	112	Shrimps and prawns, nei	6.3	2	0.15	THA	33	112	Lobsters, spiny-rock lobsters	17.3	1	0.20							
	3																				
	4																				
	5																				
4 Processed food, nei	1																				
	2																				
	3																				
	4																				
	5																				

B. Smaller Quantities of Exports than Estimated Based on Prices

IC1	Rank	Price ranges																			
		Low							Mid							High					
		Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value
1 Vegetable products	1	SGP	13	112	Pumpkins, squash and gourds	0.5	0.000	0.00	THA	15	122	Chocolate products nes	10.0	0.000	0.00	THA	14	122	Juice, plum, single strength	13.0	0.000	0.05
	2	SGP	14	122	Juice, plum, single strength	1.3	0.000	0.00	THA	14	122	Fruit, prepared nes	5.3	0.000	0.00	SGP	14	122	Juice, citrus, single strength	1.6	0.000	0.13
	3	MYS	14	122	Juice, fruit nes	0.6	0.008	0.01	SGP	13	112	Vegetables, fresh nes	2.8	0.000	0.01							
	4	SGP	14	112	Fruit, stone nes	1.4	0.000	0.01	THA	11	122	Pastry	8.7	0.000	0.01							
	5	SGP	11	122	Bread	1.4	0.025	0.02	THA	11	122	Cereals, breakfast	4.8	0.000	0.09							
2 Livestock products	1	SGP	22	112	Milk, whole fresh cow	1.1	0.000	0.00														
	2	SGP	22	122	Milk, whole condensed	1.2	0.000	0.04														
	3	SGP	22	112	Milk, skimmed cow	0.9	0.000	0.06														
	4	THA	22	122	Milk, whole condensed	2.2	0.000	0.09														
	5																					
3 Aquatic products	1	THA	34	112	Molluscs, nei	3.6	0.000	0.00														
	2	SGP	38	122	Fish and fish products, nei	11.0	0.000	0.00														
	3	SGP	38	122	Fish and fish products, nei	1.8	0.022	0.02														
	4	SGP	32	122	Miscellaneous pelagic fishes	1.4	0.000	0.02														
	5	SGP	34	112	Molluscs, nei	6.3	0.000	0.03														
4 Processed food, nei	1	SGP	41	122	Beverages, non alcoholic	1.2	0.000	0.01	THA	41	122	Sugar confectionery	7.0	0.000	0.00	IDN	43	122	Food preparations, nes	50.5	0.000	0.05
	2	BRN	43	122	Food preparations, nes	4.9	0.000	0.01								THA	41	122	Beverages, non alcoholic	5.8	0.000	0.17
	3	SGP	42	121	Fat, nes, prepared	0.9	0.000	0.01														
	4	THA	42	122	Margarine, liquid	7.0	0.000	0.01														
	5	SGP	42	121	Oil, coconut (copra)	1.4	0.000	0.03														

BEC = Broad Economic Categories, United Nations Statistics Division (UNSD), BRN = Brunei, IC1 = item category level 1, IC2 = item category level 2, IDN = Indonesia, kg = kilogram, MYS = Malaysia, nei = not elsewhere included, nes = not elsewhere specified, PHL = Philippines, SGP = Singapore, THA = Thailand, VNM = Viet Nam.

Notes: The values listed in this table represent the averages for 2014–2016. The top five agri-food products within each IC1 grouping are listed in ascending order of p-value < 0.2, under the BEC as follows: primary products mainly for industry (111), primary products mainly for household consumption (112), processed products mainly for industry (121), and processed products mainly for household consumption (122). 'Price' refers to the CIF (cost, insurance, and freight) import price added to the tariff set by the ASEAN *Trade* in Goods Agreement (ATIGA). 'Value' refers to the imported value (CIF) without the tariff. The expression 'p-value' refers to the p-value of the t-stat against the externally studentized residual. See Appendix 3.6. Data category: FAOSTAT Commodity List and the adjusted groups under the International Standard Statistical Classification of Aquatic Animals and Plants (ISSCAAP) classified under BEC 111, 112, 121, and 122.

Sources: UNSD (2017); Appendix 3.6.

Inter-commodity and Inter-country Comparisons of Land/Feed Productivity

The median land productivity of vegetables (13) were the highest of the agri-food products, followed by fruits and nuts (14), in 2011–2015 (Table 9.10). The ratio of the yield is an indicator of comparative advantage in the ASEAN region; that value for all IC2 groups in the category of vegetable products were at similar levels during this period, with the exception of stimulants and spices (15).

Table 9.10. Median Levels of Productivity and Resource Allocation in Each IC2 Group

IC1	IC2	Land productivity (MK million/ha)	Chg (%)	Ratio of the yield Index (Yi/Yi')	Chg (%)	Area harvested (1,000 ha)	Chg (%)	Obs.
1 Vegetable products	11 Cereals	0.8	3	0.8	-1	229	1	6
	12 Oil and sugar crops	0.7	0	0.9	0	197	0	8
	13 Vegetables	3.2	0	0.9	-2	66	1	10
	14 Fruits and nuts	2.7	0	0.8	1	29	2	6
	15 Stimulants and spices	1.4	4	0.6	-1	47	1	4
	Total	1.3	2	0.8	-1	90	1	34
IC1	**IC2**	**Feed productivity (MK million/100 PU)**	**Chg (%)**	**Ratio of the yield Index (Yi/Yi')**	**Chg (%)**	**Producing animals (million PU)**	**Chg (%)**	**Obs.**
2 Livestock products	21 Meat	0.8	—	0.9	—	6	9	9
	22 Milk	0.4	—	0.5	—	6	8	4
	23 Eggs	1.6	—	1.2	—	14	7	2
	Total	0.8	—	0.8	—	6	9	15

MK = kyats (Myanmar currency).

ha = hectare, IC1 = item category level 1, IC2 = item category level 2, PU = unit of pig feed requirements, Yi = yield in Myanmar, Yi' = average yield in other ASEAN countries.

Notes: Land/feed productivity, ratio of the yield, and area harvested/producing animals represent the average values for 2011–2015. 'Chg' refers to the average annual rates of change during 2006–2015 (%). 'Obs.' refers to the number of items in the FAOSTAT Commodity List (FCL). The data on land productivity was deflated to constant 2015 kyat prices. The figures are estimates based on all the FAOSTAT data under the 'Production' rubric. Data category: FCL.

Sources: FAO (2019); Appendix 3.7.

In the IC2 vegetables (13) group, the land productivity and ratios of the yield of garlic, fresh vegetables, nes, and dried onions were higher than for the other products during the same period (Table 9.11). The productivity and ratio of the yield of garlic gradually increased, with a slight expansion in the harvested land area. Meanwhile, the productivity of fresh vegetables, nes, and of dried onions decreased; and their ratios of the yield decreased or stagnated. In the vegetable products category, wheat, coconuts, and areca nuts outstripped the other product groups in their ratios of the yield, and they had relatively high productivity, as well. Similarly, pork and hen eggs had high feed productivity and ratios of the yield compared with those of the other livestock products. Although the harvested land areas or the number of producing animals for the products mentioned above were small (except for fresh vegetables, nes), and were not necessarily increasing, the potential of these products as exports to other ASEAN countries could be high if they became competitive with the same products from those other countries by means of physical productivity.

As shown in the second column from the right in Table 9.11, which lists examples of products imported by other ASEAN countries from Myanmar during 2014–2016 in greater quantities than expected based on their prices, only dried beans had non-price competitiveness or were differentiated from the same item produced by other countries. Agri-food products in Myanmar should be actively improved for the sake of developing the FVC in that country.

Table 9.11. Levels of Productivity and Resource Allocation for Individual Items

No.	IC2	FCL name	Land or feed productivity (MK million/ha or MK million/100 PU)	Chg (%)	Ratio of the yield Index (Yi/Yi')	Chg (%)	Area or producing animals (1,000 ha or million PU)	Chg (%)	Intpn. A	Intpn. B	Items imported larger or smaller compared with the price (p<0.2) Imported larger	in	Imported smaller	in
1	11	Rice, paddy	1.3	3	0.9	-2	7,030	-2	iii	i				
2		Maize	1.1	3	0.9	-1	440	4	iii	i				
3		Wheat	0.8	-3	1.8	-2	98	0	iii	i				
4		Millet	0.3	5	0.7	-3	228	1	iv	iv				
5		Cereals, nes	0.2	8	0.3	6	18	-7	iv	iv				
6		Sorghum	—	—	0.5	0	230	1	—	—				
7	12	Sugar cane	2.0	20	0.9	0	163	1	i	ii				
8		Groundnuts, with shell	1.6	0	0.9	4	926	2	i	ii				
9		Coconuts	1.5	-2	2.0	3	47	0	i	i				
10		Sesame seed	0.7	2	0.7	-2	1,505	1	iv	ii				
11		Sunflower seed	0.7	-4	1.0	-7	505	-5	iii	iii				
12		Soybeans	0.6	-6	0.7	-5	154	-1	iv	iv				
13		Seed cotton	0.1	11	3.0	26	230	-3	iii	iii				
14		Castor oil seed	—	—	1.2	1	15	0	—	—				
15	13	Garlic	8.6	4	1.3	1	29	1	i	i				
16		Vegetables, fresh nes	7.6	-4	1.2	-2	260	2	i	i				
17		Onions, dry	6.6	-2	2.1	0	75	2	i	i				
18		Potatoes	6.5	1	0.9	-1	37	0	i	i				
19		Cassava	4.9	6	0.6	-3	44	10	ii	ii				
20		Sweet potatoes	1.4	1	0.8	-3	7	-1	ii	iv				
21		Beans, dry	1.1	3	1.5	3	2,896	2	iii	iii	Beans, dry	IDN		
22		Peas, dry	0.8	-1	0.2	—	56	2	iv	iv				
23		Pigeon peas	0.6	-5	0.5	-7	632	1	iv	iv				
24		Cow peas, dry	0.5	-7	0.3	-5	137	-4	iv	iv				
25	14	Areca nuts	10.0	0	1.9	4	56	2	i	i				
26		Plantains and others	2.7	3	1.1	2	75	2	i	i				
27		Fruit, fresh nes	1.4	0	0.4	2	360	2	ii	iv				
28		Mangoes, mangosteens, guavas	—	—	0.8	-2	0	3	—	—				
29		Fruit, tropical fresh nes	—	—	0.8	1	1	-1	—	—				
30		Cashew nuts, with shell	—	—	0.5	1	2	10	—	—				
31	15	Coffee, green	1.8	4	0.6	0	12	4	ii	i				
32		Tea	1.4	3	0.7	-1	82	1	ii	i				
33		Chillies and peppers, dry	0.4	4	0.5	-1	112	-2	iv	iv				
34		Spices, nes	—	—	0.1	-2	3	1	—	—				
35	21	Meat, pig	10.2	—	2.3	—	6	6	i	i				
36		Meat, turkey	1.3	—	0.7	—	0	6	ii	ii				
37		Meat, cattle	1.0	—	1.2	—	25	9	i	i				
38		Meat, goose and guinea fowl	0.9	—	0.9	—	1	9	i	i				
39		Meat, goat	0.8	—	1.6	—	8	11	i	i				
40		Meat, buffalo	0.6	—	0.7	—	6	8	iv	iv				
41		Meat, sheep	0.5	—	1.1	—	2	12	iii	iii				
42		Meat, duck	0.5	—	0.7	—	27	9	iv	iv				
43		Meat, chicken	0.5	—	0.8	—	309	10	iii	iv				
44	22	Milk, whole fresh cow	1.1	—	0.4	—	41	7	ii	ii				
45		Milk, whole fresh buffalo	0.6	—	0.5	—	9	-1	iv	i				
46		Milk, whole fresh sheep	0.3	—	0.7	—	0	10	iv	iii				
47		Milk, whole fresh goat	0.2	—	0.4	—	2	11	iv	iv				
48	23	Eggs, hen, in shell	1.9	—	1.4	—	25	7	i	i				
49		Eggs, other bird, in shell	1.3	—	1.0	—	3	7	i	iv				

MK = kyats (Myanmar currency).

FCL = FAOSTAT Commodity List, ha = hectare, IC2 = item category level 2, IDN = Indonesia, Intpn. = interpretation, nes = not elsewhere specified, p = p-value, PU = unit of pig feed requirements, Yi = yield in Myanmar, Yi' = average yield in other ASEAN countries.

Notes: 'Area' refers to the total harvested area, and 'producing animals' refers to the number of producing animals. Land/feed productivity, ratio of the yield, and area harvested/producing animals represent the average values for 2011–2015. 'Chg' refers to the average annual rates of change during 2006–2015 (%). The data on land productivity was deflated to constant 2015 kyat prices. The figures are estimates based on all the FAOSTAT data provided under the 'Production' rubric. In the 'Intpn' column, the codes are as follows: i = both productivity and ratio of the yield are high; ii = productivity is high, but the ratio of the yield is low; iii = productivity is low, but the ratio of the yield is high; and iv = both productivity and ratio of the yield are low. The codes under 'A' reflect the median of the broader product categories in IC1 (item category level 1), and those under 'B' reflect the median of the specific products in IC2 included here. Regarding the items imported in larger or smaller quantities compared with their prices (p<0.2), the names of the FCL items (classified according to the Broad Economic Categories) listed in the table are those with the smallest p-value < 0.2 estimated based on data during 2014–2016. Data category: FCL.

Source: Appendix 3.7.

Table 9.12 shows a positive correlation between the land productivity and ratios of the yield of cereals (11) and vegetables (13) during 2011–2015. In other words, the profitability per unit area of FCL items tended to be high when they had a comparative advantage in terms of physical productivity within the ASEAN region. This did not apply, however, for products in the oil and sugar crops (12) group.

Weak or non-existent correlations are observed between land/feed productivity or ratios of the yield and the extent of harvested areas or number of producing animals for all IC2 product groups. Such results show that most of the land and producing animals in Myanmar were simply not allocated to products characterised by high productivity or competitiveness.

Table 9.12. Correlation Matrix of Comparative Advantage, Productivity, and Resource Allocation, 2011–2015

	Land or feed productivity						Ratio of the yield					
IC2	11 Cereals	12 Oil and sugar crops	13 Vegetables	14 Fruits and nuts	15 Stimulants and spices	21 Meat	11 Cereals	12 Oil and sugar crops	13 Vegetables	14 Fruits and nuts	15 Stimulants and spices	21 Meat
Ratio of the yield	0.70	-0.18	0.71	—	—	0.52	—	—	—	—	—	—
Area or producing animals	0.90	0.04	-0.39	—	—	-0.60	0.40	-0.14	0.05	—	—	-0.12
Obs.	5	7	10	3	3	9	5	7	10	3	3	9

IC2 = item category level 2.
Notes: 'Area' refers to the total harvested area, and 'producing animals' refers to the number of producing animals. This table uses Spearman's rank correlation coefficient of average values during 2011–2015. The values were estimated based on the data for items on the FAOSTAT Commodities List (FCL) relating to land/feed productivity, the ratio of the yield, and the number of producing animals and the land area they used. FCL items with correlation coefficients less than 4 were omitted. 'Obs.' refers to the number of FCL items. Data category: FCL.
Source: Author's calculations, see Appendix 3.7.

5. Summary

Social and Economic Conditions

- Although Myanmar's population is middling in size compared with the populations of the other ASEAN states, the country's strong prospect of population and economic growth suggests a large potential as a consumption market of agri-food products.
- VA of the wholesale and retail trade sectors has been a major component of Myanmar's GDP; for instance, their total VA accounted for about 14% of GDP in 2015. While the proportion of GDP due to the VA of the food and beverage industry shrank, that due to the VA of most FVC-related industries expanded, especially in the case of fishing and agriculture.
- Interindustry and intra-industry transactions in Myanmar had special characteristics compared with those in the other countries covered in this report. Most products of the agriculture, fishing, and food-and-beverage industries were destined for intra-industry transactions. The FVC in Myanmar expanded rapidly with regard to intra-industry transactions, while inter-industry transactions increased only gently.

Linkages amongst FVC-related Industries

- The increase in final demand in downstream sectors of the FVC, particularly the food and beverage industries, had an impact on the VA of upstream sectors. This result suggests that interventions into the food and beverage industries do contribute to the development of agriculture.
- The effects of downstream industries on the VA of fishing was notable, as the size of the fishing market is very limited. It is also suggested that the services provided by the wholesale/retail trade sectors are necessary, but alone not sufficient, to automatically drive the development of the FVC-related industries.
- Production growth can accompany a rise in per capita employee compensation in many FVC-related industries, particularly agriculture.
- The hotel and restaurant industries, which had remarkably high per capita compensation and a sharp increase in the number employees, seem to have been one of the more attractive sectors in terms of labour absorption, although the number of employees was actually very limited.

Supply–Demand Balance of Agri-food Products

- Most agri-food products, particularly cereals, oil and sugar crops, and vegetables, were mainly produced and consumed in the domestic market. However, a comparatively large quantity of fat and oils was imported, followed by cereals and milk. Exports of vegetables consisted mainly of beans, and the quantity was remarkably large. The second- and third-largest export goods were cereals and marine fishes, respectively. Even though cereals are mainly produced/consumed at home, the little that's produced/consumed in foreign markets are in large enough volumes to rank high compared with other exports and imports. The supply–demand structure in Myanmar had some unique features, such as a high self-sufficiency in milk and a high dependency on imports for alcoholic beverages, unlike the other ASEAN countries covered in this report.
- The export prices of aquatic products—such as raw and processed molluscs; raw aquatic animals, nei; and raw crustaceans—were remarkably high. A noticeable amount of raw marine fishes were also exported at high prices. And the export values of raw crustaceans were relatively high. We can conclude that raw crustaceans and marine fishes exported in large volumes had high enough values to induce active trade.

The Competitiveness of Each Product in the ASEAN Region

- Myanmar's vegetable products in the low-price range—especially vegetables such as dried beans; pulses, nes; and bambara beans—tended to be imported in great quantities by other ASEAN countries in 2014–2016, considering to their prices. Among the aquatic products, crustaceans (such as shrimps, prawns, and crabs, nei) and fishes, nei, were imported in significantly larger quantities than had been estimated based on their import prices.
- Research on the characteristics of the goods actively exported by other ASEAN countries to Myanmar might trigger a reconsideration of production and marketing strategies for domestic products that could compete with goods produced by other ASEAN states, for instance: soya paste, miscellaneous aquatic products, and baby food from Malaysia; breakfast cereals from Thailand; sugar confectionery from Viet Nam; and potatoes, nutmeg/mace/cardamons, condensed whey, whole condensed milk, salmons/trouts/smelts, food preparations, nes, and sesame oil from Singapore.

- In the vegetables group, land productivity and ratios of the yield were higher for garlic, fresh vegetables, nes, and dried onions than for the other products. Within the overall vegetable products category, wheat, coconuts, and areca nuts outstripped the other products in their ratios of the yield; and they had relatively high land productivity. Similarly, pork and hen eggs had high feed productivity, and their ratios of the yield were comparable with those of most other livestock products. The potential of these products as exports to other ASEAN countries could be high if they became competitive with the same products from those other countries by means of greater physical productivity.

Chapter 10

Summary

This report provided fundamental information on agri-food industries in each of eight ASEAN countries from four perspectives: social and economic conditions, linkages amongst FVC-related industries, the supply–demand balance of agri-food products, and the competitiveness of each product in the ASEAN region. Although the statistical data reflecting each country's conditions is based on various values, several implications emerging from the country reviews overlapped. This chapter summarizes the outputs of all the country-focused chapters to clarify the similarities and differences amongst the agri-food sectors in the eight ASEAN countries.

1. Social and Economic Conditions

Population and Per Capita GDP

- Either a large population or a strong prospect of population and economic growth suggests a considerable potential as a consumption market for agri-food products in Malaysia, Indonesia, Philippines, Viet Nam, and Myanmar. In Viet Nam, this same prospect also implies a growing importance of foreign markets as destinations for their agri-food products in the long-term.
- Although Thailand has a population that is comparatively large vis-à-vis those of other countries in the ASEAN region, and has a certain presence as a consumption market, the country's poor prospect of population and economic growth suggests a growing importance of foreign markets for its agri-food products.
- By contrast, Lao PDR and Cambodia both have a strong prospect of long-term population and economic growth, but their small populations suggest only a limited potential for their domestic consumption markets. Foreign markets, especially ASEAN countries, where regional integration is in progress, will likely become essential consumption markets for their agri-food products.
- Projections of the population based on the level of per capita GDP show rapid increases in the number of high-income people in all eight ASEAN member states covered in this report. It will thus be necessary to establish a system for supplying agri-food products to match the demand from this rapidly growing upper-income bracket.

The VA of FVC-related Industries

- Amongst six agri-food industries targeted in this report—agriculture, fishing, food and beverages, wholesale trade, retail trade, and hotels and restaurants—the VA of wholesale and retail trade accounted for a notable share of GDP in all eight countries during the periods covered in this report.
- The proportion of GDP due to the agricultural VA was comparatively large in Malaysia, Indonesia, the Philippines, and Viet Nam. Of these countries, only Indonesia and the Philippines also had a large share of their GDP due to the VA of the food and beverage sector.
- While the share of GDP due to a majority of FVC-related industries shrank, that due to the VA of food and beverages gradually expanded in Malaysia, Thailand, Indonesia, and the Philippines.

