Chapter 3

Thailand

September 2019

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Chapter 3

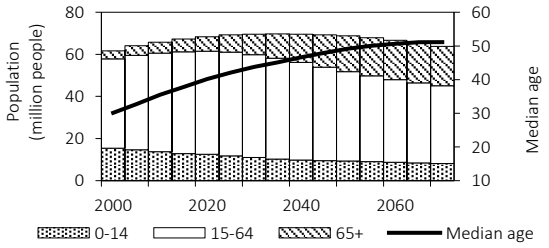
Thailand

1. Social and Economic Conditions

Population and Per Capita GDP

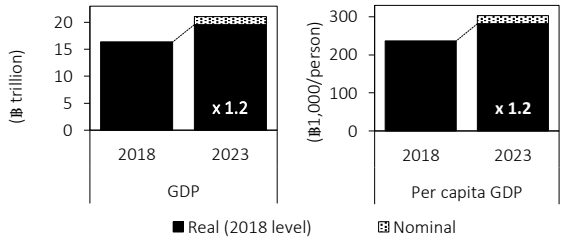
The population of Thailand, 69 million people in 2018, accounts for 11% of the total population of the ASEAN region, placing it fourth amongst the ASEAN countries. It is expected to reach 65 million people by 2040, and to start to decline after that (Figure 3.1). The working-age people, those between 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

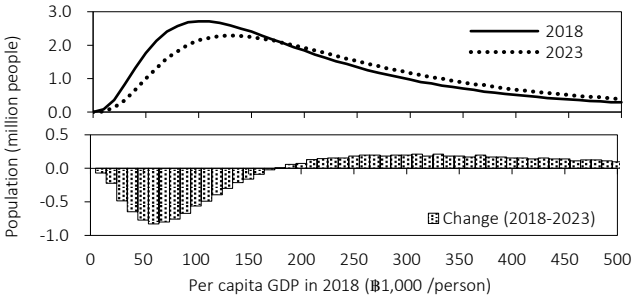


฿ = baht (Thai currency).
GDP = gross domestic product,
Source: Estimates based on data from the International Monetary Fund (IMF, 2018).

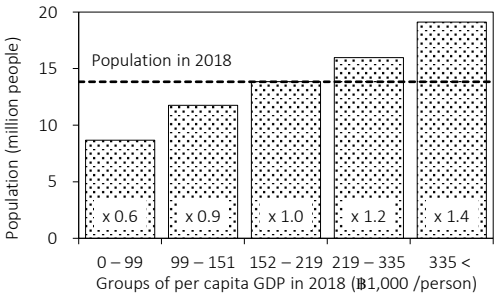
Real GDP and per capita real GDP are both expected to increase steadily by 1.2 times between 2018 and 2023 (Figure 3.2). According to a projection of Thailand's population based on the level of per capita GDP (Figure 3.3, Appendix 3.1), as per capita GDP approaches ฿180,000, a boundary is crossed whereby 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



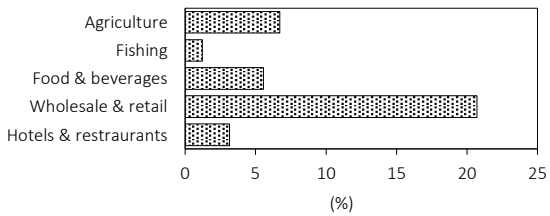
฿ = baht (Thai currency).
GDP = gross domestic product.
Note: The per capita GDP was calculated based on constant 2018 prices. The bars in Figure B show the estimated populations of the GDP groups in 2023. The numbers in the bars show the changes in these populations from 2018 to 2023.
Source: Appendix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

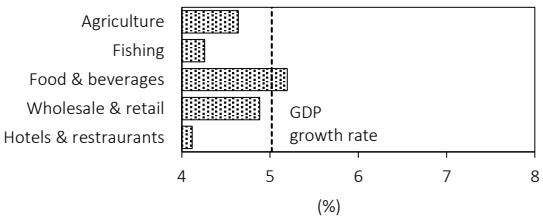
The annual growth rates of real VA in the FVC-related industries averaged 4%–5% during 2000–2015, lower than the average GDP rate, the one exception being the food and beverage industries, which averaged higher (Figure 3.5). While the proportion of GDP due to the VA of most of FVC-related industries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