- By contrast, the proportion of GDP due to the VA of food and beverages decreased in Viet Nam, Lao PDR, Cambodia, and Myanmar, despite the fact that the proportions for many other industries were expanding. The rapid increases in the proportions of GDP due to the VA of agriculture and fishing in Lao PDR, Cambodia, and Myanmar were especially notable.

Destinations of Products in Agri-food Industries

- Interindustry transactions involving product flows from agriculture and fishing to the food-and-beverage industries increased in most of the ASEAN countries analysed in this report, with the exceptions of Viet Nam and Myanmar. Transactions from fishing to the hotel-and-restaurant industries, and from the food-and-beverage industries to the hotel-and-restaurant industries, gradually increased in Malaysia, Thailand, Indonesia, Lao PDR, and Cambodia.
- The Philippines and Myanmar showed a slight increase in their transactions from their food-and-beverage to their hotel-and-restaurant sectors. In Viet Nam, there were no observable transactions from the fishing to the hotel-and-restaurant industries, or from the food-and-beverage to the hotel-and-restaurant sectors.
- Growth in intra-industry transactions within agriculture and the food-and-beverage industries was observable in Malaysia, Thailand, Indonesia, and Cambodia. We can conclude that the FVC was growing steadily in these countries with regard to both interindustry and intra-industry transactions.
- Meanwhile, intra-industry transactions stagnated or were very limited for agriculture and fishing in the Philippines, Viet Nam, and Lao PDR, and for the food and beverage industries in Viet Nam and Lao PDR.
- Interindustry and intra-industry transactions in Myanmar had unique characteristics that set it apart from the other countries targeted in this report. For example, intra-industry transactions were the majority of product flows in the agriculture, fishing, and food-and-beverage industries. The FVC in Myanmar has rapidly expanded with regard to intra-industry transactions, while inter-industry transactions increased only gently.

2. Linkages amongst FVC-related Industries

Production and VA Induced by Final Demand

- The increase in final demand in downstream sectors of the FVC, particularly in the food and beverage industries, had notable impacts on the VA of upstream sectors in all the countries covered in this report except Malaysia. This result suggests that interventions into the food and beverage industries do contribute to the development of agriculture.
- The impacts of final demand in downstream sectors of the FVC, such as the hotel-and-restaurant and food-and-and-beverage industries, on upstream sectors were limited in Malaysia. For this reason, direct interventions to increase final demand in agriculture might be more effective than expecting a ripple effect from the hotel-and-restaurant and food-and-beverage sectors.
- The effects of downstream industries on the VA of fishing was notable, given that the market size of fishing is limited in all the countries except the Philippines and Indonesia. In the Philippines and Indonesia, the effects of downstream industries on the VA of fishing was limited, compared with their effects on the VA of agriculture.

- It is suggested that the services provided by the wholesale/retail trade sectors are necessary, but alone not sufficient, to automatically drive the development of the FVC-related industries in all the countries other than Thailand. The wholesale and retail trade sectors in Thailand can, to a large extent, induce the development of the hotel and restaurant industries. The development of wholesale and retail trade can thus sequentially affect production sectors in the FVC in Thailand.

The Relationship amongst the Number of Employees, Per Capita Compensation, and Production

- Production growth can accompany a rise in per capita employee compensation in many FVC-related industries, particularly in agriculture in all eight countries, as well as the fishing industry in Malaysia, Thailand, and the Philippines.
- The number of employees in the agricultural sector decreased while per capita compensation increased in all countries other than Malaysia. This suggests that an interindustry movement of labourers could be strongly tied to productivity and the efficient development of agriculture.
- The food and beverage industries in Thailand, Indonesia, the Philippines, and Viet Nam, and the hotel and restaurant industries in Lao PDR, Cambodia, and Myanmar, had higher per capita compensation than the other FVC-related industries, and may have been the more attractive sectors in terms of labour absorption. However, the number of employees was actually quite small in these industries, except in Cambodia, and workforce growth was slow in Indonesia and Viet Nam.
- In Malaysia, the number of employees in the agricultural sector increased along with a rise in per capita compensation. That suggests structural characteristics indicating the absence of a labour surplus, in contrast to the situation in most of the other ASEAN states.

3. Supply–Demand Balance of Agri-food Products

Supply–Demand Structure

- Most agri-food products are produced and consumed in the domestic market in Indonesia, the Philippines, Viet Nam, Lao PDR, Cambodia, and Myanmar. In addition to domestic production and consumption, many products are exported by Thailand and Viet Nam, and imported by Malaysia.
- Cereals, vegetables, and oil and sugar crops are typical examples of domestically produced goods, in terms of quantity, in all countries other than Malaysia. In Malaysia, the production of fat and oils exceeded that of all the other products.
- Every country covered in this report except Thailand imported relatively large amounts of cereals. Other major imports included: milk in Indonesia, the Philippines, Viet Nam, and Myanmar; vegetables in Malaysia, Indonesia, and Viet Nam; and sugar in Indonesia, Lao PDR, and Cambodia.
- Products exported in significant quantities included: cereals from Thailand, Viet Nam, Lao PDR, and Cambodia; vegetables from Thailand, Viet Nam, and Myanmar; fat and oils from Malaysia and Indonesia; and fruits and nuts from the Philippines.
- In Malaysia, stimulants and spices were mostly imported for further processing and re-exportation. Myanmar had a high self-sufficiency in milk and high dependency on imports for alcoholic beverages. These are special features that were not observed in other ASEAN states.

Trade Prices and Volumes

- Aquatic products had remarkably high export prices, particularly raw and processed crustaceans in all countries other than Lao PDR and Cambodia. The following aquatic products also had high export prices: processed molluscs from Malaysia, Thailand, the Philippines, and Myanmar; processed freshwater fishes from Thailand and the Philippines; and processed and raw aquatic animals, nei, from Thailand and Myanmar.
- The export prices were notably high for raw and processed stimulants from Malaysia, Lao PDR, and Cambodia. The export prices of alcoholic beverages from Malaysia and processed meat from Indonesia also exceeded the prices of many other products.
- Although the trade quantities of high-priced products were generally small, several high-priced products were exported in significant volumes. These included crustaceans from Thailand, Indonesia, Viet Nam, and Myanmar; marine fishes from the Philippines and Myanmar; and stimulants and spices from Malaysia and Lao PDR.
- Similarly, the following products were imported in large amounts, although their prices were high: processed food, nei, including baby food and miscellaneous prepared food in Malaysia, Thailand, the Philippines, Viet Nam, and Cambodia; raw crustaceans and raw stimulants and spices in Viet Nam; and alcoholic beverages in Malaysia.
- The export and import prices of processed products tend to be higher than those of primary products, except for some items (such as eggs, sugar, and several aquatic products) in all countries other than the Philippines and Myanmar. An increase in processing can lead to a rise in the trade prices of many items, while trade in primary products can raise the prices of various items.

4. The Competitiveness of Each Product in the ASEAN Region

Goods Imported in Smaller/Larger Quantities than Estimated Based on Prices: Non-price Competitiveness in the ASEAN Region

- Table A4.3, in Appendix 4, presents a matrix of representative items that are imported in significant amounts by ASEAN countries, considering their prices.
- Various products in the vegetable, livestock, and aquatic categories, as well as processed foods produced by ASEAN member states were exported to other ASEAN states in significant quantities, considering their prices. These products included: vegetable products in the low- and mid-price ranges; livestock products (e.g. dairy products from Thailand and boneless cattle meat from Malaysia); various aquatic products; and processed food (e.g. prepared fat, molasses, and infant food from Malaysia; and refined sugar and short margarine from Thailand).
- It might be beneficial to seek possibilities to develop further export markets for these products. Moreover, research on the causes of such active import demand, including production and sales methods, would help identify pathways toward increasing the sales of other items.
- Research on the characteristics of the goods actively exported by ASEAN countries to other ASEAN countries might also trigger a reconsideration of production and marketing strategies for domestic products that could compete with goods produced by other states in the ASEAN region.

Inter-commodity and Inter-country Comparisons of Land/Feed Productivity

- Appendix 5 provides a brief evaluation of the land and feed productivity of individual agri-food products in the ASEAN countries.
- Vegetable products with notably high land productivity and ratios of the yield were as follows: tomatoes from Malaysia; tea and pepper from Thailand; tropical fruits from Indonesia; minor nuts from the Philippines; grapes and grapefruits from Viet Nam; citrus fruits from Lao PDR; pepper from Cambodia; and garlic, onions, and minor fresh vegetables from Myanmar.
- Examples of livestock products with high feed productivity and ratios of the yield were as follows: sheep meat from Malaysia; cow milk and pork from Thailand; buffalo and cattle meats from Indonesia; goat and turkey meats and cow's milk from the Philippines; cow's milk and buffalo meat from Viet Nam; cow's milk and goose or guinea fowl meat from Lao PDR; pork and buffalo meat from Cambodia; and pork and hen eggs from Myanmar.
- Although the harvested land areas or the numbers of producing animals for many products mentioned above were small, and were not necessarily increasing, the potential of these products as exports to other ASEAN countries could be high if they became competitive with the same products from those other countries by means of greater physical productivity.
- The number of products that had non-price competitiveness or were differentiated from the products of other countries was considerable in Malaysia and Thailand; middling in Indonesia and Viet Nam; and small or non-existent in the Philippines, Lao PDR, Cambodia, and Myanmar.
- Processed foods from Malaysia and Thailand tended to have non-price competitiveness. In those countries, the processing of agri-food products seems to have contributed to the differentiation of these products and enabled them to avoid competition based on physical productivity. In Indonesia and the Philippines, agri-food products with non-price competitiveness have little comparative advantage in terms of physical productivity, so maintaining or increasing their non-price competitiveness is critically important for their international competitiveness. In the case of Viet Nam, Lao PDR, Cambodia, and Myanmar, as a limited number of items already have non-price competitiveness, that of other products should be actively enhanced.
- For most product groups, weak, non-existent, or even negative correlations were observed between land/feed productivity or ratios of the yield and the extent of harvested land areas or the number of producing animals. Such results show that most of the land and producing animals were simply not allocated to products that had high productivity or competitiveness.

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Appendix 1

Conceptual Background of the Food Value Chain

The concept of the food value chain (FVC) seems to be based on the arguments for the value chain (VC), especially the global value chain (GVC), value chain development (VCD), and other concepts focusing on the procurement system of the agri-food sector, rather than on discussions around the idea of the FVC itself.

The VC is described as 'the full range of activities which are required to bring a product or service from conception, through the intermediary phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers, and final disposal after use' (Kaplinsky, 2000: 121).[1] Although the VC includes a wide range of activities, the concept itself does not provide a specific analytical perspective.[2]

By contrast, the concepts of the GVC and VCD can offer guidance regarding the assessment of the comprehensive issues surrounding the VC. This chapter provides an overview of the literature on the GVC, VCD, and other concepts relating to the procurement system of the agri-food sector in the member states of the Association of Southeast Asian Nations (ASEAN), to clarify the basic ideas needed to evaluate the FVC.

1.1. Key Concepts in the Literature on the GVC

The notion of the GVC was constructed in line with studies on the global commodity chain that had been conducted by the Institute of Development Studies, based at the University of Sussex, since the 1990s. The idea of an interrelationship between upgrading and governance took root mostly around 2000, when the concept of the GVC first emerged; it is a distinctive perspective that has served as a theoretical basis for many studies on the VC. This section summarizes the concepts of upgrading and governance to provide a better understanding of this unique perspective on the VC.

Upgrading

A representative study on the notion of upgrading defines it as the maintaining or increasing of producers' incomes accompanied by an increase in 'the skill content of their activities and/or move

[1]The difference between the VC concept and other chain concepts, such as supply chains, international production networks, and the French *filière*, is discussed in Bair (2005); Faße, Grote, and Winter (2009); and Coulibaly et al. (2010). However, according to many studies and publications, the VC concept seems to be used without any strict differentiation from the other concepts. This situation does not greatly differ from that of the dawn of the GVC concept. 'The "value chain" concept was adopted over several widely used alternatives because it was perceived as being the most inclusive of the full range of possible chain activities and end products' (Gereffi et al., 2001: 3).

[2] VC analysis sometimes aims at accomplishing VCD. However, the definition of 'VCD' is also ambiguous (Donovan et al., 2013: 16–17) because any goals can be assumed to qualify as development. Kaplinsky and Morris (2001) notes that the point of entry into VC analysis depends on the particular research interest.

into market niches' under the competitive pressure of globalisation (Humphrey and Schmitz, 2002b: 3).[3] It is notable that 'skill content' and technology are stressed, as well as income.

Table A1.1 shows four types of upgrading often classified by earlier studies.[4] The literature of in the 1990s on the global commodity chain focused on the concept of upgrading mainly in the context of how industries and firms could incorporate new functions into the VC to increase their profits (Gereffi, 1994, 1995). Functional upgrading, as defined in this table, corresponds to this kind of upgrading.[5] One example of functional upgrading is the acquisition of functions that generate higher VA than the original activity, such as a shift from mere assembly to full-package production, or the creation of original brands for their products (Gereffi, 1999). Inter-sectoral upgrading can be a countermeasure by suppliers to release lock-ins or overcome difficulties in functional upgrading in the context of strong and explicit coordination by buyers (Humphrey and Schmitz, 2002a).

Table A1.1. Typology of Upgrading

Process upgrading	Transforming inputs into outputs more efficiently by reorganizing the production system or introducing superior technology
Product upgrading	Moving into more sophisticated product lines, which can be defined in terms of increased unit values
Functional upgrading	Acquiring new functions, such as design or marketing, or abandoning existing functions to increase the overall skill content of activities
Inter-sectoral upgrading	Entering a different sector to produce a new product by using specific knowledge, capabilities, or competence acquired in the original sector

Sources: Humphrey and Schmitz (2000b, 2002a, 2002b).

The concept of upgrading has evolved mainly in the literature on industrial clusters, industrial capability (IC), and technical capability (TC). The industrial cluster literature mainly emphasizes the importance of local industrial organisation, namely vertical and horizontal cooperation amongst firms for the purpose of upgrading (Bell and Albu, 1999; Schmitz and Nadvi, 1999). By contrast, IC/TC literature has focused on investment to acquire technology from inside and outside firms for the purpose of upgrading.

The term 'cluster' refers to 'the geographical and sectoral concentration of enterprises' (Schmitz, 1999a: 466). The formation of industrial clusters can be led by the private sector or by the government through such methods as the construction of special economic zones, the implementation of regional programs, the organisation of cooperatives, and other interventions to promote collective actions.

The literature on industrial clusters and upgrading tends to support measures that will improve the competitiveness of local producers when it comes to meeting the stricter requirements for

[3] The definition used by Gereffi (2005) and Gereffi and Fernandez-Stark (2016) places more emphasis on the shift in the functions or positioning of actors in the GVC. For instance, Gereffi said, 'Industrial upgrading refers to the process by which economic actors—nations, firms, and workers—move from low-value to relatively high value activities in global production networks' (2005: 171).

[4] However, upgrading cannot really be divided so neatly into four patterns. For example, product upgrading can be realized through process upgrading (Gibbon, 2004). Several more patterns have been proposed by other studies, such as those by Frederick (2010) and Fernandez-Stark et al. (2012).

[5] 'Buyer' and 'supplier' indicate two firms or sectors vertically linked by a business transaction in the chain, such as a retailer (buyer)–wholesaler (supplier), retailer (buyer)–processor (supplier), and processor (buyer)–farmer (supplier).

production, design, and marketing that have accompanied globalisation. Such competitiveness is thought to be possible through joint action or cooperation amongst industrial clusters, as well as through their external economies (Schmitz, 1999a; Schmitz and Nadvi, 1999).[6] Cooperation leads to collective efficiency, including benefits from the disintegration and specialisation of individual firms; it also enables industrialisation driven by local small enterprises.[7]

Both vertical and horizontal cooperation can affect a wide range of activities, such as investment, production, distribution, marketing, and design (Table A1.2). With regard to the effect on investment, clustering, especially in the incipient stage of industrialisation, facilitates 'the mobilisation of financial and human resources, that it breaks down investment into steps with small risk, that the enterprise of one creates a foothold for the other, that ladders are constructed which enable small enterprise to climb up and grow' (Schmitz and Nadvi, 1999: 1507).

Table A1.2. Types of Cooperation and its Effects

Cooperation	
Vertical cooperation	● Producer and user improvements of components ● Alliances across the VC
Horisontal cooperation	● Sharing of equipment ● Sectoral associations
Effects of cooperation	
Investment	● Breaking down investment into small steps with lower risk
Production	● Improving quality, speed, and flexibility ● Certifying products
Distribution	● Building infrastructure for speedier and more cost-efficient transportation
Marketing	● Organising a trade fair
Design	● Creating local design capacity ● Developing brand names

VC = value chain.
Sources: Schmitz (1998, 1999a).

The IC/TC literature has focused on the process of acquiring technology, which is not fully discussed in the industrial cluster literature. The literature on ICs/TCs defines 'upgrading' based on the absolute speed of technological change or innovation.[8] Dahlman, Ross-Larson, and Westphal (1985) define upgrading as an increase in efficiency and productivity through a minor change in existing producing units, such as a rearrangement of the organisation, in contrast to a radical change in technology. Similarly, Bell (2007) classifies innovation as 'upgrading innovations', characterised by incremental

[6] Consciously pursued 'cooperation' is contrasted with passively enjoyed 'external economies'. Marshall (1890) divides economies arising from an increase in the scale of production of any kind of goods into two classes. External economies are 'those dependent on the general development of the industry', and internal economies are 'those dependent on the resources of the individual houses of business engaged in it, on their organisation and the efficiency of their management'. When 'social benefits are higher than private benefits we speak of external economies' (Schmitz, 1999a: 474). External economies include the benefit of labour market pooling, support for more specialized local suppliers of inputs and services, technology spillovers, and market access (Schmitz, 1999a, 1999b; McCormick, 1999).

[7] Collective efficiency is defined as 'the competitive advantage derived from local external economies and joint action' (Schmitz, 1999a: 466).

[8] Kaplinsky and Morris (2001: 37) suggest a decrease in the VA and market share when the rate of innovation becomes lower than the rates of competitors. The relative speed of technological change also seems to be something that is important to consider upgrading, as defined by Humphrey and Schmitz (2002b).

advances in technology, and 'new facility innovations', characterised by radical technological advances.

Innovation, including upgrading, is thought to be achieved through a change in the ongoing production system as a result of the accumulation of ICs, which is defined as highly complex TCs that are 'required to specify and design new products, develop novel machines and install new processes, establish new channels of supply and distribution', rather than to undertake ongoing operations (Bell and Albu, 1999: 1723).[9]

ICs are accumulated through an investment called 'learning', with the aim of acquiring and creating human resources and knowledge bases for innovative strategies (Bell and Figueiredo, 2012). Table A1.3 shows mechanisms of learning from inside and outside firms for improving the firms' ICs. This table indicates that learning is a complex mechanism of knowledge creation and acquisition, including pre- and post-learning processes such as preparation, assimilation, and codification.

Table A1.3. Typology of Learning Mechanisms for Latecomer Firms

	Internal learning	External learning
Preparation	● Organisational arrangements for knowledge creation, assimilation, and codification, or external knowledge acquisition	
Creation or acquisition	● Training in innovation-related skills and experience acquisition	
	● Knowledge creation by R&D	● Establishment via FDI of R&D facilities in knowledge-rich locations in other countries
	—	● Acquisition of codified knowledge as a basis for developing new products or processes ● Acquisition of ready-made specifications for new products ● The hiring of 'ready-made' innovative human capital
Assimilation	● Intra-firm communication of knowledge ● Knowledge articulation and assimilation	—
Codification	● Knowledge codification	

— = not applicable, FDI = foreign direct investment, R&D = research and development.
Sources: Bell and Figueiredo (2012), tables 1 and 2.

The industrial cluster can encourage external learning on the part of firms. Humphrey and Schmitz (2000b) explain the roles of technological gatekeepers in two types of industrial clusters. The first is a cluster that collaborates with technology-support organisations, including public sector institutes and business associations. The second is a cluster of small firms led by large local firms, called the 'hub-and-spoke cluster.' An example of the former, concerning Brazilian fruit exports, was provided by Damiani (1999), as well as by Humphrey and Schmitz (2000a: 10), who describe it as encompassing 'the acquisition of knowledge about market entrance requirements, the development, and maintenance of a reputation for quality which applied to producers in the region as a whole and introduction of pest control procedures to satisfy USDA [United States Department of Agriculture] requirements on fruit fly control'.

[9] A simpler TC required for ongoing operations is called 'production capability' (Bell 2007, 2009).

Governance

The second key concept emphasised in the GVC literature is governance.[10] Governance is a concept focused on organisational structure and inter-firm transactions between buyers and suppliers. A model presented by Gereffi, Humphrey, and Sturgeon (2005) is often cited to explain governance.[11]

According to this model, the types of governance, or vertical relationships amongst firms, can be classified by the degree of explicit coordination,[12] and by the power asymmetry of firms in the chain. The type of governance is determined by the complexity of the transactions, the ability to codify transactions, and the suppliers' capabilities to meet buyers' requirements (Figure A1.1).[13] Buyers would engage in explicit coordination with sellers when seeking to define a product or requiring complex conditions when dealing with suppliers.[14] Meanwhile, a higher degree of codification or standardisation would ease the complexity of transactions and diminish explicit coordination (Humphrey and Schmitz, 2000b; Gereffi, Humphrey, and Sturgeon 2005).

This model of governance is useful for prospecting the organisational structure of firms from changes in the complexity of transactions and in suppliers' capabilities due to the trend of economic growth and globalisation. This model emphasises standards and certification schemes, which can reduce the complexity of transactions through an intervention into the VC.[15]

[10] Gereffi et al. (2001: 2–3) write, 'By focusing on the chain or organisational network as the unit of analysis, rather than the firm, interesting question about power, governance and the dynamics of chins emerge'.

[11] The typology of governance laid out by Gereffi, Humphrey, and Sturgeon (2005) has still been utilized in recent literature, such as Gereffi and Fernandez-Stark (2016), and has served as a theoretical backbone of the discussion on the GVC in recent years. For example, Jespersen et al. (2014) analysed individual types of aquaculture VCs in Asian countries based on the framework provided by Gereffi, Humphrey, and Sturgeon (2005).

[12] Explicit coordination means 'non-market forms of coordination of economic activity' (Gereffi, Humphrey, and Sturgeon, 2005: 100).

[13] 'Capability' can be defined as the knowledge, experience, and skills that are needed to carry out activities of organisations in the context of governance (Richardson, 1972). Richardson notes, 'The capability of an organisation may depend upon command of some particular material technology…or may derive from skills in marketing or knowledge of and reputation in a particular market' (1972: 888). 'Capability' is sometimes defined as 'competence' in Gereffi, Humphrey, and Sturgeon (2005).

[14] According to Humphrey and Schmitz (2004: 97), product definition includes '1. What is to be produced: product design and specifications. 2. How it is to be produced. This involves the definition of production processes, which can include elements such as the technology to be used, quality systems, labour standards and environmental standards. 3. How much is to be produced, and when: production scheduling and logistics.'

[15] Gereffi, Humphrey, and Sturgeon (2005: 98) write that the 'effectiveness of industry actors and the social processes surrounding the development, dissemination, and adoption of standards and other codification schemes … opens the door for policy interventions and corporate strategy'.

Figure A1.1. Determinants of VC Governance Type

		Ability to codify transactions			
		Low		High	
		Capability of supplier			
		Low	High	Low	High
Complexity of transactions	Low	Unlikely to occur		Exclusion	Market
	High	Hierarchy (vertical integration)	Relational	Captive	Modular

VC = value chain.

Notes: 'Exclusion' is not shown in Table 1 of Gereffi, Humphrey, and Sturgeon (2005) because it would not appear in the GVC. However, the exclusion is 'quite common, and with requirements for suppliers increasing, perhaps increasingly likely to occur' in developing countries (Gereffi, Humphrey, and Sturgeon, 2005: 100–01).

Source: Gereffi, Humphrey, and Sturgeon (2005), Table 1.

This model of governance is largely influenced by the theory of transaction-cost economics, which explains the spectrum of governance structures, from market to hierarchy, by focusing on specific characteristics of inter-firm transactions between buyer and supplier. Williamson (1979) explains the complexity of transactions or contractual relations by specifying three factors: frequency, uncertainty, and asset specificity.[16] Asset specificity is especially emphasised as a key factor in distinguishing amongst governance structures (Williamson, 1979, 1991). When assets are nonspecific to buyers and suppliers, the transactions will be organised as a market exchange because of the advantages regarding production costs due to scale economies, aggregation of uncorrelated demands, and economies of scope. However, when there is a higher specification of assets, or higher bilateral dependency, hierarchy governance will be more efficient for economising on the sum of transaction and production costs (Williamson, 1981, 1991).

The modular type of governance, which cannot be explained by the theory of transaction-cost economics, was incorporated from studies on 'mundane transaction costs'. While transaction-cost economics draws attention to the costs of dealing with the risk of opportunism,[17] Baldwin and Clark (2002, 2006) focus on 'mundane transaction costs', or the costs of tasks required for mundane transactions, such as standardisation; counting;[18] and compensation; in addition to the transfer of material, energy, information, and money. A transaction between subnetworks consisting of complex

[16] Williamson (1991: 281) states that 'asset specificity has reference to the degree to which an asset can be redeployed to alternative uses and by alternative users without sacrifice of productive value.' Asset specificity includes (i) site specificity, (ii) physical asset specificity, (iii) human-asset specificity, (iv) brand name capital, (v) dedicated assets, and (vi) temporal specificity. See De Vita, Tekaya, and Wang (2011) for more details.

[17] Such costs include both the ex-ante (pre-contract) costs of safeguarding by drawing up and negotiating contracts, and the ex-post (harmonizing) costs of mitigating the risk of opportunism (Williamson, 1981).

[18] 'Counting' quantifies 'a number, weight, volume, length of time, or flow' of a transferred object (Baldwin and Clark, 2002: 12).

and interdependent transfers in order to minimise 'mundane transaction costs' is called a 'system exhibiting modularity'.[19]

The focus on the supplier's capability as a factor in determining governance type was introduced by a managerial framework called the 'resource-based view' of firms. The essential concept of the resource-based view is that 'firms must in certain instances depend on external resources' because the acquisition of the capabilities needed to engage in certain VCs may be 'difficult, time-consuming, and effectively impossible for some firms' (Gereffi, Humphrey, and Sturgeon, 2005: 81). Thus, it is a rational strategy for a business that supports core competencies to integrate vertically,[20] and to rely on the market for its other functions (Prahalad and Hamel, 1990: 83). In fact, Gereffi, Humphrey, and Sturgeon (2005: 81) note that 'firms which rely on the complementary competencies of other firms and focus more intensively on their area of competence will perform better.'

The Interrelationship between Upgrading and Governance

The governance pattern and the possibility or efficiency of the supplier's upgrading can influence each other (Humphrey and Schmitz, 2000b, 2002a, 2002b; Dolan and Humphrey, 2004; Kaplinsky, Terheggen, and Tijaja, 2011; Lee, Gereffi, and Beauvais, 2012). Case studies by Dolan, Humphrey, and Harris-Pascal (1999), and Dolan and Humphrey (2000, 2004), which analysed the fresh fruit and vegetable (FFV) trade between the UK and Kenya/Zimbabwe, are frequently cited as representative examples of such an interrelationship in agri-food GVCs.[21]

Supermarkets in the UK, which are major importers of African FFVs, strengthened their explicit coordination within the chain, in this case with positive outcomes, by establishing standards and directly monitoring suppliers to ensure that they responded to domestic social needs such as high-quality food, consistent year-round supplies, and high-value finished products.[22] Such coordination

[19] According to Baldwin and Clark (2002: 35), 'a complex system is said to exhibit modularity if its parts operate independently, but still support the functioning of the whole.'

[20] Prahalad and Hamel (1990: 81) define 'core competencies' as 'the collective learning in the organisation, especially how to coordinate diverse production skills and integrate multiple streams of technologies.' And they give three criteria for identifying core competencies: Such a competency must 'provide potential access to a wide variety of markets', 'make a significant contribution to the perceived consumer benefits of the end product', and be 'difficult for competitors to imitate' (1990: 83). For example, core competencies were embodied in NEC's 'digital technology, especially VLSI [very-large-scale integration] and systems integration skills'; Honda's 'engines and power trains'; and Canon's 'optics, imaging, and microprocessor controls' (1990: 83).

[21] For example, see Humphrey and Schmitz (2002a), Gereffi, Humphrey, and Sturgeon (2005), and Humphrey and Memedovic (2006). Loconto and Dankers (2014) note how often Dolan and Humphrey (2000) had cited by studies regarding voluntary standards. Although supermarket- or buyer-driven VCs are frequently mentioned, these are not the only forms of agri-food VCs. Lee, Gereffi, and Beauvais (2012) mention not only buyer-driven chains, but also 'producer-driven' chains, led by processors, and 'bilateral oligopolies', led by both retailers and processors. Reardon et al. (2009) and Reardon and Timmer (2014) describe the transition of a 'food system' as an interactive change involving the wholesale, processing, and retail sectors.

[22] The standards for food quality and safety, particularly private standards, are thought to be an essential factor affecting inter-firm transactions in the agri-food sector (Kaplinsky and Morris, 2001; Humphrey and Schmitz, 2001; Gereffi, Humphrey, and Sturgeon, 2005; Humphrey and Memedovic, 2006; Henson and Humphrey, 2009; Lee, Gereffi, and Beauvais, 2012). In addition, the UK government established comprehensive standards for food hygiene and safety in the Food Safety Act 1990 (Dolan and Humphrey, 2000, 2004).

affected wholesale markets and importers in the UK, as well as exporters and FFV producers in African countries.

The growers had to meet the requirements regarding production and post-harvest practices, health and safety, and ethical trade. This demand for higher standards encouraged upgrading in the FFV sector by introducing 'cool chains' and the diversification of products. By contrast, small growers and small and medium-sized exporters who could not meet such requirements were excluded from the chains.[23]

When explicit coordination is strong, the buyer can support a supplier's processes and product upgrading so as to secure raw materials more efficiently. However, such conditions are thought to actually hinder the supplier's functional upgrading and to lock the supplier into lower-profit functions in the chain.[24]

Studies have recommended several strategies for releasing lock-ins to enable functional upgrading by suppliers, such as 'strategic intent and substantial investment' to acquire new functions; the diversification of buyers to reduce explicit coordination (Humphrey and Schmitz, 2000b); and entrance into a different sector or market by utilising knowledge or capabilities obtained in a supplier's original sector, referred to as 'inter-sectoral upgrading' (Table A.1.1; Humphrey and Schmitz, 2004).[25]

In recent years, GVC studies that emphasise international trade rather than upgrading and governance have become prominent.[26] These studies often focus on the contribution of economic activities in each country to international trade, based on an analysis of inter-country input–output data (De Backer and Miroudot, 2013; Kuroiwa, 2016; Greenville et al., 2017a, 2017b).[27] For example, indices such as the participation index clarify the strength and extent of inter-country economic activities (De Backer and Miroudot, 2013; Greenville et al., 2017a, 2017b). We can see this as a result of the diversification of the GVC concept and the tendency to emphasise empirical studies, rather than as the result of a decrease in the significance of basic concepts of upgrading and governance.

[23] Kaplinsky, Terheggen, and Tijaja (2011) analysed timber VCs in Gabon and cassava VCs in Thailand, and suggested, by contrast, that lower standards could facilitate the participation of developing countries and small firms in GVCs. The question of how to insert small and medium-sized producers into 'high-value agro-food chains' has been one of the major topics of recent GVC studies (Gereffi and Fernandez-Stark, 2016). Fernandez-Stark, Bamber, and Gereffi (2011) suggest that constraints on access to markets, training, collaborative networks, and finance need to be removed to increase the competitiveness of farmers and enable their participation in higher-value VCs.

[24] Humphrey and Schmitz (2000b, 2002a, 2002b) present a captive or quasi-hierarchical chain in the Sinos Valley shoe cluster, in Brazil, as an example of a lock-in. US footwear manufacturers helped Brazilian producers 'in the choice of technology and organisation of production, inspected quality on site, organised transport and payment arrangements.' However, an attempt by Brazilian producers to advance into design and marketing was 'not put into practice, mainly because a small number of very influential export manufacturers did not support them.' (Humphrey and Schmitz, 2000b, 22–23).

[25] There are further recommendations, such as moving 'into functions which the lead firms governing the chain are willing to relinquish' (Humphrey and Schmitz, 2002a: 31), and 'intelligent mediation by public actor' or public assessments of 'different claims and their validity and likely impact' (Schmitz, 1999b: 1644).

[26] Those GVC studies can be positioned in the genealogy of international trade theory. Inomata (2017) regards the GVC as a paradigm of post-new-new trade theory.

[27] Studies based on international trade theory often imply the importance of international specialisation and trade activation.

1.2. VCD Handbooks

The concept of the GVC, including its key components—upgrading and governance—has been enthusiastically adopted, although possibly based on their own interpretations, mainly by donor organisations since the middle of the 2000s (Stamm and von Drachenfels, 2011). The perspective of the GVC mixed with other concepts, mainly from development studies, has generated various methodologies for evaluating VCs.

The methodologies of VC analysis have been presented in practical handbooks, manuals, and reports on VCD as a part of procedures for interventions into VCs, agricultural VCs in particular.[28] The goals of VCD literature generally surround pro-poor development, although 'clear-cut definitions of VCD are scarce in the guides' (Donovan et al., 2013: 17).[29] Most VCD handbooks focus on increasing the incomes of marginalised peoples, especially small-scale farmers.

This section starts by summarising a particular form of VCD analysis that is a distinguishing characteristic of VCD literature. Then, it provides an overview of the aspects of VC that VCD handbooks tend to emphasise.[30]

The Framework of VCD Analysis

There are roughly three steps in the analytical procedures proposed in VCD handbooks: VC selection, VC mapping, and further analysis based on the mapping.

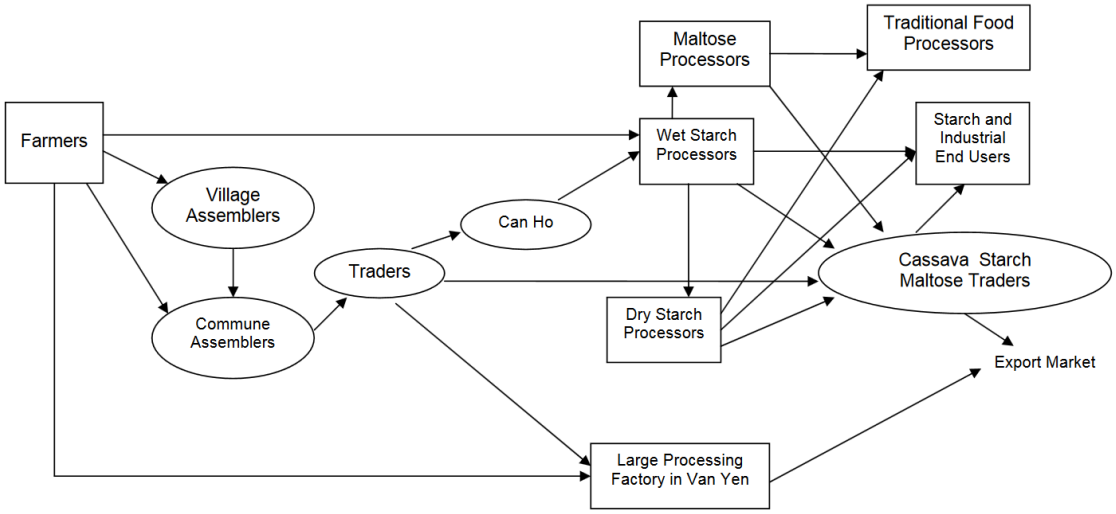
First, a VC, subsector, or commodity, is selected according to the goals and target groups of the VCD (Da Silva and De Souza Filho, 2007; Herr and Muzira, 2009; Donovan et al., 2013). Many handbooks assume that the VC is selected based on the opinions of stakeholders or on a comprehensive market analysis using macro-level data. One important criterion for VC selection is the stable growth of the consumer markets (Haggblade and Gamser, 1991; GTZ, 2007).[31] Other criteria include the potential for poverty alleviation, intervention, and outreach, as well as the priorities of government policy (GTZ, 2007; M4P Project, 2008). According to the criterion of poverty alleviation potential, for example, labour-intensive products such as coffee and organic fruits/vegetables can be selected for small-scale farmers to enable their participation in the chain (GTZ, 2007; M4P Project, 2008; Fernandez-Stark and Bamber, 2012).

The second step is the mapping of the selected chain, subsector, or agri-food products based on interviews with VC actors.[32] VC mapping clarifies the inter-firm or inter-sectoral flow of agri-food products, and identifies the main actors and structures of the VC (Asian Development Bank [ADB],

[28] The methodologies of VC analysis have been systematically summarized, especially by the Making Markets Work Better for the Poor (M4P) Project (2008) and Coulibaly et al. (2010).
[29] According to Gereffi (2014: 19), 'much of the literature that uses the GVC moniker misses the point and doesn't apply the framework consistently'.
[30] The concepts of VCD found in various handbooks have been summarized in several studies, such as Stamm and Von Drachenfels (2011); Nang'ole, Mithöfer, and Franzel (2011); and Donovan et al. (2013).
[31] Markets that are newly developed or regarding which future prospects are unclear can experience short-term shocks that cannot be withstood by asset-poor farmers (Fernandez-Stark and Bamber, 2012).
[32] Although VC mapping is stressed in many VCD handbooks, it is not the original method of VC analysis, nor is it an inherent part of it. See the subsector analysis in Haggblade and Gamser (1991).

2005; Da Silva and De Souza Filho, 2007; GTZ, 2007). As an example, Figure A1.2 shows the mapping of the cassava VC in northern Viet Nam.

Figure A1.2. Example of VC Mapping: The Cassava VC in Northern Viet Nam



Source: Asian Development Bank (ADB), 2005: 13.

The third step, based on the VC map, entails a more detailed description of the whole chain or of specific parts of it by using data such as the quantities and prices of products; number of firms and employees; and the incomes, costs, and profits—mainly collected from stakeholders in the chain.[33] An analysis of the social and economic issues surrounding each actor in the chain would clarify effective strategies and leverage points for intervention. (ADB, 2005; GTZ, 2007; M4P Project, 2008; Herr and Muzira, 2009).[34]

The Perspectives on the VC in VCD literature

We can divide VCD literature into two types, depending on what aspects of the VC concept is emphasised. The first type pays more attention to the organisational arrangement of local industries, including specialisation and cooperation amongst firms (Webber and Labaste, 2010), as well as knowledge and technology (M4P Project, 2008), similar to the GVC and IC/TC literature. This type of literature implicitly or explicitly adopts the view that understanding governance is important for understanding the VC.[35] Furthermore, this type of literature stresses rules and regulations, particularly standards, as a factor affecting explicit coordination.[36]

[33] This procedure can be interpreted as a part of VC mapping. Several studies that use the System Dynamics Model, such as Rich et al. (2011) and Hamza and Rich (2015), focus on the structure of a VC as obtained from the VC map, rather than on the detailed information from stakeholders.

[34] The SWOT matrix (of Strengths, Weaknesses, Opportunities, and Threats) is often introduced as a method for such analysis, for instance, by Da Silva and De Souza Filho, 2007; GTZ, 2007; and by Coulibaly et al., 2010.

[35] However, it is the small handbooks that have delved into the mechanisms of governance, upgrading, and their interrelationships.

[36] Inter-firm contracts (vertical collaboration), producer groups, and agricultural cooperatives (horizontal collaboration) (GTZ, 2007), as well as firms linked by mutual trust, are also important factors related to governance (M4P Project, 2008).

The second type of VCD literature stresses various strategies for rural development, including the formation of industrial clusters, rather than identifying aspects of technologies for upgrading (GTZ, 2007; Herr and Muzira, 2009).[37] The analytical perspective and approach to intervention are broader in this literature. For example, Altenburg (2007) mentions general policies for developing the private sector—such as improving the business environment and policies on trade, investments, and taxes—as methods for supporting pro-poor VCs (Table A1.4). Fernandez-Stark and Bamber (2012) and Bamber et al. (2014) argue for various factors, such as macroeconomic stability, labour costs, and investment in irrigation systems to enhance the competitiveness of small and medium-sized producers, and for including them in regional and global VCs (Bamber et al., 2014). These arguments seem to exceed the framework of upgrading and governance, which were the focuses of the earlier GVC studies.

Table A1.4. Major Policy Options for Influencing VCs

General private sector development policies and support programmes
● Creation of an enabling environment for the private sector ● Trade and investment policies and export-promotion programmes ● Tax policy ● Policies and programmes for skills development and innovation ● Financial and nonfinancial business services ● Support of local economic development ● Marketing
Specific VC support activities
● Awareness raising and matching (information and motivational events for suppliers; subcontracting exchange schemes; supplier fairs and exhibitions) ● Support for spillovers from lead firms (co-financed grant schemes for private sector-led initiatives; tax and financial incentives to induce TNCs; corporate social responsibility movement) ● Access to VC finance (receiving credit from business partners; making the firm creditworthy to financial institutions; developing financial products that support VC integration) ● Promotion of inclusive standards (promoting standards and labels; reforming and sensitising target groups and supporting poor producers, helping set up inclusive low-cost certification systems, and promoting group certification) ● Franchise development (organising events for building awareness of the potential benefits of franchising, reviewing the existing legal regulations regarding the franchising of businesses)

TNC = transnational corporation, VC = value chain.

Source: Altenburg (2007: 39–50).

1.3. Other Studies Stressing the Agri-food Procurement System in the ASEAN Region

There are many studies that do not explicitly use the term 'VC', but have similar perspectives to those in the literature mentioned above on agri-food GVCs.[38] Those studies focus on the transformation or

[37] The definition of 'upgrading' varies in VCD literature. For example, GTZ (2007) defines it as 'improving business linkages, associations, and partnerships', 'strengthening service supply and demand', and 'introducing standards and improving policies and the business environment of the chain' (11).

[38] Some examples are Dolan and Humphrey (2000); Humphrey and Memedovic (2006); Kaplinsky, Terheggen, and Tijaja (2011); and Gereffi and Lee (2012).