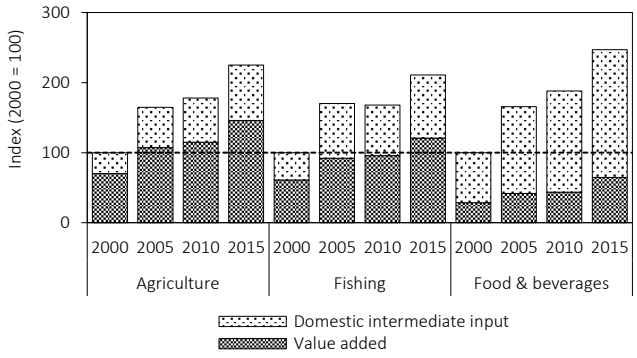


GDP = gross domestic product, VA = value added.
Sources: Estimates based on data from Eora (2018)and the International Monetary Fund (IMF, 2018).

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.

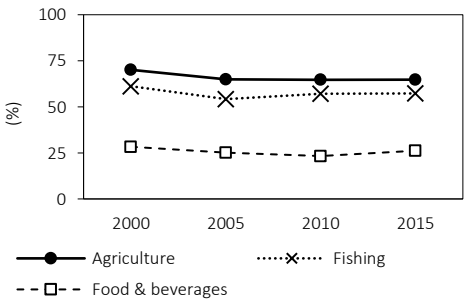
The VA rates of the agriculture, fishing, and food-and-beverage industries were almost flat between 2005 and 2015. This may reflect the fact that the production structure stayed the same in terms of the cost of sales to revenue ratios, the efficiency of the product mix, and/or the ability of technology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

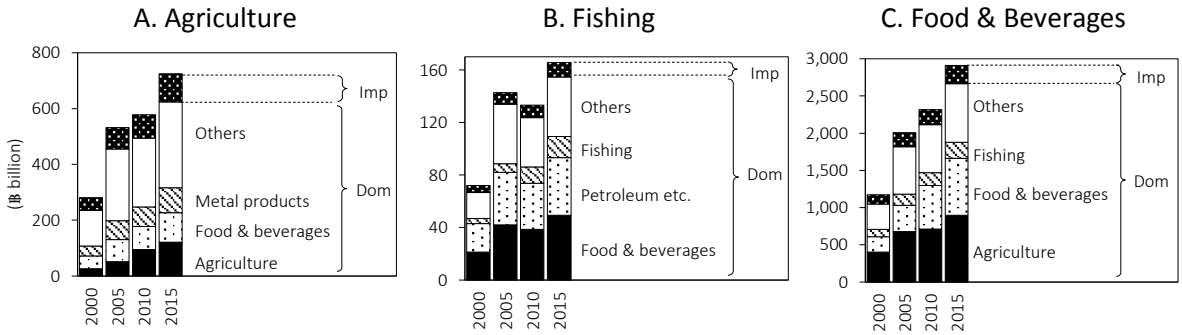
Intermediate Inputs in Agri-food Industries