'modernisation' of food retail, or agri-food system;[39] dissemination of private standards; and the exclusion or inclusion of small-scale producers.[40]

Studies on the Transformation or 'Modernisation' of the Agri-food System

In Southeast Asia, as in other regions, there has been a rapid growth of supermarkets, called the 'supermarket revolution', accompanied by income growth, urbanisation, and an increase in foreign direct investment and domestic investment (Reardon et al., 2009; Reardon, Timmer, and Minten, 2012).[41] Reardon, Timmer, and Minton (2012) mention that buyers change their supply sources from traditional spot markets to distribution centres and networks, preferred supplier systems, and to dedicated wholesalers; and this shift is accompanied by the spread of private standards,[42] as part of the supermarket revolution.[43] Such a view of procurement system modernisation has raised concerns about the exclusion of small-scale or asset-poor producers and processors, and has generated discussions on how such firms can be included in the chain (Reardon and Timmer, 2007; Reardon et al., 2001, 2009; and Swinnen, 2014).[44]

Reardon and Timmer (2007) and Reardon et al. (2009) have proposed a model to explain the dynamism of the procurement system by focusing on buyers' and suppliers' incentives and capacities to adopt new technologies.[45] For example, investment in wholesale market systems and in other market infrastructure would stimulate buyers and enhance procurement modernisation (Reardon, Timmer, and Minten, 2012). Small-scale suppliers could participate in this system, depending on such resources as farmers' assets;[46] collective capital;[47] and access to assistance with credit, inputs, and information (Reardon et al., 2009). Reardon, Timmer, and Minten (2012) mention several strategies

[39] Reardon and Timmer (2014: 11) use 'food system' as 'a general term for food supply chains and markets'.

[40] Reardon and Timmer (2007, 2014); Reardon et al. (2009); Reardon, Timmer, and Minten (2012); Maertens and Swinnen (2015); and Swinnen (2014). Many of these studies use the term 'chain' or 'supply chain', instead of 'value chain'.

[41] Fresh products mainly come from small producers, and are purchased by supermarkets mostly at traditional wholesale markets. By contrast, processed products from medium-sized and large companies tend to be purchased from modern retailers (Reardon, Timmer, and Minten, 2012; Reardon and Timmer, 2014). The transition of supermarket procurement from traditional to modern suppliers has been recognized as 'a crucial vector of change in agrifood systems' (Reardon and Timmer, 2007: 2835).

[42] A shift from no standards or public standards to private standards is stressed as an aspect of procurement system modernisation (Reardon et al., 2009).

[43] Reardon, Timmer, and Minten (2012) describe the modernisation of the procurement of fresh products as a gradual shift from the most traditional sources to the most modern. Similarly, Gómez and Ricketts (2013) classify the types of 'food value chains' as follows: (i) traditional, (ii) modern, (ii) modern (supplier) to traditional (buyer), and (iv) traditional (supplier) to modern (buyer).

[44] Exclusion from a specific sector does not necessarily mean that the 'modernisation' of the agri-food system has had negative effects on employment. The modernisation of the chain can actually increase the demand for labour and labourers' incomes in related sectors, such as the food processing and export sectors (Maertens and Swinnen, 2009; Broeck, Swinnen, and Maertens, 2017).

[45] To be precise, this is an issue about 'decisions of adoption of ''technologies" (of procurement and output marketing)' by the buyer and supplier (Reardon et al., 2009: 1720).

[46] Farmers' assets include land and non-land resources like irrigation, infrastructure, education, and knowledge (Reardon et al. 2009; Reardon, Timmer, and Minten, 2012). Furthermore, labour can be one such asset. Small-scale farms can be appropriate for labour-intensive field management, which may be needed by modern buyers (Reardon et al., 2009; Fernandez-Stark and Bamber, 2012)

[47] Collective capital includes 'vehicles and warehouses owned by the cooperative, and access to public infrastructure such as roads' (Reardon et al., 2009: 1721).

emerging in Asia for increasing the suppliers' capacities: developing 'rural business hubs' or clusters consisting of farmers, small retailers, and complementary services and products;[48] establishing collection centres and providing assets and services to small farmers who lack them; and forming farmer market cooperatives.

Empirical Studies on the Agri-food Sector's Procurement System in the ASEAN Region

Empirical studies on the procurement system of the agri-food sector—including the issues of the supermarket revolution, private standards, and small farmer exclusion—have used many different methods. We can broadly classify these studies into two categories.

The first is a comprehensive description of the agri-food sector and related issues in specific countries by using macro-level data. A typical example is Gulati et al. (2005), which summarises information about income, trade policies, foreign direct investment, agricultural production, and farm sizes in selected Asian countries, including Indonesia, Philippines, Thailand, and Viet Nam. The United Nations Conference on Trade and Development (UNCTAD) (2007) describes the general situation regarding private standards, particularly national schemes to implement good agricultural practices in the FFV sectors and in FFV trade in Malaysia, Thailand, and Viet Nam. The World Bank (2007) analyses the supermarket revolution of Indonesia by using macro-level information.

The second category comprises micro-level empirical studies on specific issues. Many of these studies are based on interviews with actors in the chain or on sample surveys in selected villages, and they often use econometric methods. Table A1.5 shows selected issues addressed in these micro-level studies of ASEAN countries. Micro-level studies focus on the interaction between the transformation of the procurement system and the activities of firms, and on the structure of the procurement systems.

Table A1.5. Issues of Selected Empirical Studies Related to FVCs in ASEAN countries

Structures of 'modern' and traditional FVCs
● The differences in organisation between the traditional chain and the 'modern' chain that is driven by the supermarket. The function of farmers' organisations as suppliers to supermarkets in Viet Nam (Moustier et al., 2010).
● Management conditions, including assets such as irrigation pumps, for tomato farmers, by distribution channel in Indonesia (World Bank, 2007). Clarification of the modernisation of the food retail sector in Viet Nam (Wertheim-Heck, Vellema, and Spaargaren, 2015).
Effects of the transformation of FVCs on firms
● The effects of supermarkets on revenue and profit of traditional traders/suppliers providing goods mainly to small stores and households in Indonesia (Suryadarma et al., 2010). Impacts of contract farming, direct sales, and spot marketing on household incomes of vegetable producers in Viet Nam (Wang, Moustier, and Loc, 2014).
● The effects of the size, colour, and quality of chili on its farm gate price in both traditional and modern markets in Indonesia (Chang, Di Caprio, and Sahara, 2015).

[48] Reardon, Timmer, and Minten (2012: 12336) mention that these 'rural business hubs' are emerging mainly in India, 'but may be useful nodal development strategies, for example for regional economic corridor projects underway in Southeast Asia and southern Africa.'

The behaviour of firms driving the FVC transformation
● Factors affecting market channel choice of sweet pepper farmers in Thailand (Schipmann and Qaim, 2011). ● The effects of global GAP adoption on the management of small-scale fruit and vegetable farms, and the factors influencing the adoption of standards in Thailand (Kersting and Wollni, 2012). The effects of producers' assets and farm sizes on the selection of species and feed for shrimp aquaculture in Indonesia (Yi, Reardon, and Stringer, 2018). ● Food-shopping behaviour of consumers in wet markets and supermarkets in Thailand (Gorton, Sauer, Supatpongkul, 2011) and Viet Nam (Figuié and Moustier, 2009).

FVC = food value chain, GAP = good agricultural practices.

Sources: See citations in this table.

1.4. Summary

- The term 'VC' denotes a wide range of sequential activities from pre-production to production, processing, distribution, consumption, and post-consumption, although it does not provide a specific analytical perspective.
- Earlier studies on the GVC and VCD, as well as studies on the transformation of the agri-food procurement system, provide specific perspectives from which to analyse the FVC.
- GVC literature has focused on the interrelationship between upgrading and the organisational arrangement (i.e. governance). The complexity of the buyers' requirements for suppliers and the suppliers' capability to meet them will affect the organisational arrangements and technological transfers.
- VCD handbooks differ in their perspectives on VCs, although many of them use a methodology for visualising VCs called 'VC mapping'. Several VCD handbooks emphasise theories regarding upgrading and governance, found mainly in the GVC literature. However, most of the VCD literature presents various ways of conducting studies on pro-poor development.
- There are many studies that do not explicitly use the term 'VC', but have similar perspectives as those found in the GVC literature on agri-food products. A representative example is a study on the transformation of procurement systems driven by the modernisation of downstream sectors, such as supermarkets.

Appendix 2

Data Classification

This report used data from various sources, such as the multi-region input–output table (MRIO) of Eora26,[49] ILOSTAT,[50] tariff schedules, United Nations (UN) Comtrade,[51] and FAOSTAT.[52] For a consistent interpretation of data classified into different categories, we summarised activity- and item-based classifications of FVC-related sectors and created new categories, such as 'item category level 1' (IC1) and 'item category level 2' (IC2).

2.1. Activity-based Classifications

Table A2.1 shows the activity-based classifications of all the sectors covered by Eora26, which is an inter-country input–output (ICIO) table that uses the International Standard Industrial Classification of All Economic Activities (ISIC), Revision 3. In this report, we mainly focused on three sectors: agriculture, fishing, and food and beverages.

Table A2.2 shows the activity-based classifications of selected industries related to agri-food production and distribution according to Eora26, and the corresponding categories under ISIC revisions 3 and 4. The agricultural, forestry, and fishing sectors of ISIC revisions 3 and 4 include the activities of processing on farms or the preparation of products for the first markets. Food manufacturing includes grain milling, which means that milled grain is produced in the food sector, rather than in the agricultural sector. The farming of livestock and the production of raw milk and eggs are included in the agricultural sector. However, the production of fresh meat is considered an activity of the food sector. So, for example, the production of smoked meat from fresh meat implies an intra-sector linkage (within the food sector), rather than inter-sector linkage between the agricultural and food sectors.

We do not take into account the following sectors specified in ISIC Revision 4 (noted here with their ISIC Revision 4 codes): the 'manufacture of chemicals and chemical products' (20), including fertilisers and pesticides; 'manufacture of coke and refined petroleum products' (19), including motor fuel and light, medium, and heavy fuel oil; 'electricity, gas, steam and air conditioning supply' (35); and 'civil engineering', (42), including roads and railways (Department of Economic and Social Affairs, UN Secretariat, 2008: 108, 109, 166, 173). Although those sectors are important for the development of entire economies, including the FVCs, the range of topics would have been too broad to cover in this report.

[49] Eora (2017), *Eora26*, https://worldmrio.com/eora26/ (accessed 21 February, 2018). See Lenzen et al. (2012) and Lenzen et al. (2013) for more detail about Eora.
[50] ILOSTAT is the database of the International Labour Organization (ILO). ILO (2019), *ILOSTAT Database*, https://www.ilo.org/ilostat (accessed 31 May, 2018).
[51] UN Comtrade is the United Nations database for statistics on international trade. UNSD (2017), *UN International Trade Statistics (UN Comtrade) Database*, https://comtrade.un.org/ (accessed 26 February, 2018).
[52] FAOSTAT is the database of the Food and Agriculture Organization of (FAO) of the United Nations. FAO (2019), *FAOSTAT: Food and agriculture data*, http://www.fao.org/faostat/en/ (accessed 27 September, 2018).

Table A2.1. Activity-based Sectors in Eora26

1. Agriculture	10. Transport equipment	20. Post and telecommunications
2. Fishing	11. Other manufacturing	21. Financial intermediation and business activities
3. Mining and quarrying	12. Recycling	
4. **Food & beverages**	13. Electricity, gas and water	22. Public administration
5. Textiles and wearing apparel	14. Construction	23. Education, health and other services
6. Wood and paper	15. Maintenance and repair	
7. Petroleum, chemical, and non-metallic mineral products	16. Wholesale trade	24. Private households
	17. Retail trade	25. Others
8. Metal products	18. Hotels and restaurants	26. **Re-export & re-import**
9. Electrical and machinery	19. Transport	

Source: Eora (2018).

Table A2.2. Activity-based Data Classifications for Major Industries Targeted in this Report

Sectors in Eora26		Category of ISIC Rev. 3 Section (Level 1)		Division (Level 2)		Category of ISIC Rev. 4 Section (Level 1)		Division (Level 2)		Group (Level 3)	
Production											
1	Agriculture	A	Agriculture	01	Agriculture	A	Agriculture	01	Crop production	011	Non-perennial crops
										012	Perennial crops
										013	Plant propagation
									Animal production	014	Animals
									Mixed farming	015	Mixed farming
					Service				Support activities	016	Support and post-harvest activities
			Hunting		Hunting		Hunting		Hunting	017	Hunting
			Forestry	02	Forestry		Forestry	02	Forestry	021	Silviculture etc.
					Logging				Logging	022	Logging
										023	Non-wood forest products
					Service				Support activities	024	Support activities
2	Fishing	B	Fishing	05	Fishing		Fishing	03	Fishing	031	Fishing
									Aquaculture	032	Aquaculture
					Service						
4	Food and beverages	D	Manufacturing	15	Food	C	Manufacturing	10	Food	101	Meat
										102	Fish
										103	Fruit and vegetables
										104	Oils and fats
										105	Dairy products
										106	Grain mill products
										108	Animal feeds
										107	Other foods
								11	Beverages	110	Beverages
				16	Tobacco			12	Tobacco	120	Tobacco
					Other manufacturing				Other manufacturing		(Omitted)
Distribution											
16	Wholesale	G	Wholesale, retail and repair	51	Wholesale	G	Wholesale and retail	46	Wholesale		(Omitted)
17	Retail			52	Retail			47	Retail		(Omitted)
					Repair						
				50	Automotive fuel				Automotive fuel		
					Motor vehicles and motorcycles			45	Motor vehicles and motorcycles		(Omitted)
18	Hotels and restaurants	H	Hotels and restaurants	55	Hotels and restaurants	I	Accommodation and food service	55	Accommodation		(Omitted)
								56	Food and beverage service		(Omitted)

ISIC = International Standard Industrial Classification (of All Economic Activities), Rev. = Revision.

Notes: The categories of Eora26 correspond to those in ISIC Revision 3, Level 2 (Lenzen et al., 2013). Inessential information was omitted from certain cells for the purpose of simplification.

Sources: Department of Economic and Social Affairs, UN Secretariat (2008); Eora (2018); Lenzen et al. (2013).

2.2. Item-based Classifications (IC1 and IC2)

As shown in Table A2.3, we established the classifications of IC1 (item category level 1) and IC2 (item category level 2) to allow a consistent interpretation of the product data in the Harmonized Commodity Description and Coding Systems, or 'Harmonized System' (HS),[53] FAOSTAT's Food Balance Sheet (FBS), and the FAOSTAT Commodity List (FCL), based on their corresponding classifications of agri-food products (Table A2.4). IC2 was mainly based on the 'groups' in the Central Product Classification (CPC), Version 2.1. The IC2 group for aquatic products was created mainly based on the 'divisions' of the International Standard Statistical Classification of Aquatic Animals and Plants (ISSCAAP).[54] The IC2 groups of vegetable and livestock products and processed food, nei, can be broken down into FBS groups, FBS items, and then into more detailed groups (i.e. FCL, FCL classified according to United Nations Broad Economic Categories: BEC, HS). Similarly, the IC2 group of aquatic products can be converted into FBS groups, and then broken down into FCL, 'adjusted ISSCAAP groups', adjusted ISSCAAP groups classified according to BEC, and HS.

Processed foods are classified into the same categories (IC1 or IC2) of main ingredients. For example, although HS 2012 190211 Pasta may contain eggs, it is included in FCL 122 Macaroni and IC2 11 Cereals, as the main ingredient is generally wheat. When the main ingredients cannot be easily identified, as in the case of HS 190220 Pasta, which is stuffed with meat and other substances, the food is classified in the category of FCL 1232 Food preparations, nes, and IC2 43 Food, nei.[55] IC1 Processed food, nei, is a special category for sugar, fat and oils, and for highly processed or unclassifiable products such as alcoholic beverages, infant food, and yeast.

Table A2.3. Classifications of Production Categories of Agri-food Products

IC1		IC2		FBS group (FAOSTAT)	
1	Vegetable products	11	Cereals	2905	Cereals - excluding beer
		12	Oil and sugar crops	2913	Oil crops
				2908	Sugar crops
		13	Vegetables	2907	Starchy roots
				2911	Pulses
				2918	Vegetables
		14	Fruits and nuts	2912	Tree nuts
				2919	Fruits - excluding wine
		15	Stimulants and spices	2923	Spices
				2922	Stimulants
2	Livestock products	21	Meat	2943	Meat
				2945	Offals
		22	Milk	2948	Milk - excluding butter
		23	Eggs	2949	Eggs
3	Aquatic products	31	Freshwater fishes	2960	Fish, seafood
		32	Marine fishes		
		33	Crustaceans		
		34	Molluscs		

[53] In this report, only those items categorized as Food and Beverages of The United Nations Broad Economic Categories (BEC), including subcategories 111, 112, 121, 122, are used when HS six-digit products are aggregated.

[54] The ISSCAAP *divisions* are larger categories that contain the ISSCAAP *groups*.

[55] The abbreviation 'nes' means 'not elsewhere specified,' and 'nei' means 'not elsewhere included'. Thus, 'nes' and 'nei' have essentially the same meaning.

		35	Other meats	2961	Aquatic products, other
		36	Aquatic plants		
		37	Aquatic animal products, nei*		
		38	Fishes, nei	2960	Fish, seafood
4	Processed food, nei	41	Sugar	2909	Sugar & Sweeteners
		42	Fat and oils	2946	Animal fats
				2914	Vegetable oils
		43	Food, nei	2928	Miscellaneous
		44	Alcoholic beverages	2924	Alcoholic beverages

FBS = Food Balance Sheet (FAOSTAT) , IC1 = item category level 1, IC2 = item category level 2, nei = not elsewhere included.

Notes: Categories and numbers of IC1 and IC2 were established by author for this study. FAOSTAT is the database of the Food and Agriculture Organization of the United Nations. The category 'aquatic animal products, nei' is not analysed in this report because it does not include products for food consumption.

Source: FAO (2019).

Table A2.4. The Main Corresponding Tables Used in This Paper

Correspondence	Source	Websites
HS2012→HS2007→FCL→FBS items→FBS groups	FAO (2019)	Production/Trade/Food Balance > Definitions and standards > Item/Item Group, http://www.fao.org/faostat/en/#data
HS2007→FCL (nonaquatic products)	FAO (a)	Correspondence tables, http://www.fao.org/economic/ess/ess-standards/commodity/fr/
HS2012→ISSCAAP groups (aquatic products)	FAO (b)	ISSCFC, http://www.fao.org/tempref/FI/DOCUMENT/cwp/handbook/annex/ANNEX_RII.pdf (linked from Statistics > Standards http://www.fao.org/statistics/standards/en/)
HS2012→HS2007→HS2002, BEC (Revision 4)	TSB, UNSD	Conversion and correlation tables, https://unstats.un.org/unsd/trade/classifications/correspondence-tables.asp

BEC = Broad Economic Categories, United Nations Statistics Division (UNSD); FAO = Food and Agriculture Organization (United Nations); FBS = Food Balance Sheet (FAOSTAT); FCL = FAOSTAT Commodity List; HS = Harmonized Commodity Description and Coding Systems, or 'Harmonized System'; ISSCAAP = International Standard Statistical Classification of Aquatic Animals and Plants; ISSCFC = International Standard Statistical Classification of Fishery Commodities; TSB = Trade Statistics Branch (under the UNSD).

Sources: See the middle column in this table.

The ISSCAAP divisions corresponding to the IC2 groups were adjusted in this report. There are aquatic products that can be classified into multiple ISSCAAP divisions based on the HS six-digit items. To achieve a one-to-one correspondence with those items, we created new ISSCAAP division-level categories. HS six-digit aquatic items were placed in the IC2 level, corresponding to the new ISSCAAP divisions (Table A2.5). IC2 'Fishes, nei' (38), was created for HS six-digit aquatic items that could not be classified in any specific category. In addition, the IC1 category of oil and fats, from aquatic products, was moved from 'Aquatic products' (3) to 'Processed food, nei' (4).

Table A2.6 summarises the items in the FCL and ISSCAAP groups classified according to the three-digit BEC categories, FBS groups, and the adjusted ISSCAAP divisions.

Table A2.5. Newly Classified HS Six-digit Level Aquatic Items

	IC2		HS 2012	Examples
Categories for miscellaneous commodities	33	Crustaceans	030614, 030624, 160510	Crabs, frozen, not frozen
			030617, 030627	Shrimps and prawns, frozen, not frozen
			030619, 030629, 160540	Crustaceans, frozen, not frozen, prepared, not prepared, nei
	34	Molluscs	030791, 030799, 160559	Molluscs, line, not live, prepared, not prepared, nei
	36	Aquatic plants	121221	Seaweeds, fit for human consumption
	35	Aquatic animals, nei	160569, 210390	Aquatic invertebrates, prepared or preserved, nei, Mixed condiments and seasonings
Additional category to IC2	38	Fishes, nei	030199, 030289, 030389, 030390, 030439, 030449, 030459, 030469, 030489, 030499, 030520, 030539, 030544, 030549, 030559, 030569, 160419, 160420, 160432	Fish, live, nei, Fish, fresh or chilled, nei, Fish, frozen, nei, etc.
Replaced category	42	Fat and oils	150410, 150420, 150430	Fish, liver oil, Fish, body oil, Fats, marine mammals

HS = Hamonized System, IC2 = item category level 2, nei = not elsewhere included.
Sources: UNSD (2017); TableA2.4.

Table A2.6. Items from FCL and ISSCAAP Groups Classified according to Three-digit BEC Categories, FBS Group, and Adjusted ISSCAAP Divisions

IC1 and IC2	FBS groups (FAOSTAT)/ ISSCAAP divisions		Primary products		Processed products	
			For industry (BEC 111)	For household use (BEC 112)	For industry (BEC 121)	For household use (BEC 122)
1 Vegetable products						
11 Cereals	2511	Wheat and products	Wheat		Flour, wheat; Bran, wheat; Gluten, wheat; Food preparations, flour, malt extract	Macaroni; Bread; Bulgur; Pastry; Cereals, breakfast; Mixes and doughs
	2513	Barley and products	Barley		Malt	Barley, pearled
	2514	Maize and products			Flour, maize; Bran, maize	Germ, maize
	2515	Rye and products	Rye			
	2516	Oats				Oats rolled
	2517	Millet and products	Millet		Bran, millet	
	2518	Sorghum and products	Sorghum			
	2520	Cereals, other	Buckwheat; Quinoa; Fonio; Triticale; Canary seed; Grain, mixed		Flour, fonio	Cereal preparations, nes
	2805	Rice	Rice, paddy; Rice, husked			Rice, milled/husked; Rice, broken; Bran, rice
12 Oil and sugar crops	2536	Sugar cane	Sugar cane			
	2537	Sugar beet	Sugar beet			
	2555	Soybeans	Soybeans			Soya sauce; Soya paste
	2556	Groundnuts	Groundnuts, with shell; Groundnuts, shelled			Peanut butter
	2557	Sunflower seed	Sunflower seed			
	2558	Rape and mustard seed	Rapeseed; Mustard seed			Flour, mustard
	2559	Cottonseed	Cottonseed			
	2560	Coconuts (incl copra)	Coconuts; Coconuts, desiccated; Copra			
	2561	Sesame seed	Sesame seed			
	2563	Olives (incl preserved)		Olives		Olives preserved
	2570	Oil crops, other	Poppy seed		Flour, oilseeds	
13 Vegetables	2531	Potatoes and products		Potatoes; Potatoes, frozen	Flour, potatoes; Tapioca, potatoes	
	2532	Cassava and products		Cassava		
	2533	Sweet potatoes		Sweet potatoes		
	2534	Roots, other		Yautia (cocoyam); Taro (cocoyam); Roots and tubers, nes	Flour, roots and tubers, nes	
	2535	Yams		Yams		
	2546	Beans		Beans, dry		
	2547	Peas		Peas, dry		
	2549	Pulses, other and products		Broad beans, horse beans, dry; Chickpeas; Cowpeas, dry; Pigeon peas; Lentils; Bambara beans; Pulses, nes	Flour, pulses; Bran, pulses	
	2601	Tomatoes and products		Tomatoes		Juice, tomato; Tomatoes, paste; Tomatoes, peeled

IC1 and IC2	FBS groups (FAOSTAT)/ ISSCAAP divisions		Primary products		Processed products	
			For industry (BEC 111)	For household use (BEC 112)	For industry (BEC121)	For household use (BEC 122)
1 Vegetable products						
13 Vegetables	2605	Vegetables, other	Chicory roots; Carobs	Cabbages and other brassicas; Artichokes; Asparagus; Lettuce and chicory; Spinach; Cassava leaves; Cauliflowers and broccoli; Pumpkins, squash and gourds; Cucumbers and gherkins; Eggplants (aubergines); Chillies and peppers, green; Onions, shallots, green; Garlic; Leeks, other alliaceous vegetables; Beans, green; Peas, green; Vegetables, leguminous, nes; Carrots and turnips; Sweet corn frozen; Mushrooms and truffles; Vegetables, fresh, nes; Vegetables, frozen		Sweet corn prep or preserved; Mushrooms, dried; Mushrooms, canned; Vegetables, dehydrated; Vegetables in vinegar; Vegetables, preserved, nes; Vegetables, temporarily preserved; Vegetables, preserved, frozen; Vegetables, homogenized preparations; Coffee, substitutes containing coffee
14 Fruits and nuts	2551	Nuts and products	Nuts, prepared (exc. groundnuts)	Brazil nuts, with shell; Cashew nuts, with shell; Chestnut; Almonds, with shell; Walnuts, with shell; Pistachios; Kola nuts; Hazelnuts, with shell; Areca nuts; Brazil nuts, shelled; Cashew nuts, shelled; Almonds shelled; Walnuts, shelled; Hazelnuts, shelled; Nuts, nes; Nuts, prepared (exc. groundnuts)		Nuts, prepared (exc. groundnuts)
	2611	Oranges, mandarins		Oranges; Tangerines, mandarins, clementines, satsumas		Juice, orange, single strength; Juice, orange, concentrated
	2612	Lemons, limes, and products		Lemons and limes		Juice, lemon, concentrated
	2613	Grapefruit and products		Grapefruit (inc. pomelos)		Juice, grapefruit; Juice, grapefruit, concentrated
	2614	Citrus, other		Fruit, citrus, nes		Juice, citrus, single strength
	2615	Bananas		Bananas		
	2616	Plantains		Plantains		
	2617	Apples and products		Apples		Juice, apple, single strength; Juice, apple, concentrated
	2618	Pineapples and products		Pineapples		Pineapples canned; Juice, pineapple; Juice, pineapple, concentrated
	2619	Dates		Dates		
	2620	Grapes and products (excl wine)		Grapes; Raisins		Juice, grape
	2625	Fruits, other	Fruit, prepared nes	Pears; Quinces; Apricots; Apricots, dry; Cherries, sour; Cherries; Peaches and nectarines; Plums and sloes; Plums dried (prunes); Fruit, stone, nes; Strawberries; Raspberries; Gooseberries; Blueberries; Watermelons; Melons, other (inc. cantaloupes); Figs; Mangoes, mangosteens, guavas; Avocados; Persimmons; Kiwi fruit; Papayas; Fruit, tropical fresh, nes; Fruit, dried, nes; Fruit, prepared, nes	Flour, fruit	Juice, plum, single strength; Juice, fruit, nes; Fruit, prepared, nes; Fruits, nuts, peel, sugar preserved; Fruit, cooked, homogenised preparations

IC1 and IC2		FBS groups (FAOSTAT)/ ISSCAAP divisions	Primary products		Processed products	
			For industry (BEC 111)	For household use (BEC 112)	For industry (BEC121)	For household use (BEC 122)
1 Vegetable products						
15 Stimulants and spices	2630	Coffee and products	Coffee, green; Coffee, roasted			Coffee, roasted; Coffee, extracts
	2633	Cocoa beans and products	Cocoa, beans		Cocoa, paste; Cocoa, powder and cake; Chocolate products, nes	Chocolate products, nes
	2635	Tea (incl mate)		Tea; Maté		Tea, mate extracts
	2640	Pepper		Pepper (Piper spp.)		
	2641	Pimento		Chilies and peppers, dry		
	2642	Cloves		Cloves		
	2645	Spices, other	Vanilla	Vanilla; Cinnamon (canella); Nutmeg, mace and cardamons; Anise, badian, fennel, coriander; Ginger; Spices, nes		
2 Livestock products						
21 Meat	2731	Bovine meat			Meat, cattle; Meat, extracts	Meat, cattle; Meat, cattle, boneless (beef and veal); Meat, beef, dried, salted, smoked; Meat, beef, and veal sausages; Meat, beef, preparations; Meat, homogenised preparations
	2732	Mutton & goat meat			Meat, sheep	Meat, sheep; Meat, goat
	2733	Pig meat			Meat, pig	Meat, pig; Bacon and ham; Meat, pig, preparations
	2734	Poultry meat				Meat, chicken; Fat, liver prepared (foie gras); Meat, chicken, canned; Meat, duck; Meat, goose and guinea fowl; Meat, turkey
	2735	Meat, other			Meat, horse	Meat, bird, nes; Meat, rabbit; Meat, game; Meat, dried nes; Meat, nes; Meat, nes, preparations; Snails, not sea
	2736	Offals, edible				Offals, edible, cattle; Offals, sheep, edible; Offals, pigs, edible; Offals, liver geese; Offals, liver duck
22 Milk	2848	Milk (excl butter)		Milk, whole fresh cow; Milk, skimmed cow; Yoghurt; Buttermilk, curdled, acidified milk	Whey, condensed; Milk, skimmed dried; Milk, products of natural constituents, nes	Milk, whole condensed; Milk, whole evaporated; Milk, whole dried; Cheese, whole cow milk; Ice cream and edible ice
23 Eggs	2744	Eggs	Egg albumin	Eggs, hen, in the shell; Eggs, other bird, in the shell	Eggs, liquid; Eggs, dried	
3 Aquatic products						
31 Freshwater fishes	11*	Carps, barbels and other cyprinids		Fresh		Frozen
	12*	Tilapias and other cichlids		Fresh		Fresh; Frozen
	13*	Miscellaneous freshwater fishes		Fresh; Cured		Fresh; Frozen; Frozen, dried, or cured, nei
	21*	Sturgeons, paddlefishes				Preparations, nei
	22*	River eels		Fresh		Preparations nei; Frozen
	23*	Salmons, trouts, smelts		Fresh		Fresh; Preparations, nei; Non-classified; Frozen
32 Marine fishes	31*	Flounders, halibuts, soles		Fresh		Fresh; Frozen
	32*	Cods, hakes, haddocks		Fresh; Dried; Cured		Fresh; Frozen; Frozen, dried, or cured, nei
	33*	Miscellaneous coastal fishes		Fresh		Frozen
	34*	Miscellaneous demersal fishes		Fresh		Fresh; Frozen
	35*	Herrings, sardines, anchovies		Fresh; Cured		Preparations, nei; Non-classified; Frozen
	36*	Tunas, bonitos, billfishes		Fresh		Fresh; Preparations, nei; Frozen

IC1 and IC2		FBS groups (FAOSTAT)/ ISSCAAP divisions	Primary products		Processed products	
			For industry (BEC 111)	For household use (BEC 112)	For industry (BEC121)	For household use (BEC 122)
3 Aquatic products						
32 Marine fishes	37*	Miscellaneous pelagic fishes		Fresh		Preparations nei; Frozen
	38*	Sharks, rays, chimeras		Fresh; Non-classified		Frozen
	39*	Marine fishes not identified		Non-classified	Meals	Fresh
33 Crustaceans	43*	Lobsters, spiny-rock lobsters		Non-classified; Frozen		Preparations, nei; Non-classified
	45*	Shrimps, prawns		Non-classified; Frozen		Preparations, nei
	101*	Crabs, nei		Non-classified; Frozen		Preparations, nei
	102*	Shrimps and prawns, nei		Non-classified; Frozen		
	103*	Crustaceans, nei		Frozen		Preparations, nei; Non-classified
34 Molluscs	52*	Abalones, winkles, conchs		Fresh; Frozen, dried, or cured, nei		Preparations, nei
	53*	Oysters		Fresh; Frozen, dried, or cured, nei		Preparations, nei
	54*	Mussels		Fresh; Frozen, dried, or cured, nei		Preparations, nei
	55*	Scallops, pectens		Fresh; Frozen, dried, or cured, nei		Preparations, nei
	56*	Clams, cockles, arkshells		Fresh; Frozen, dried, or cured, nei		Preparations, nei
	57*	Squids, cuttlefishes, octopuses		Fresh; Frozen, dried, or cured, nei		Preparations, nei
	104*	Molluscs, nei		Fresh; Frozen, dried, or cured, nei		Preparations, nei
35 Aquatic animals, nei	76*	Sea-urchins and other echinoderms		Fresh; Frozen, dried, or cured, nei		Preparations, nei
	77*	Miscellaneous aquatic invertebrates		Non-classified		Preparations, nei
	107*	Miscellaneous aquatic products, food				Preparations, nei
36 Aquatic plants	105*	Seaweeds, food, nei	Non-classified			
38 Fishes, nei	109*	Fish and fish products, nei		Fresh; Dried; Cured		Fresh; Preparations, nei; Non-classified; Frozen; Frozen, dried, or cured, nei
4 Processed food						
41 Sugar	2541	Sugar non-centrifugal			Sugar non-centrifugal	
	2542	Sugar			Sugar Raw Centrifugal; Sugar refined	Sugar refined; Sugar confectionery
	2543	Sweeteners, other	Sugar crops, nes		Fructose chemically pure; Molasses; Fructose and syrup, other; Sugar, nes; Glucose and dextrose; Lactose	Maple sugar and syrups; Beverages, nonalcoholic
	2745	Honey		Honey, natural		
42 Fat and oils	2571	Soya bean oil			Oil, soybean	Oil, soybean
	2572	Groundnut oil			Oil, groundnut	Oil, groundnut
	2573	Sunflower seed oil			Oil, sunflower	Oil, sunflower
	2574	Rape and mustard oil			Oil, rapeseed	Oil, rapeseed
	2575	Cottonseed oil			Oil, cottonseed	
	2576	Palm kernel oil			Oil, palm kernel	
	2577	Palm oil			Oil, palm	
	2578	Coconut oil			Oil, coconut (copra)	
	2579	Sesame seed oil			Oil, sesame	
	2580	Olive oil			Oil, olive residues	Oil, olive, virgin
	2582	Maize germ oil			Oil, maize	Oil, maize

IC1 and IC2		FBS groups (FAOSTAT)/ ISSCAAP divisions	Primary products		Processed products	
			For industry (BEC 111)	For household use (BEC 112)	For industry (BEC121)	For household use (BEC 122)
4 Processed food						
42 Fat and oils	2586	Oil crops oil, other			Cocoa, butter	Oil, vegetable origin, nes; Margarine, liquid; Margarine, short
	2737	Fats, animals, raw			Fat, pigs; Fat, nes, prepared	
	2740	Butter, ghee				Butter, cow milk; Ghee, butteroil of cow milk
	111*	Fish, body oil			Oils	
	112*	Fats, marine mammals			Oils	
43 Food, nei	2680	Infant food				Infant food
	2928	Miscellaneous			Food Preparations, nes	Food Preparations, nes
44 Alcoholic beverages	2655	Wine				Wine; Vermouths and similar
	2656	Beer				Beer of barley
	2657	Beverages, fermented				Beverages, fermented rice
	2658	Beverages, alcoholic				Beverages, distilled alcoholic

BEC = Broad Economic Categories, United Nations Statistics Division (UNSD); FBS = Food Balance Sheet (FAOSTAT); FCL = FAOSTAT Commodity List; IC1 = item category level 1; IC2 = item category level 2; ISSCAAP = International Standard Statistical Classification of Aquatic Animals and Plants; nei = not elsewhere included; nes = not elsewhere specified.

Notes: The four-digit codes in this table represent FBS commodity groupings. With regard to aquatic products, the two-digit codes represent ISSCAAP divisions and the three-digit codes represent newly created categories (see Table A2.5).

Sources: Tables A2.3, A2.4, and A2.5.

Appendix 3

Methodology

3.1. Estimation of the Populations by Per Capita GDP

The population of each country by per capita gross domestic product (GDP) was estimated based on the total population and mean of per capita GDP. We assumed the log-normal distribution for each population distribution by per capita GDP. The probability density function of per capita GDP *x* is given from

$$f(x) = \frac{1}{\sqrt{2\pi}\sigma x} \exp\left[-\frac{(\log x - \mu)^2}{2\sigma^2}\right], \quad x > 0 \quad \text{..... (1)}$$

Parameters μ and σ are estimated from

$$\mu = \log E(x) - \frac{\sigma^2}{2},$$

$$\sigma = \sqrt{\log\left[\left(\frac{V(x)}{E(x)}\right)^2 + 1\right]}.$$

where *E(x)* and *V(x)* denote mean and variance of per capita GDP *x*, respectively. *E(x)* is an exogenous variable. *V(x)* is estimated to match the Gini coefficient, and that was calculated by the following equation (2):

$$\text{Gini} = 1 - 2\int_0^1 L(F)\,dF \approx 1 - 2\sum_{k=1}^{n} \frac{L(a_{k-1}) + L(a_k)}{2n} \quad \text{..... (2)}$$

The Gini coefficient is estimated as the area under Lorenz curve *L(F)* by the trapezoidal rule. The distance from a_{k-1} to a_k is a small share of the population, dividing the total population from 0 to 1 by n, and $0 = a_0 < a_1 < \ldots < a_n = 1$. *n* is 5,000 in this report. $L(a_k)$ denotes the cumulative value of x_k divided by $\sum x_k$, where x_k is estimated by the inverse cumulative distribution function of lognormal distribution shown as equation (1). The size of each population under specific ranges of *x* was estimated based on the share of the population multiplied by the total population.

We estimated each country's population by per capita GDP in 2018 and 2022. The mean of per capita GDP in 2022 in terms of the local currency units (LCUs) was deflated to the 2018 levels by the GDP deflator. Both sets of data were collected from the World Economic Outlook (WEO) database, October 2018, of the International Monetary Fund (IMF). The data for each total population was collected from the United Nations Department of Economic and Social Affairs (UN DESA). The Gini coefficient in 2018 and 2023 was estimated by the extrapolation of power approximation of the data from the

Standardized World Income Inequality Database (SWIID), Version 7.1 (Solt, 2018). Table A3.1 shows the approximate periods and Gini coefficients used in this report.

Table A3.1. Gini Coefficient Used for the Estimation of the Populations by Per Capita GDP

Item	Malaysia	Thailand	Indonesia	Philippines	Viet Nam	Lao PDR	Cambodia	Myanmar
Gini coefficient, 2018	41.3	39.2	39.6	41.5	38.1	35.8	33.8	34.4
Gini coefficient, 2023	40.7	37.9	41.1	41.3	38.4	36.3	33.0	35.1
Approximated period	2005–2016	2005–2013	2005–2017	2005–2015	2005–2016	2005–2013	2005–2012	2010–2015

GDP = gross domestic product.
Source: Estimated based on Solt (2018).

3.2. Input–Output Analysis Based on Eora26

Annual Changes in Values

In this section, 'change' in tables denotes the annual average change from 2000 to 2015 estimated via the fitting of the linear trend by using Eora26 data from 2000, 2005, 2010, and 2015. Data is converted from US dollars to LCUs and deflated by the GDP deflator to the 2015 real value in each country. The exchange rates and GDP deflator were obtained from the IMF's WEO (IMF 2018).

Breakdown of Final Demand

The final demand observed in the Eora26 database consists of several items, which are listed in Table A3.2. The preliminary estimation of the production inducement coefficients suggested that strong assumptions had been imposed on the estimations of individual final consumption of some items in Eora26. Thus, in this paper, we aggregated detailed items into the following three categories: household final consumption (a), other consumption (b+c), and capital formation (d+e+f).

Table A3.2. Classifications of Domestic Final Consumption in Eora26

Final consumption expenditure	
a. Household final consumption	9.39 Consumption of goods and services is the act of completely using up the goods and services in a process of production or for the direct satisfaction of human needs or wants. The activity of consumption consists of the use of goods and services for the satisfaction of individual or collective human needs or wants.
b. Non-profit institutions serving households	
c. Government final consumption	
Capital formation	
d. Gross fixed capital formation	10.64 Gross fixed capital formation in a particular category of fixed asset consists of the value of producers' acquisitions of new and existing products of this type less the value of their disposals of fixed assets of the same type.
e. Changes in inventories	10.118 Changes in inventories are measured by the value of the entries into inventories less the value of withdrawals and less the value of any recurrent losses of goods held in inventories during the accounting period.
f. Acquisitions less disposals of valuables	9.36 Acquisitions of goods and services by institutional units occur when they become the new owners of the goods or when the delivery of services to them is completed.

Note: See European Commission et al. (2009) for a description of each item.

The Effects of an Increase in Final Demand on Production and Value Added

A one-unit increase in final demand in a certain sector will increase production in this sector by one unit (direct effect). At the same time, intermediate inputs from various sectors, including the original sector, will increase production in that sector (indirect effect). The indirect effect can be broken down into the initial effect, expressed by the share of intermediate input in production or input coefficients (primary effect), and the further demand for intermediate inputs (secondary and subsequent effects). The sum of the direct and indirect effects is expressed as a value in the Leontief inverse matrix (total effect).

The Leontief inverse matrix $L = (I - A)^{-1}$ can be derived from the input–output table $Ax + f = x$ as a component of the column vector of production value x as follows:

$$x = (I - A)^{-1} f$$

where *I* denotes the identity matrix, *A* denotes the input coefficient matrix, and f denotes the column vector of final demand. The power of the dispersion index (Rasmussen, 1956), often defined as a backward linkage index, is expressed as the sum on each column in *L*. The backward linkage index becomes large in sectors that need a large value in intermediate inputs.

The effect of the change in final demand on value added (VA) in each sector is estimated from the total effect multiplied by the VA rate. The effect on the VA becomes large when the indirect effect or VA rate is large.

3.3. Analysis of Employees Based on ILOSTAT and Eora26

Estimation of the Number of Employees and Per Capita Employee Compensation

We estimated the number of employees in sectors corresponding to selected sectors as defined by Eora26; and we collected the numbers of employees classified by levels 1, 2, and 3 of the International Standard Industrial Classification of All Economic Activities (ISIC), revisions 3 and 4, using a dataset for employment by sex and economic activity from the International Labour Organization (ILO) and the United Nations Statistics Division (UNSD).[56] Table A3.7 shows the correspondence between the sectors as defined by Eora26 and number of employees as classified by ISIC. The sectors of economic activity almost match those of employment.

Time series data on the numbers of employees in the Lao People's Democratic Republic (Lao PDR), Cambodia, and Myanmar could not be obtained. Thus, we used the estimated numbers of employees based on data of the ILO model for several aggregated sectors in those three countries.[57] First, we

[56] For the ILO, the data came from 'Employment by sex and economic activity – ILO modelled estimates, May 2018', under 'ILO modelled estimates' (ILO, 2019). For the UNSD, the data came from 'UN data, Total employment, by economic activity', under 'Labour market' (UNSD, 2019). Note that the data source of the UNSD is the ILO.

[57] The data came from 'Employment by sex and economic activity – ILO modelled estimates, May 2018', under 'ILO modelled estimates' (ILO, 2019).

used as reference values the data from the ILO or UNSD for the base years in Lao PDR, Cambodia, and Myanmar: 2010, 2012, and 2015, respectively. Next, we gauged the average annual change rates of employees based on estimates by the ILO model. Finally, we estimated the numbers of employees based on the reference values and estimated average annual change rates. Table A3.4 shows the aggregated categories and periods of the estimates.

To estimate the data for per capita compensation, we divided the total compensation figures obtained from Eora26 by the number of employees in each sector. Total and per capita compensation were converted from US dollars to LCUs by using the exchange rates in each year and deflating the results through the GDP deflator to 2015 levels. The exchange rates and GDP deflator were estimated or obtained from the IMF.

Table A3.3. Correspondence between Eora26 and ISIC on Employee Data

Eora26	ISIC employee data in 2000–2009	ISIC employee data in 2010–2016
Agriculture	Rev. 3, 01	Rev. 4, A – Fishing
Fishing	Rev. 4, 03 or Rev. 3, B or Rev. 3, 05	Rev. 4, 03 or Rev.3, B or Rev.3, 05
Food & Beverages	—	Rev. 4, 10 + Rev.4, 11
Wholesale Trade	—	Rev. 4, 46 or Rev.3, 51
Retail Trade	—	Rev. 4, 47
Hotels & Restaurants	Rev. 4, I or Rev.3, H	Rev. 4, I or Rev. 3, H
Total	Rev. 3	Rev. 4

— = not applicable, ISIC = International Standard Industrial Classification of All Economic Activities, Rev. = Revision.
Sources: Eora (2018); ILO (2019); UNSD (2019).

Table A3.4. Correspondence between Sectors and Periods for the Estimation of Numbers of Employees in Lao PDR, Cambodia, and Myanmar

New category	Agriculture & fishing		Wholesale & retail		Hotels & restaurants		All sectors	
Eora26 ILO model	Agriculture + Fishing ISIC Rev. 4, A		Wholesale Trade + Retail Trade ISIC Rev. 4, G		Hotels & Restaurants ISIC Rev. 4, I		Total Total	
States	Change rate	Employees	Change rate	Employees	Change rate	Employees	Change rate	Employees
Lao PDR	2013–2016	2010–2016	2010–2016	2010–2016	2010–2016	2010–2016	2000–2016	2000–2016
Cambodia	2012–2016	2012–2016	2012–2016	2012–2016	2012–2016	2012–2016	2000–2016	2000–2016
Myanmar	2001–2016	2000–2016	2000–2016	2000–2016	2000–2016	2000–2016	2000–2016	2000–2016

ILO = International Labour Organization, ISIC = International Standard Industrial Classification of all Economic Activities, Lao PDR = Lao People's Democratic Republic, Rev. = Revision.
Note: 'Change rate' denotes an estimation of the average annual change rate based on a specific period and on data from the ILO model. 'Employees' denotes an estimation of the number of employees based on a specific period and the average annual change rate.
Source: Eora (2018); ILO (2019); UNSD (2019).

Analysis of the Interaction amongst Final Demand, the Number of Employees, and Production

In general, the effects of final demand on the number of employees can be measured by input–output analysis under the assumption that the employee coefficient, or the number of employees needed for unit production in each sector, is fixed. However, in reality, the number of employees does not necessarily increase in line with increases in production. This assumption is particularly inappropriate for the agricultural sector, where increases in production are often accompanied by decreases in the number of employees.

Instead of the method described just above for analysing the effects of final demand on the number of employees, which is quite popular, this report focused on breaking down the change in production into its components: change in the total compensation of employees, the number of employees, and per capita compensation.[58] First, the average annual rate of change in production and total employee compensation,[59] and the contribution of employee compensation to production value, were estimated by using Eora26 data for 2000, 2005, 2010, and 2015. The contribution of changes in employee compensation to production is estimated from

$$C = R \times S/100 \quad .$$

where *C* denotes the contribution of compensation (%), *R* denotes the average annual rate of change in compensation (%), and *S* denotes the contribution of compensation to production (%).

Next, we estimated the average annual change rates in the number of employees and per capita compensation. The periods and the numbers of observations undertaken for the estimation are listed in Table A3.5. The product of the number of employees times per capita compensation is the total employee compensation. Thus, changes in the number of employees and/or in per capita compensation are interpreted as contributions to total employee compensation.

Table A3.5. Data Used to Estimate Changes in the Number of Employees and in Per Capita Compensation

State	Item	Agriculture & fishing	(Agriculture)	(Fishing)	Food & beverages	Wholesale & retail	Hotels & restaurants	All sectors
Malaysia	Period	2006–2016	2001–2016	2001–2016	2010–2016	2010–2016	2001–2016	2000–2016
	Obs.	10	15	15	7	7	15	16
Thailand	Period	2006–2016	2002–2016	2002–2016	2011–2016	2011–2016	2002–2016	2000–2016
	Obs.	9	13	13	6	6	13	15
Indonesia	Period	2006–2015	2000–2015	2000–2016	2012–2016	2012–2016	2012–2015	2000–2015
	Obs.	7	13	14	5	5	4	13
Philippines	Period	2012–2016	2012–2016	2012–2016	2012–2016	2012–2016	2012–2016	2000–2016
	Obs.	4	4	4	4	4	4	15
Viet Nam	Period	2010–2016	2010–2016	2009–2016	2010–2016	2010–2016	2009–2016	2000–2016
	Obs.	7	7	8	7	7	8	12
Lao PDR	Period	2010–2016	2010	–	–	2010–2016	2010–2016	2000–2016
	Obs.	7	1	0	0	7	7	17
Cambodia	Period	2012–2016	2004, 2012	2004, 2012	2012	2012–2016	2012–2016	2000–2016
	Obs.	5	2	2	1	5	5	17
Myanmar	Period	2006–2016	2000, 2015	2015	2015	2006–2016	2000–2016	2000–2016
	Obs.	11	2	1	1	11	17	17

– = data not available.
Obs. = number of observations.
Sources: Eora (2018); ILO (2019); UNSD (2019).

[58] All data (nominal prices in US dollars) was converted into LCUs according to the exchange rates, and then deflated by the GDP deflator for each country to the 2015 level real prices. The source for the exchange rates and GDP deflators was the IMF.

[59] The annual change rates of production, total compensation, number of employees, and per capita compensation were estimated by using a semi-log model of time trends.

3.4. Estimation of Supply–Demand Balance Based on the Food Balance Sheet (FAOSTAT)

The supply and demand balance of agri-food products was described based on the 'items' of the Food Balance Sheet (FBS), from FAOSTAT. The total supply quantity of each product is expressed as

$$SPL_{ttls} = PRD + IMP \ ,$$

$$SPL_{ttld} = DMD_{dms} + EXP$$

where SPL_{ttls} denotes total supply (supply side), PRD denotes production, IMP denotes import, SPL_{ttld} denotes total supply (demand side), DMD_{dms} denotes domestic demand, and EXP denotes export. SPL_{ttls} does not match SPL_{ttld} , as SPL_{ttls} does not include stock variation. In this report, the values of SPL_{ttld} are used to represent total supply.

Two indicators, PRD/SPL_{ttls} and DMD_{dms}/SPL_{ttld}, or how domestic production and demand contribute to total supply, are the focus. Shares of production and domestic demand in total supply are represented as

$$PRD/SPL_{ttls} = 1 - IMP/SPL_{ttls} \ ,$$

$$DMD_{dms}/SPL_{ttld} = 1 - EXP/SPL_{ttld} \ .$$

Items under the FBS were classified using 50% of PRD/SPL_{ttls} and DMD_{dms}/SPL_{ttld} as thresholds (Figure A3.1).

Figure A3.1. Categories of FBS Items and Their Interpretation

	$\boldsymbol{PRD/SPL_{ttls} < 50\%}$	$\boldsymbol{PRD/SPL_{ttls} \geq 50\%}$
$\boldsymbol{DMD_{dms}/SPL_{ttld} \geq 50\%}$	2nd quadrant (Import-oriented)	1st quadrant (Domestic-oriented)
$\boldsymbol{DMD_{dms}/SPL_{ttld} < 50\%}$	3rd quadrant (Trade-oriented)	4th quadrant (Export-oriented)

Source: Author.

3.5. Estimation of Ad Valorem (AV) Equivalents of Tariff Rates

The AV-equivalent tariff rates were used for the estimation of non-price competitiveness (Appendix 3.6). We estimated the average values for 2014–2016 of the AV equivalents of tariff rates for the six-digit level agri-food products under the Harmonized Commodity Description and Coding Systems, or 'Harmonized System' (HS), classified according to the United Nations Broad Economic Categories (BEC) 1, the category of 'Food & beverages'.[60] The numbers of target items are listed in Table A3.6. The values of the AV equivalents of non-AV duties were estimated by dividing non-AV duties by the import

[60] Tariff rates of the ASEAN Trade in Goods Agreement (ATIGA) and the Association of Southeast Asian Nations (ASEAN) + 1 agreements are imposed on more specific items than are listed in HS six-digit level categories. We used the highest tariff rates on the specific products that fall into each HS six-digit level item as the representative value.

values. We used the tariff rates under the Association of Southeast Asian Nations (ASEAN) Trade in Goods Agreement (ATIGA); and under the ASEAN + 1 regional agreements, including the ASEAN–China Free Trade Area (ACFTA), ASEAN–Korea Free Trade Area (AKFTA), ASEAN–Japan Comprehensive Economic Partnership (AJCEP), ASEAN–India Free Trade Area (AIFTA), ASEAN–Australia–New Zealand Free Trade Agreement (AANZFTA), and the Japan–Indonesia Economic Partnership Agreement (JIEPA), that were applied to the particular trade partners.[61]

Table A3.6. Numbers of HS Six-digit Items

	IC1 groups				
HS	1. Vegetable products	2. Livestock products	3. Aquatic products	4. Processed food, nei	Total
HS 2012	319	105	217	84	725
HS 2002 (PHL)	272	94	108	82	556

HS = Harmonized Commodity Description and Coding Systems, or 'Harmonized System'; IC1 = item category level 1, nei = not elsewhere included, PHL = Philippines.
Notes: The data for the Philippines is from 2002, and the data for the other ASEAN countries is from 2012.
Source: UNSD (2017).

The tariff rates under the ATIGA and ASEAN+1 agreements were collected from various sources, which are listed in Table A3.7.[62] Malaysia and Singapore impose non-AV tariffs on the alcohol content of several alcoholic beverages. Therefore, the alcohol content of those alcoholic beverages was assumed (Table A3.8).

Table A3.7. Sources of Tariff Schedules, ATIGA and ASEAN + 1 Regional Agreements

Agreements		Sources	Websites
AANZFTA	ASEAN–Australia–New Zealand FTA	New Zealand, Foreign Affairs & Trade, Tariff Schedules (HS 2012)	https://tariff-finder.fta.govt.nz/tariff-schedules/
ACFTA	ASEAN–China FTA	ASEAN	http://asean.org/?static_post=asean-china-free-trade-area-2
AIFTA	ASEAN–India FTA	ASEAN	http://asean.org/?static_post=asean-india-free-trade-area-3
AJCEP	ASEAN–Japan CEP	ASEAN	http://asean.org/?static_post=asean-japan-free-trade-area-2
AKFTA	ASEAN–Korea FTA	CMSMS and AKFTA, Tariff Finder Korea Customs Service ASEAN, ASEAN Tariff Finder	http://akfta.asean.org/ https://www.customs.go.kr/kcshome/site/index.do?layoutSiteId=english http://tariff-finder.asean.org/index.php?page=search2
ATIGA	ASEAN FTA	ASEAN, Annex 2 (Tariff Schedules)	http://asean.org/?static_post=annex-2-tariff-schedules
JIEPA	Japan–Indonesia EPA	Japan–Indonesia Economic Partnership Agreement [in Japanese]	http://www.meti.go.jp/policy/trade_policy/epa/epa/id/ [in Japanese]

ASEAN = Association of Southeast Asian Nations, ATIGA = ASEAN Trade in Goods Agreement, CEP =

[61] We used the tariff rates under the JIEPAfor trade between Indonesia and Japan, instead of the AJCEP, which did not enter into force until 2018.
[62] There are many blanks in the source of AKFTA. Blanks can be interpreted as tariff-free, omission of recording, or ignorable blanks. Blanks were ignored or filled in by referring to data from CMS Made Simple (CMSMS) and AKFTA, Korea Customs Service, and ASEAN Tariff Finder. Tariff rates of the ACFTA in Viet Nam in 2014 were assumed to have the same values as in 2015.

Comprehensive Economic Partnership, CMSMS = CMS Made Simple, EPA: Economic Partnership Agreement, FTA = free trade agreement.
Sources: See the middle column in this table.

Table A3.8. The Assumed Levels of Alcohol Content for the Estimation of Tariff Rates

HS 2007		Alcohol content (%)	HS 2007		Alcohol content (%)
220300	Beer made from malt	5	**220710**	Undenatured ethyl alcohol (>= 80% vol.)	80
20600	Cider, perry, mead and other fermented beverages	7	**220870**	Liqueurs and cordials	20
			220890	Ethyl alcohol (< 80% vol.)	40

HS = Harmonized Commodity Description and Coding Systems, or 'Harmonized System'.
Source: Author.

3.6. An Analysis Based on the Trade Matrix of UN Comtrade

Trade Quantities and Prices

In this report, we estimated the trade prices based on the export or import values divided by quantities. We collected the data on trade values and quantities from UN Comtrade.[63] The raw data on HS six-digit level items, including only those items classified under BEC 1 (Food & Beverages) were aggregated into the groups of the FAOSTAT Commodity List (FCL) and the adjusted groups from the International Standard Statistical Classification of Aquatic Animals and Plants (ISSCAAP). The data was further aggregated into item category level 2 (IC2) groups, which reflect the BEC 11 (primary products) and 12 (processed products) classifications.

Prices often become extremely high when the trade quantity is limited. For this reason, the prices of whole items in the IC2 groups appear very high. Thus, items in the FCL and adjusted ISSCAAP groups whose quantities were smaller than 10 tonnes were excluded from the price estimates of the IC2 groups.

Estimation of Non-price Competitiveness in the ASEAN Region

We assumed that the non-price competitiveness of a product exported to an ASEAN country is high when the import quantity of the product is larger than the estimated value based on an approximate line. Conversely, non-price competitiveness is low when the import quantity is smaller than the approximated value. Approximate lines for each item exported from any of the ASEAN+6 countries are determined by the power approximation of the relationship between import quantities and prices in each ASEAN country.

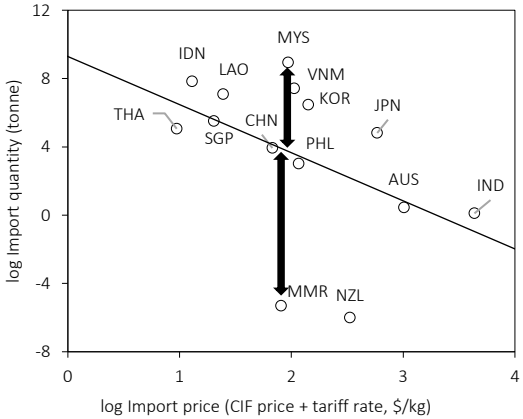
Figure A3.2 shows, as an example, the non-price competitiveness of the coffee extracts imported by Thailand in 2014–2016. The relationship between import prices and quantities exported by ASEAN+6 countries are approximated by the downward-sloping line of a power function (Figure A3.2 A). The coffee extracts imported by each country were classified by price, with the highest and lowest values evenly divided into three categories: low price, mid price, and high price (Figure A3.2 B).

[63] The values of imports are based on cost insurance and freight (CIF), while exports are based on free on board (FOB).

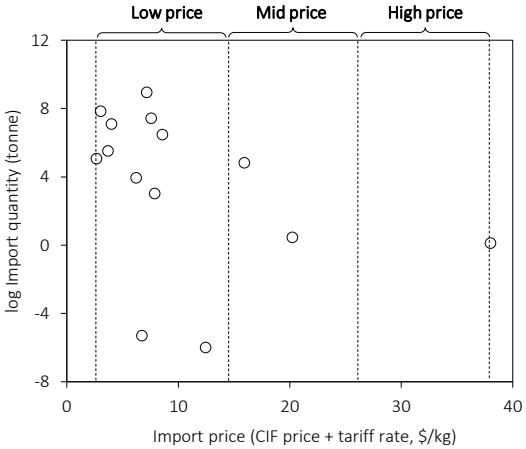
The import quantities of coffee extracts from Malaysia were remarkably higher than the approximate line, while those from Myanmar were remarkably lower. We may be able to conclude that the deviations reflect the value of imports other than price. Such value may include the product's quality, recognition, convenience, marketing methods, preferential treatment in trade, and other characteristics and methods differentiating the product.

Figure A3.2. An Example of Non-price Competitiveness: Imports of Coffee Extracts by Thailand, 2014–2016

A. Upward/downward Deviation from the Approximate Line



B. Equally Divided Price Ranges



AUS = Australia, CHN = China, CIF = cost, insurance, and freight (included in the import prices), IDN = Indonesia, IND = India, JPN = Japan, kg = kilograms, KOR = Republic of Korea, LAO = Lao People's Democratic Republic, MMR = Myanmar, MYS = Malaysia, NZL = New Zealand, PHL = Philippines, SGP = Singapore, THA = Thailand, VNM = Viet Nam.

Notes: The values indicated in these graphs represent the averages for 2014–2016. 'Coffee extracts' is a classification in the FAOSTAT Commodity List, and is classified under United Nations (UN) Broad Economic Categories (BEC) 122.

Source: Estimates based on data from UNSD (2017) and tariff rates in Table A3.7.

Whether the deviation is significantly large is evaluated by externally studentised residuals. The externally studentised residual is estimated from the following double-log model:

$$\log Q_{i,k} = \alpha + \beta \log P_{i,k} + u$$

where Q denotes import quantity, P denotes import price, which is the sum of the CIF (with cost, insurance, and freight) price and tariff rates, α and β denote parameters. The errors u are assumed to be $N(0, \sigma^2)$, and independently and identically distributed. Subscripts i and k denote the items and exporting country, respectively. The probability of each externally studentised residual is estimated by a t-test.

For the estimation of the non-price competitiveness, the import quantities and values of HS six-digit level categories were aggregated under detailed items, specifically, in FCL groups for vegetable and livestock products and processed food, nei, and in adjusted ISSCAAP groups for aquatic products

classified under BEC 111, 112, 121, and 122. The import prices in this analysis are the sum of the CIF prices and tariff rates under the ATIGA or ASEAN + 1 regional agreements (Appendix 3.5). In reality, exporters may apply the bilateral agreements, rather than ATIGA and ASEAN + 1 agreements, or they may not apply the agreed tariff rates. Thus, the estimation in this analysis is a value in the hypothetical situation that ASEAN+6 countries minimise export prices by using ATIGA for intra-ASEAN trade and ASEAN + 1 agreements for the trade between the ASEAN and +6 countries.

The items analysed in this report were the major export goods of the ASEAN+6 countries competing in the ASEAN market. The following products were excluded from the analysis: items exported by fewer than 4 out of a total of 16 countries, and items for which the import quantity increases in line with increases in the import price. The proportion of observations for which non-price competitiveness could be estimated for each exporter was around 70% of the total number of observations (Table A3.9).

Table A3.9. The Numbers of Observations for Which Non-Price Competitiveness Could Be Estimated

Exporter	MYS	THA	IDN	PHL	VNM	LAO	KHM	MMR	Total
Obs.	1,607	2,014	1,249	679	1,236	109	184	487	7,565
Obs. for estimation	1,103	1,244	939	518	903	81	133	395	5,316
Share of Obs. (%)	69	62	75	76	73	74	72	81	70

IDN = Indonesia, KHM = Cambodia, LAO = Lao People's Democratic Republic, MMR = Myanmar, MYS = Malaysia, PHL = Philippines, THA = Thailand, VNM = Viet Nam.

Notes: 'Obs.' denotes the total number of observations of detailed commodities classified under BEC three-digit categories for each importing country. 'Obs. for estimation' denotes the number of observations used to estimate non-price competitiveness.

Sources: Estimates based on data from UNSD (2017) and tariff rates in Table A3.7.

3.7. Estimation of Productivity and Comparative Advantage Based on FAOSTAT Data

For each FCL item, we estimated the land/feed productivity, ratio of the yield, Spearman's rank correlation coefficient, and the land area used by producing animals, to estimate productive and comparative advantage. The data is from FAOSTAT, GLEAM-i, and the calculated values noted below.

Estimation of Land and Feed Productivity

This report compares the productivity of FCL items with the land productivity of vegetable products and feed productivity of livestock products within each IC1 and IC2 group. Both land and feed productivity were estimated from production values divided by input quantities (harvested areas and a proxy variable for feed inputs).

The comparison of productivity in terms of production value within each IC1 group can be read as the comparison of profitability of all input costs with the harvested areas or feed inputs. Such an interpretation could apply to the comparison of items within the same IC2 groups for which the production structures may be similar. By contrast, if the production structures are considered very different, any comparisons of productivity in terms of production value cannot serve as comparisons in terms of profitability.

The production values of vegetable and livestock products were estimated based on producer prices multiplied by production quantities obtained from FAOSTAT. The data regarding harvested areas also came from FAOSTAT. The proxy variable of feed inputs was estimated based on the number of producing animals, including slaughtered animals, and on the energy requirements per animal estimated from FAOSTAT data and from the Global Livestock Environmental Assessment Model-interactive (GLEAM-i), Version 2.0, Revision 5, which was developed by the Food and Agriculture Organization of the United Nations (FAO) (2017a, 2017b).

Estimation of Comparative Advantage in Terms of the Ratio of the Yield or Physical Productivity

Comparative advantage in terms of physical productivity can be estimated based on the ratio of the yield, or production quantity per unit area or feed input, in a particular ASEAN country and other ASEAN countries, assuming the Ricardian model.[64]

The comparative advantage of product *i* can be compared with other products based on the rate of input coefficients expressed as a_i/a_i', where a_i and a_i' denote input coefficients in a particular country and other ASEAN countries, respectively. In this report, harvested areas and the proxy variable of feed are assumed to be representative input goods. Thus, a_i is estimated from the harvested area, or from the proxy variable of feed, divided by production quantity.

The reciprocal of the ratio of the input coefficient a_i'/a_i equals the ratio of the yield, Y_i/Y_i'. Here, product *i* can be interpreted as indicating a relatively higher productivity than other ASEAN countries in producing *j* when $Y_i/Y_i' > Y_j/Y_j'$. Y_j' is estimated from the sum of production divided by the sum of the harvested area or the proxy of feed input in other ASEAN countries.

Interpretation Codes A and B for the Classification of Items

Codes for interpretation were prepared to provide an understanding of the combinations of land or feed productivity and comparative advantage in terms of yield (Table A3.10). In this report, there were two criteria dividing items into high or low productivity and comparative advantage. Criteria A represented the median values of productivity and comparative advantage for the categories of vegetable products and livestock products at the IC1 level. Criteria B represents the median values for products listed at the IC2 level.

[64] Although the revealed comparative advantage (RCA) index is often used to measure comparative advantage, it is not appropriate for measuring the comparative advantage of products mainly destined for domestic markets.

Table A3.10. Combinations of Levels of Productivity and Comparative Advantage in Terms of Yield

			The ratio of the yield or physical productivity	
			High	**Low**
			Higher production quantity per unit area than in other ASEAN countries. The high competitiveness can surface with trade liberalisation in the region.	Lower production quantity per unit area than in other ASEAN countries. The low competitiveness can surface with trade liberalisation in the region.
Land or feed productivity	**High**	Higher production value per unit area/feed than for other domestic products.	**i.** Active exporting can be promoted due to the high profitability and competitiveness in terms of physical productivity, especially with regional integration.	**ii.** Higher yield or differentiation of products would be needed when the low competitiveness surfaces with regional integration.
	Low	Lower production value per unit land/feed than for other domestic products.	**iii.** Active development of export markets within and outside the ASEAN region could increase land/feed productivity and producers' incomes.	**iv.** The possibility of improving productivity and competitiveness, and the appropriateness of current resource allocation, should be investigated.

Source: Author.

The Proxy Variable of Feed Input to Produce Livestock Products

The proxy variable of feed input is used to estimate feed productivity in terms of production value, and comparative advantage in terms of yield.[65] The productivity of different livestock products in different countries can be compared by dividing the production data by this proxy variable. However, this method was not appropriate for gauging changes in productivity over time, as the input structure of feed and feeding efficiency can change greatly over the long term.

To estimate feed productivity, we used the digestible energy (DE) and metabolised energy (ME) needed for all producing animals, expressed by a unit of pig feed requirements (PU) as the proxy variable for feed input under the assumption that the input costs of feed are proportional to the DE.[66] The numbers of producing animals, including slaughtered animals, were collected from FAOSTAT. The DE per producing animal in 2010 was estimated from GLEAM-i, Version 2.0, Revision 5 (FAO, 2017b).[67] The conversion rates from the DE for producing animal to PUs were estimated by dividing the DE for each producing animal in each country by the DE needed to feed one pig in the ASEAN region for a year (Table A3.10).[68] The number of producing animals in terms of PUs as the proxy variable for feed inputs was obtained from the number of producing animals divided by the conversion rate.

To estimate the conversion rate, we made several assumptions. The DE or ME of meat-producing animals was estimated based on the total number of animals, as all livestock animals, including milk-producing animals and egg-producing birds, were assumed to have been eventually slaughtered to produce meat. The milk-producing animals were classified as 'adult females' to match the corresponding animals in GLEAM-i. Similarly, egg-producing hens were analysed as the sum of 'layers',

[65] There are various studies applying such conversion from livestock to feed, amongst them Haberl et al. (2007) and Cassidy et al. (2013).

[66] This refers specifically to the DE for cattle, buffalo, sheep, goats, and pigs; and to the ME for chickens.

[67] The DE and ME required for each producing animal were estimated based on the quantity of feed for each animal and the DE and ME of the feed. The values were obtained from GLEAM-i (FAO, 2017b) and applied as default values for exogenous variables in each country.

[68] The average for pigs was 1,089 MJ/head/year (MJ = mega joule).

and 'adult reproductive females' of chickens were classified under the 'backyard' production systems, as under GLEAM-i. The conversion rate of horses was calculated at 22.7 by referring to the data on the daily feed intake of horses in Haberl et al. (2007).[69] We omitted the amount of feed required to produce 'meat, nes', which is observed in FAOSTAT. The conversion rates for producing the meat of ducks, geese and guinea fowls, turkeys, and bird, nes, were assumed to be the same as for chickens. Likewise, the conversion rates for 'eggs, other bird, in the shell' were assumed to be the same as for 'eggs, hen, in the shell'.

Table A3.11. Feed Requirements by Each Animal Expressed by Pig-Feeding Units, 2010

(PU/head)

Products	Animals	SGP*	BRN	MYS	THA	IDN	PHL	VNM	LAO	KHM	MMR	Mean
Meat	Cattle	19.10	–	17.40	19.48	20.63	19.18	19.52	19.71	19.36	17.51	19.10
	Buffalo	–	–	19.71	19.43	20.92	19.59	19.69	20.71	20.56	21.10	20.21
	Pig	1.16	–	1.12	1.05	0.87	1.04	1.43	0.80	0.82	0.71	**1.00**
	Sheep	–	–	2.14	2.13	2.27	2.12	2.16	2.46	1.83	2.14	2.16
	Goat	2.40	–	3.12	1.46	2.91	2.29	2.52	2.37	–	2.13	2.40
	Chicken, etc.	0.09	0.14	0.14	0.23	0.20	0.30	0.36	0.30	0.30	0.29	0.24
	Horse	22.70	22.70	22.70	22.70	22.70	22.70	22.70	22.70	22.70	22.70	22.70
Milk, whole fresh	Cow	–	–	14.47	17.66	23.15	16.04	16.73	16.02	13.47	14.18	16.46
	Buffalo	–	–	–	–	–	–	23.61	–	–	23.16	23.38
	Sheep	–	–	–	–	2.29	–	–	–	–	2.17	2.23
	Goat	–	–	–	–	3.22	–	–	–	–	2.36	2.79
Eggs, in shell	Hen, etc.	0.31	0.49	0.56	0.58	0.49	0.42	0.44	0.40	0.40	0.37	0.45

– = data not available.

BRN = Brunei, IDN = Indonesia, KHM = Cambodia, LAO = Lao People's Democratic Republic, MMR = Myanmar, MYS = Malaysia, PHL = Philippines, PU = a unit of pig feed requirements, SGP = Singapore, THA = Thailand, VNM = Viet Nam.

Notes: Chicken etc. = chickens, ducks, geese and guinea fowls, and turkeys. Hen etc. = hens and other birds.

*The conversion rates of cattle, total, and goats, total, in Singapore assumed an average value in ASEAN, as the exact rates could not be estimated.

Source: Values estimated based on data from the FAO (2017b, 2019).

[69] Species-specific daily feed intake of horses was estimated at 10, while that of sheep and goats was estimated at 1. The average value of the DE of sheep and goats estimated for our report was 2.27.

Appendix 4

Agri-food Products Imported in Large Quantities by ASEAN Countries, and Exported from Brunei, Singapore, and the +6 Countries

We found that the member states of the Association of Southeast Asian Nations (ASEAN) imported large quantities of agri-food products from Brunei, Singapore, and the +6 countries: Australia, China, India, Japan, Republic of Korea, and New Zealand (Appendix 3.6). Table A4.1 gives the number of observations that were undertaken for this estimation. Table A4.2 lists representative exports from Singapore and the +6 countries to the ASEAN region by ascending order of p-values smaller than 0.2.

Table A4.3 is a matrix that summarises the items imported in large quantities by the ASEAN countries at significance levels of $p < 0.1$, specifically, those that were exported from all the ASEAN+6 countries other than Lao PDR, Brunei, and the Republic of Korea. No products exported from those three countries met the p-value requirement.

Table A4.1. Numbers of Observations Made to Estimate Non-price Competitiveness

Exporter	BRN	SGP	AUS	CHN	IND	JPN	KOR	NZL	Total
Obs.	107	1,621	1,930	2,238	1,319	1,754	1,393	1,052	11,414
Obs. for estimation	98	1,098	1,263	1,414	966	1,181	987	744	7,751
Share (%)	92	68	65	63	73	67	71	71	68

AUS = Australia, BRN = Brunei, CHN = China, IND = India, JPN = Japan, KOR = Republic of Korea, NZL = New Zealand, SGP = Singapore.

Notes: 'Obs.' refers to the total number of detailed commodities classified as three-digit categories under the United Nations Broad Economic Categories (BEC) for each importing country. 'Obs. for estimation' refers to the number of observations undertaken to estimate non-price competitiveness.

Sources: Estimates based on data from UNSD (2017) and tariff rates in Table A3.7.

Table A4.2. Agri-food Products Imported by ASEAN Countries in Larger Quantities Than Estimated Based on Import Prices, in Ascending Order of P-value, 2014–2016

A. Exported from Singapore

IC1	Rank	Price ranges: Low								Mid								High							
		Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value		Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value		Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	
1 Vegetable products	1	MYS	15	121	Chocolate products nes	3.2	18	0.03		PHL	12	122	Soya sauce	2.1	3	0.06		MMR	15	112	Nutmeg, mace and cardamoms	8.6	0.5	0.11	
	2	MMR	13	112	Potatoes	0.5	0.1	0.04		MYS	15	112	Cloves	9.9	4	0.20		MMR	15	122	Tea, mate extracts	9.8	0.6	0.13	
	3	KHM	14	122	Juice, orange, single strength	1.0	0.1	0.09										IDN	11	122	Mixes and doughs	3.6	2	0.15	
	4	BRN	14	122	Juice, apple, concentrated	1.3	0.2	0.09										MMR	15	121	Chocolate products nes	4.3	0.5	0.15	
	5	MYS	14	122	Juice, orange, single strength	0.8	1	0.11																	
2 Livestock products	1									MMR	22	121	Whey, condensed	1.1	1	0.06		THA	21	122	Meat, homogenized preparations	10.2	0.0	0.12	
	2									MMR	22	122	Milk, whole condensed	2.4	46	0.08									
	3																								
	4																								
	5																								
3 Aquatic products	1	MMR	31	122	Salmons, trouts, smelts	4.4	0.3	0.03		BRN	34	112	Squids, cuttlefishes, octopuses	7.8	0.5	0.20									
	2	BRN	31	122	Salmons, trouts, smelts	7.3	1.0	0.11																	
	3																								
	4																								
	5																								
4 Processed food, nei	1	KHM	41	112	Honey, natural	4.5	0.0	0.02		MMR	43	122	Food preparations, nes	8.1	21	0.05		MMR	42	121	Oil, sesame	4.9	0.0	0.06	
	2	KHM	44	122	Beverages, distilled alcoholic	4.4	3	0.06		MYS	44	122	Beer of barley	1.6	26	0.05		THA	41	121	Fructose and syrup, other	9.6	0.0	0.06	
	3	KHM	44	122	Beer of barley	0.8	25	0.12		MYS	44	122	Beverages, distilled alcoholic	11.4	64	0.06		IDN	41	121	Molasses	98.6	0.1	0.18	
	4	IDN	44	122	Beverages, distilled alcoholic	13.7	2	0.14		BRN	41	121	Glucose and dextrose	3.9	0.0	0.13		VNM	43	122	Food preparations, nes	###	94	0.19	
	5	IDN	44	122	Beer of barley	1.7	0.3	0.15		BRN	41	122	Beverages, non alcoholic	0.7	18	0.14									

B. Exported from Australia

IC1	Rank	Price ranges: Low								Mid								High							
		Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value		Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value		Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	
1 Vegetable products	1	BRN	14	112	Grapes	4.2	0.8	0.03		IDN	14	122	Nuts, prepared (exc. groundnuts)	7.5	2	0.05		THA	11	111	Grain, mixed	9.8	0.3	0.04	
	2	MYS	11	122	Oats rolled	0.7	13	0.07		BRN	14	122	Juice, lemon, concentrated	5.0	0.0	0.10		MYS	14	112	Nuts, nes	11.5	3	0.07	
	3	MYS	11	121	Malt	0.5	3	0.08		THA	14	112	Almonds shelled	8.3	11	0.11		MYS	14	112	Avocados	3.3	2	0.13	
	4	MMR	11	122	Barley, pearled	0.5	56	0.08		MYS	11	111	Wheat	0.3	223	0.13		SGP	14	122	Fruit, cooked, homogenized preparations	9.3	0.3	0.17	
	5	BRN	14	112	Plums and sloes	3.8	0.0	0.09		MYS	13	112	Vegetables, fresh nes	1.2	2	0.14		MYS	13	112	Pumpkins, squash and gourds	1.5	0.3	0.20	
2 Livestock products	1	PHL	21	122	Offals, pigs, edible	1.3	5	0.04		SGP	22	122	Cheese, whole cow milk	5.7	31	0.16		VNM	21	122	Meat, beef and veal sausages	5.4	0.1	0.13	
	2	MYS	22	112	Yoghurt	2.6	2	0.05										THA	22	122	Ice cream and edible ice	15.1	0.0	0.17	
	3	THA	21	122	Meat, beef, preparations	5.9	6	0.09																	
	4	THA	22	112	Yoghurt	2.7	1	0.12																	
	5	THA	22	121	Whey, condensed	2.4	4	0.15																	
3 Aquatic products	1	SGP	31	112	Salmons, trouts, smelts	6.8	2	0.16																	
	2																								
	3																								
	4																								
	5																								
4 Processed food, nei	1	PHL	41	121	Lactose	2.2	0.3	0.04		PHL	41	112	Honey, natural	4.8	2	0.03									
	2	MYS	42	121	Oils	14.2	2	0.05		SGP	44	122	Wine	8.9	53	0.05									
	3	SGP	42	122	Oil, olive, virgin	4.5	0.2	0.07																	
	4	SGP	41	121	Lactose	1.3	1	0.14																	
	5	MYS	42	122	Oil, vegetable origin nes	3.3	0.1	0.17																	

C. Exported from China

IC1	Rank	Price ranges: Low							Mid							High						
		Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value
1 Vegetable products	1	THA	13	122	Mushrooms, dried	7.3	74	0.00	MYS	14	112	Dates	2.3	8	0.06	PHL	13	112	Vegetables, frozen	0.9	3	0.06
	2	MYS	13	122	Mushrooms, dried	5.0	21	0.01	MYS	13	112	Peas, green	2.6	5	0.08	BRN	14	112	Cashew nuts, with shell	9.4	0.1	0.08
	3	MYS	13	122	Mushrooms, canned	1.2	14	0.01	MYS	13	112	Garlic	1.3	137	0.09							
	4	PHL	13	122	Tomatoes, paste	1.0	25	0.01	SGP	13	112	Peas, dry	4.1	0.1	0.12							
	5	SGP	13	112	Roots and tubers, nes	1.5	9	0.02	MYS	13	112	Vegetables, leguminous nes	1.9	0.1	0.14							
2 Livestock products	1	MYS	21	122	Meat, dried nes	4.1	0.5	0.04														
	2	THA	21	122	Meat, nes, preparations	1.4	6	0.04														
	3	MYS	21	122	Meat, beef and veal sausages	3.8	6	0.06														
	4	PHL	21	122	Meat, pig, preparations	0.3	3	0.14														
	5																					
3 Aquatic products	1	MYS	32	122	Cods, hakes, haddocks	3.9	12	0.03	THA	33	112	Shrimps and prawns, nei	17.3	5	0.07							
	2	MYS	32	122	Miscellaneous pelagic fishes	1.6	9	0.06	MYS	33	112	Shrimps and prawns, nei	7.6	88	0.11							
	3	THA	34	112	Abalones, winkles, conchs	28.7	5	0.08	MYS	32	122	Miscellaneous pelagic fishes	2.0	29	0.13							
	4	THA	32	122	Flounders, halibuts, soles	4.1	1	0.11	PHL	33	122	Shrimps, prawns	2.3	0.2	0.15							
	5	MYS	34	112	Scallops, pectens	8.0	7	0.11	MYS	31	122	River eels	16.9	0.3	0.16							
4 Processed food, nei	1	PHL	43	121	Food preparations, nes	2.0	20	0.03	VNM	41	121	Sugar, nes	1.5	13	0.07							
	2	VNM	43	121	Food preparations, nes	4.6	6	0.05	MYS	41	122	Sugar refined	1.0	1.0	0.10							
	3	THA	41	111	Sugar crops, nes	3.3	10	0.07														
	4	IDN	41	121	Glucose and dextrose	0.5	48	0.10														
	5	PHL	41	121	Glucose and dextrose	0.6	44	0.11														

D. Exported from India

IC1	Rank	Price ranges: Low							Mid							High						
		Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value
1 Vegetable products	1	PHL	13	122	Vegetables in vinegar	0.9	0.9	0.01	BRN	12	111	Sesame seed	2.7	0.0	0.07							
	2	BRN	15	112	Anise, badian, fennel, coriander	2.1	0.3	0.02	BRN	15	112	Nutmeg, mace and cardamoms	12.0	0.0	0.11							
	3	MYS	15	112	Anise, badian, fennel, coriander	1.8	34	0.02	MYS	13	112	Chick peas	1.1	2	0.12							
	4	PHL	15	112	Chillies and peppers, dry	2.6	1	0.05	MYS	13	121	Flour, potatoes	1.4	1.0	0.18							
	5	IDN	15	112	Spices, nes	1.2	0.5	0.05														
2 Livestock products	1																					
	2																					
	3																					
	4																					
	5																					
3 Aquatic products	1	THA	33	112	Shrimps and prawns, nei	9.0	22	0.18	THA	38	122	Fish and fish products, nei	1.7	74	0.19	VNM	33	112	Shrimps and prawns, nei	10.2	309	0.02
	2															THA	33	112	Shrimps and prawns, nei	21.6	2	0.15
	3																					
	4																					
	5																					
4 Processed food, nei	1	IDN	42	121	Oil, coconut (copra)	1.4	3	0.08														
	2																					
	3																					
	4																					
	5																					

E. Exported from Japan

IC1	Rank	Price ranges: Low							Mid							High						
		Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value
1 Vegetable products	1	THA	11	121	Flour, fonio	6.1	0.4	0.05	MYS	13	122	Juice, tomato	2.2	0.0	0.09	VNM	12	122	Soya sauce	2.2	0.6	0.08
	2	SGP	11	111	Rice, husked	1.8	2	0.11	IDN	11	122	Bread	5.8	2	0.15	VNM	11	121	Flour, maize	0.7	0.1	0.12
	3	THA	11	121	Flour, maize	1.6	0.1	0.11	SGP	13	112	Beans, dry	9.5	0.1	0.16	THA	14	122	Juice, plum, single strength	12.8	0.1	0.13
	4	THA	12	122	Soya sauce	3.0	8	0.16	THA	13	112	Pumpkins, squash and gourds	5.1	0.0	0.17	BRN	11	122	Rice, milled/husked	3.6	0.1	0.15
	5	SGP	15	122	Tea, mate extracts	13.6	1	0.19	SGP	15	112	Tea	28.7	10	0.18	SGP	13	122	Vegetables, preserved, frozen	5.3	0.4	0.18
2 Livestock products	1																					
	2																					
	3																					
	4																					
	5																					
3 Aquatic products	1	THA	31	122	Salmons, trouts, smelts	2.9	12	0.04	SGP	35	112	Sea-urchins and other echinoderms	###	1	0.09	IDN	38	112	Fish and fish products, nei	24.1	0.4	0.04
	2	THA	34	112	Clams, cockles, arkshells	3.4	0.5	0.07	THA	32	112	Tunas, bonitos, billfishes	67.2	1	0.13	SGP	32	112	Tunas, bonitos, billfishes	50.1	3	0.06
	3	VNM	31	122	Salmons, trouts, smelts	4.7	13	0.07	MYS	34	112	Scallops, pectens	18.5	4	0.19	MYS	31	112	Carps, barbels and other cyprinids	28.7	0.8	0.08
	4	MMR	33	112	Shrimps and prawns, nei	9.9	0.1	0.17								SGP	33	112	Shrimps and prawns, nei	58.3	0.7	0.10
	5															THA	38	112	Fish and fish products, nei	27.7	7	0.10
4 Processed food, nei	1	SGP	41	121	Sugar refined	1.7	0.4	0.17	SGP	44	122	Beverages, fermented rice	11.8	7	0.06							
	2								SGP	41	121	Glucose and dextrose	1.9	0.2	0.07							
	3								MYS	42	122	Oil, sunflower	8.4	0.0	0.12							
	4								THA	41	121	Glucose and dextrose	5.4	0.1	0.16							
	5								THA	43	121	Food preparations, nes	20.8	0.7	0.19							

F. Exported from the Republic of Korea

IC1	Rank	Price ranges: Low							Mid							High						
		Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value
1 Vegetable products	1	SGP	14	122	Juice, citrus, single strength	1.5	0.3	0.12	MMR	14	122	Juice, pineapple, concentrated	1.5	0.1	0.13							
	2	MYS	14	122	Juice, citrus, single strength	2.1	0.0	0.16														
	3	SGP	15	112	Maté	15.3	0.1	0.16														
	4	THA	14	122	Juice, fruit nes	2.3	0.4	0.19														
	5																					
2 Livestock products	1																					
	2																					
	3																					
	4																					
	5															THA	22	112	Buttermilk, curdled, acidified milk	17.2	0.0	0.18
3 Aquatic products	1	MYS	34	112	Oysters	1.8	0.0	0.13	THA	36	111	Seaweeds, food, nei	14.5	37	0.11							
	2								MYS	34	112	Oysters	5.6	2	0.13							
	3																					
	4																					
	5																					
4 Processed food, nei	1	VNM	44	122	Beverages, distilled alcoholic	8.0	0.7	0.13														
	2																					
	3																					
	4																					
	5																					

G. Exported from New Zealand

IC1	Rank	Price ranges																					
		Low							Mid								High						
		Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value	Importer	IC2	BEC	Detailed commodity name	Price ($/kg)	Value ($ million)	p-value
1 Vegetable products	1	THA	13	112	Peas, dry	1.0	2	0.10	MYS	13	112	Sweet corn frozen	2.1	0.3	0.15	SGP	11	122	Oats rolled	16.7	0.0	0.13
	2	SGP	15	121	Chocolate products nes	2.4	3	0.10	SGP	14	112	Fruit, prepared nes	6.2	0.0	0.17							
	3	BRN	14	112	Persimmons	8.8	0.1	0.11														
	4	KHM	12	111	Soybeans	0.4	0.0	0.11														
	5	SGP	14	112	Avocados	3.6	3	0.13														
2 Livestock products	1	MYS	22	121	Whey, condensed	5.1	19	0.07	VNM	22	121	Milk, products of natural constituents nes	3.4	0.9	0.14	THA	22	122	Milk, whole condensed	14.1	0.1	0.14
	2	THA	22	112	Buttermilk, curdled, acidified milk	3.4	29	0.10	PHL	22	122	Milk, whole evaporated	3.0	1	0.17							
	3	THA	22	122	Milk, whole dried	3.5	135	0.12														
	4	MYS	22	122	Milk, whole dried	3.7	112	0.12														
	5	PHL	22	112	Buttermilk, curdled, acidified milk	2.6	26	0.12														
3 Aquatic products	1	BRN	38	122	Fish and fish products, nei	6.0	0.1	0.12	MYS	34	112	Mussels	5.4	2	0.13							
	2	THA	31	112	Salmons, trouts, smelts	14.3	0.9	0.19														
	3																					
	4																					
	5																					
4 Processed food, nei	1	MYS	42	122	Ghee, butteroil of cow milk	3.9	34	0.07	MMR	42	122	Butter, cow milk	3.9	0.9	0.07	PHL	42	122	Ghee, butteroil of cow milk	3.9	68	0.04
	2	THA	41	121	Lactose	2.0	3	0.11	SGP	44	122	Wine	10.8	16	0.14	MMR	42	122	Ghee, butteroil of cow milk	4.6	0.3	0.13
	3	MYS	42	122	Butter, cow milk	4.0	18	0.16	MYS	41	121	Sugar, nes	2.8	0.3	0.17	KHM	42	122	Butter, cow milk	2.6	0.4	0.18
	4	THA	42	122	Ghee, butteroil of cow milk	4.6	32	0.17														
	5	IDN	41	112	Honey, natural	15.6	0.2	0.19														

BEC = Broad Economic Categories, United Nations Statistics Division (UNSD); BRN = Brunei; IC1 = item category level 1; IC2 = item category level 2; IDN = Indonesia; kg = kilograms; KHM = Cambodia; MMR = Myanmar; MYS = Malaysia; PHL = Philippines; SGP = Singapore; THA = Thailand; VNM = Viet Nam.

Notes: The values in this table represent the averages for 2014–2016. The top five agri-food products within each IC1 group are listed in ascending order of p-value < 0.2 under BEC groups as follows: primary products mainly for industry (111), primary products mainly for household consumption (112), processed products mainly for industry (121), and processed products mainly for household consumption (122). 'Price' refers to the CIF ('cost, insurance, and freight') import price added to the tariffs set by the ASEAN Trade in Goods Agreement (ATIGA) for Brunei and Singapore, and by each ASEAN+1 regional agreement for the + 6 countries (Appendix 3.5). 'Value' refers to the CIF import value without the tariff. The 'p-value' refers to the p-value of the t-stat against the externally studentised residual. See Appendix 2.6. Data category: FAOSTAT Commodity List (FCL) and the adjusted groups of the International Standard Statistical Classification of Aquatic Animals and Plants (ISSCAAP) classified under BEC 111, 112, 121, and 122.

Sources: UNSD (2017); Appendix 3.6.

Table A4.3. Matrix of Agri-food Products Imported by ASEAN Countries in Larger Quantities Than Estimated Based on Import Prices, 2014–2016

($p < 0.1$)

		Importer									
		SGP	**BRN**	**MYS**	**THA**	**IDN**	**PHL**	**VNM**	**LAO**	**KHM**	**MMR**
Exporter	**SGP**	—	Juice, apple, concentrated	Chocolate products, nes; juice, orange, single strength; beer of barley; beverages, distilled alcoholic	Fructose and syrup, other	—	Soya sauce	—	—	Juice, orange, single strength; honey, natural; beverages, distilled alcoholic	Potatoes; whey, condensed; milk, whole condensed; salmons / trouts / smelts; food preparations, nes.; oil, sesame
	MYS	Soybeans; watermelons; cocoa, paste; tomatoes; cassava; tapioca, potatoes; coffee, extracts; juice, pineapple; juice, lemon, concentrated; tilapias and other cichlids, herrings; herrings / sardines / anchovies; Fat, nes, prepared; molasses	Cereals, breakfast; coffee, extracts; pastry; Vegetables, preserved, frozen; Spices, nes.; bread; tea, mate extracts; flour, roots and tubers, nes; fish and fish products, nei.	—	—	Coffee, roasted	—	—	Meat, cattle, boneless	—	Soya paste; miscellaneous aquatic products, food; infant food
	THA	Rice, husked	Fruit, stone, nes.; fish and fish products, nei	Flour, fonio; flour, roots and tubers, nes; juice, citrus, single strength; sweet corn prep or preserved; salmons / trouts / smelts; tunas / bonitos / billfishes; sugar refined	—	Fruit, stone, nes	Fruit, dried, nes; flour, fonio; juice, fruit, nes; soya paste; yoghurt	Fruit, dried, nes	—	Spices, nes.; juice, fruit, nes; tea, mate extracts; tea; meat, beef and veal sausages; milk, whole fresh cow; meat, pig, preparations; margarine, short; sugar, refined	—

		Importer									
		SGP	BRN	MYS	THA	IDN	PHL	VNM	LAO	KHM	MMR
	IDN	Areca nuts; cinnamon; lobsters, spiny-rock lobsters	—	Cocoa, powder and cake; crabs, nei; sharks / rays / chimaeras	Cinnamon; coconuts	Nutmeg / mace / cardamons; shrimps, prawns	Cinnamon; cereals, breakfast	—	—	—	—
	PHL	—	—	Bananas	—	—	—	—	—	—	—
	VNM	—	—	Chilies and peppers, green; miscellaneous freshwater fishes	Chilies and peppers, green; miscellaneous freshwater fishes	—	Tilapias and other cichlids	—	—	Flour, maize	—
	KHM	—	—	—	Soybeans	—	—	—	—	—	—
	MMR	—	—	—	—	Beans, dry	—	—	—	—	—
	AUS	Grapes; oil, olive, virgin; wine	Grapes; plums and sloes	Oats, rolled; malt; nuts, nes; yoghurt; oils	Grain, mixed; meat, beef, preparations	Vegetables, frozen; Nuts, prepared (exc. groundnuts)	Offals, pigs, edible; lactose; honey, natural	—	—	—	Barley, pearled
	CHN	Roots and tubers, nes; gluten, whet; garlic; fruit, dried, nes; tangerines / mandarins / clementines / satsumas;	Peas, green; vegetables, dehydrated; cashew nuts, with shell	Mushrooms, dried; mushrooms, canned; cassava; lemons and limes; plums dried; cauliflowers and broccoli; juice, apple, concentrated; sunflower seed; vegetables, temporarily preserved; leeks, other alliaceous vegetables; ginger; peanut butter; vegetables, dehydrated; vegetables, fresh, nes; fruits, nuts, peel, sugar preserved; cabbages and other brassicas; dates; peas, green, garlic; meat, dried, nes; meat, beef and veal sausages; cods / hakes / haddocks; miscellaneous pelagic fishes;	Mushrooms, dried; mushrooms, canned; tomatoes, pastel meat, nes, preparations; sugar crops, nes	Sweet corn, frozen; tea, mate extracts; vegetables, dehydrated; mushroom, dried	Tomatoes, paste; sugar cane; peanut butter; vegetables, dehydrated; apples; vegetables, frozen	Nuts, prepared (exc. groundnuts), sugar, nes	—	—	Tea; juice, orange, single strength

		Importer									
		SGP	BRN	MYS	THA	IDN	PHL	VNM	LAO	KHM	MMR
	IND	Anise / badian / fennel / coriander	Anise / badian / fennel / coriander; sesame seed	Anise / badian / fennel / coriander; spices, nes	—	Spices, nes.; oil, coconut	Vegetables in vinegar; chilies and peppers, dry; sesame seed	Shrimps and prawns, nei	—	—	—
	JPN	Sea-urchins and other echinoderms; tunas / bonitos / billfishes; beverages, fermented rice; glucose and dextrose	—	Juice, tomato; carps, barbels and other cyprinids; oil, sunflower	Flour, fonio; salmons / trouts / smelts; clams / cockles / ark shells	Fish and fish products, nei.	—	Soya sauce; salmons / trouts / smelts	—	—	—
	NZL	—	—	Whey, condensed; ghee, butteroil of cow milk	—	—	Ghee, butteroil of cow milk	—	—	—	Butter, cow milk

— = not applicable.

AUS = Australia, BRN = Brunei, CHN = China, IDN = Indonesia, JPN = Japan, KHM = Cambodia, LAO = Lao People's Democratic Republic, MMR = Myanmar, MYS = Malaysia, NZL = New Zealand, PHL = Philippines, SGP = Singapore, THA = Thailand, VNM = Viet Nam.

Notes: This table is based on the averages for 2014–2016, for all items for which $p < 0.1$ in tables 2.9 to 9.9. The Lao People's Democratic Republic, Brunei, and the Republic of Korea are omitted from the exporters because no products of theirs matched the condition of $p < 0.1$.

Sources: Tables 2.9 to 9.9; Table A4.2; and raw data used for those tables.

Appendix 5

Land or Feed Productivity of Agri-food Products:

Summary of Interpretation B

Table A5 Summary of Interpretation B for Land or Feed Productivity in the ASEAN Countries

IC2	No.	FCL	Singapore	Brunei	Malaysia	Thailand	Indonesia	Philippines	Viet Nam	Lao PDR	Cambodia	Myanmar
11. Cereals	1	Cereals, nes	—	—	—	iii	—	—	—	—	—	iv
	2	Maize	—	—	—	i	—	iv	iv	—	—	i
	3	Millet	—	—	—	—	—	—	i	—	—	iv
	4	Rice, paddy	—	—	—	ii	—	i	i	—	—	i
	5	Sorghum	—	—	—	i	—	i	—	—	—	—
	6	Wheat	—	—	—	iv	—	—	—	—	—	i
12. Oil and sugar crops	7	Castor oil seed	—	—	—	iii	iv	iii	—	—	iii	—
	8	Coconuts	—	—	iii	ii	iii	iii	i	—	i	i
	9	Groundnuts, with shell	—	—	i	ii	i	ii	i	i	ii	ii
	10	Kapok fruit	—	—	—	iii	—	—	—	—	—	—
	11	Oil, palm fruit	—	—	iv	i	i	ii	—	—	—	—
	12	Oilseeds nes	—	—	—	—	—	iv	—	—	i	—
	13	Seed cotton	—	—	—	iv	iv	iv	—	iv	iv	iii
	14	Sesame seed	—	—	—	i	—	—	iii	i	iii	ii
	15	Soybeans	—	—	—	iv	i	i	iv	iii	iii	iv
	16	Sugar cane	—	—	ii	i	ii	i	ii	ii	ii	ii
	17	Sunflower seed	—	—	—	iv	—	—	—	—	—	iii
13. Vegetables	18	Asparagus	—	—	—	ii	—	i	—	—	—	—
	19	Beans, dry	—	—	—	iv	iv	iv	iv	iv	iii	iii
	20	Beans, green	—	—	—	iv	i	iii	—	—	—	—
	21	Cabbages and other brassicas	ii	—	ii	ii	ii	ii	i	—	—	—
	22	Carrots and turnips	—	—	—	—	i	i	—	—	—	—
	23	Cassava	—	iii	iv	iii	iii	iv	iv	i	i	ii
	24	Cauliflowers and broccoli	—	—	—	i	—	i	i	—	—	—
	25	Chillies and peppers, green	—	i	i	i	i	iv	—	iv	—	—
	26	Cow peas, dry	—	—	—	—	—	iii	—	—	—	iv
	27	Cucumbers and gherkins	—	iii	iii	iv	iv	iv	—	—	—	—
	28	Eggplants (aubergines)	—	i	—	i	iv	i	—	—	—	—
	29	Garlic	—	—	—	ii	i	ii	—	—	—	i
	30	Leeks, other alliaceous vegetables	—	—	—	—	i	ii	—	—	—	—
	31	Lettuce and chicory	i	iv	i	iv	—	ii	—	—	—	—
	32	Maize, green	—	iv	—	iii	iv	—	—	—	—	—
	33	Mushrooms and truffles	ii	—	—	—	i	—	—	—	—	—
	34	Okra	—	—	i	—	—	iii	—	—	—	—
	35	Onions, dry	—	—	—	i	i	i	iv	—	—	i
	36	Onions, shallots, green	—	ii	—	i	—	—	—	—	—	—
	37	Peas, dry	—	—	—	—	—	—	—	—	—	iv
	38	Peas, green	—	—	—	i	—	ii	—	—	—	—
	39	Pigeon peas	—	—	—	—	—	iii	—	—	—	iv
	40	Potatoes	—	—	—	iv	i	i	i	i	—	i
	41	Pulses, nes	—	—	—	iii	iv	iii	iv	iii	—	—
	42	Pumpkins, squash and gourds	—	i	iv	ii	i	ii	—	—	—	—
	43	Roots and tubers, nes	iii	iv	iv	iii	iv	iv	—	—	i	—
	44	Spinach	iii	iii	iii	—	iv	—	—	—	—	—
	45	Sweet potatoes	—	ii	iv	—	iii	iv	i	i	iv	iv
	46	Taro (cocoyam)	—	—	—	i	—	iii	—	—	—	—
	47	Tomatoes	ii	i	i	i	ii	i	—	—	—	—
	48	Vegetables, fresh nes	iii	iv	ii	iv	iv	iv	—	ii	ii	i
	49	Vegetables, leguminous nes	—	i	—	iv	—	—	—	—	—	—
14. Fruits and nuts	50	Areca nuts	—	—	i	iii	iv	—	—	—	—	i
	51	Avocados	—	—	—	—	i	iv	—	—	—	—
	52	Bananas	—	iv	iv	iv	i	i	iv	i	iv	—
	53	Cashew nuts, with shell	—	—	iii	iv	iv	i	iii	—	—	—
	54	Fruit, citrus nes	—	—	i	ii	—	i	—	—	—	—
	55	Fruit, fresh nes	—	iii	—	i	i	iv	—	iv	i	iv
	56	Fruit, tropical fresh nes	—	—	—	iv	iii	i	—	—	—	—
	57	Grapefruit (inc. pomelos)	—	—	iii	ii	—	iv	i	iv	iii	—
	58	Grapes	—	—	—	i	—	iv	i	—	—	—
	59	Lemons and limes	—	iii	i	i	—	iv	—	i	iii	—
	60	Mangoes, mangosteens, guavas	—	—	ii	iii	iv	iv	ii	iii	i	—
	61	Melons, other (inc.cantaloupes)	—	—	—	—	ii	i	—	iv	—	—
	62	Nuts, nes	—	—	—	iii	iv	i	iii	—	iii	—
	63	Oranges	—	ii	iv	i	i	iv	ii	ii	ii	—
	64	Papayas	—	—	ii	iv	i	ii	—	—	—	—
	65	Pineapples	—	ii	ii	iv	i	i	iv	iv	ii	—
	66	Plantains and others	—	—	—	—	—	—	—	—	—	i
	67	Tangerines, mandarins, clementines, satsumas	—	—	—	i	—	iv	—	i	—	—
	68	Watermelons	—	i	iii	ii	iv	i	ii	i	—	—
15. Stimulants and spices	69	Chillies and peppers, dry	—	—	iv	iii	—	—	ii	i	iv	iv
	70	Cinnamon (canella)	—	—	—	—	iii	—	iv	—	—	—
	71	Cloves	—	—	iii	—	iii	—	—	—	—	—
	72	Cocoa, beans	—	—	iv	iii	iii	iii	—	—	—	—
	73	Coffee, green	—	—	iii	iv	ii	iv	i	iv	i	i
	74	Ginger	—	—	ii	ii	i	ii	—	—	—	—
	75	Nutmeg, mace and cardamoms	—	—	i	—	iv	—	—	iii	—	—
	76	Pepper (piper spp.)	—	—	i	i	ii	i	i	—	i	—
	77	Spices, nes	—	—	—	ii	i	—	—	—	—	—
	78	Tea	—	—	i	i	iv	—	iii	ii	—	i
21. Meat	79	Meat, buffalo	—	—	iv	i	i	i	i	ii	i	iv
	80	Meat, cattle	i	—	ii	ii	i	i	i	i	iv	i
	81	Meat, chicken	i	—	iii	iv	iv	iv	iii	iv	ii	iv
	82	Meat, duck	iii	—	iii	iii	iv	iv	iv	iii	iii	iv
	83	Meat, goat	iv	—	ii	iii	iv	i	i	iii	—	i
	84	Meat, goose and guinea fowl	—	—	—	i	—	iv	—	i	—	i
	85	Meat, horse	—	—	iv	—	iii	iv	iv	—	—	—
	86	Meat, pig	ii	—	i	ii	ii	ii	ii	ii	i	i
	87	Meat, sheep	—	—	i	iv	i	iii	—	—	—	iii
	88	Meat, turkey	—	—	—	—	—	i	—	—	—	ii
22. Milk	89	Milk, whole fresh buffalo	—	—	—	—	—	—	—	—	—	i
	90	Milk, whole fresh cow	—	—	—	—	ii	—	—	—	—	ii
	91	Milk, whole fresh goat	—	—	—	—	i	—	—	—	—	iv
	92	Milk, whole fresh sheep	—	—	—	—	iii	—	—	—	—	iii

– = not applicable, FCL = FAOSAT Commodity List, IC2 = item category level 2.

Notes: The codes are as follows: i = both productivity and ratio of the yield are high; ii = productivity is high, but the ratio of the yield is low; iii = productivity is low, but the ratio of the yield is high; and iv = both productivity and ratio of the yield are low. The interpretation code 'B' reflects the median of the specific products in IC2 included here, while the code 'A', which is not shown in this Appendix, reflects the median of the broader product categories in IC1. See Appendix 3.7. The interpretation code is omitted when there are fewer than three products (as categorized by the FCL) in a country's IC2 grouping.

Source: Tables 2.11 to 9.11.