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

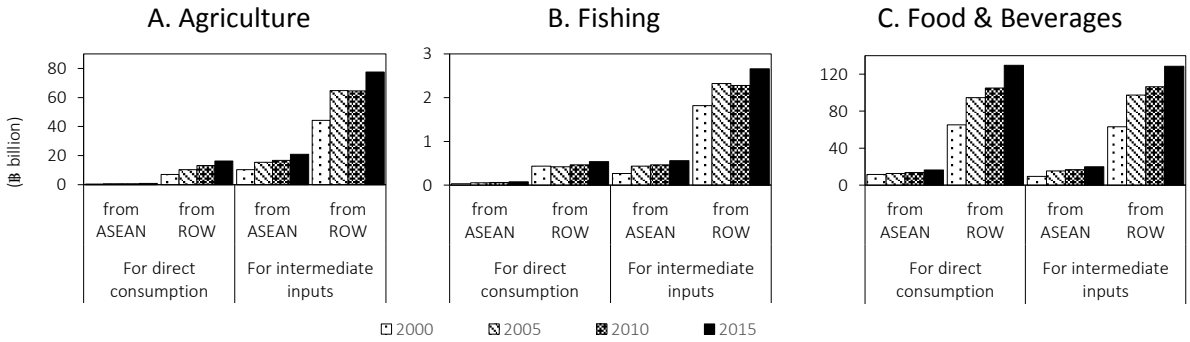


฿ = baht (Thai currency).
Dom = domestic supply, Imp = imports.
Notes: The values in these graphs are based on constant 2015 prices. 'Petroleum etc.' refers to the petroleum, chemical, and non-metallic mineral product industries.
Sources: Estimates using data from Eora (2018) and the International Monetary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

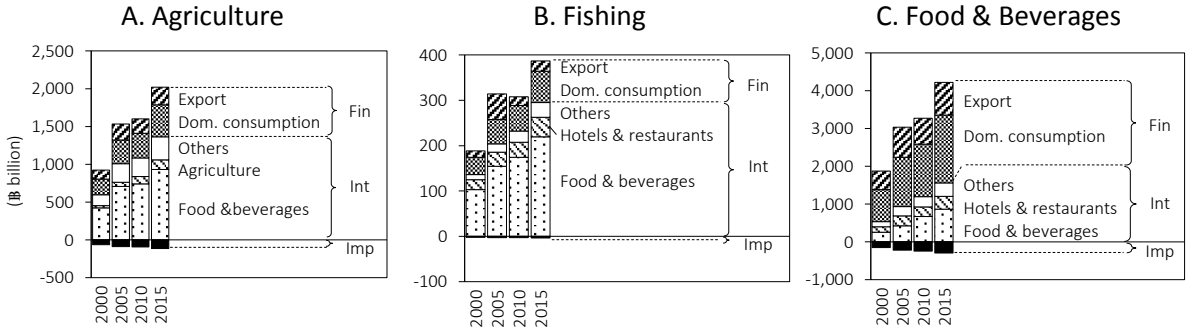


฿ = baht (Thai currency).
ASEAN = Association of Southeast Asian Nations, ROW = rest of the world.
Notes: The values of imports shown in these graphs are based on constant 2015 prices. They include imports from foreign agricultural, fishing, and food-and-beverage sectors destined for domestic final consumption 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

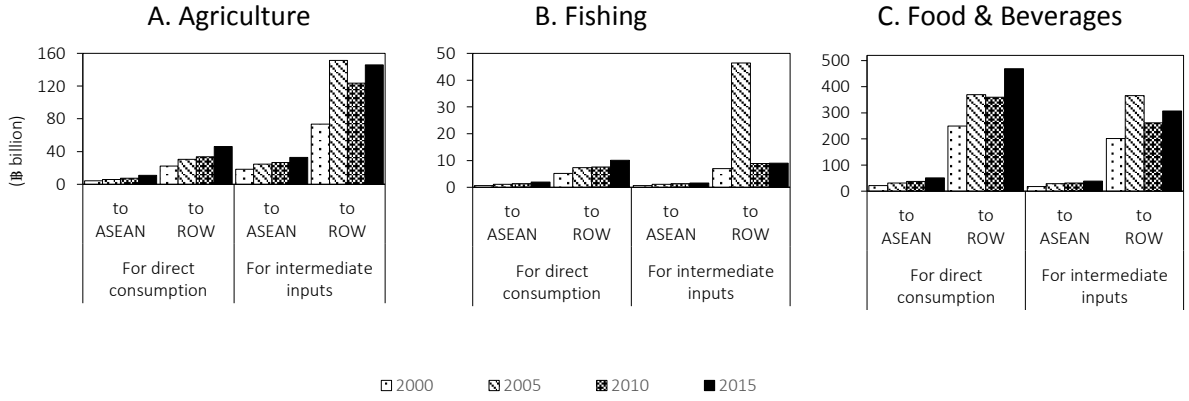


฿ = baht (Thai currency).
Dom. = domestic.
Notes: The values in these graphs are based on constant 2015 prices. 'Fin' = final demand for domestic and imported goods, 'Int' = intermediate demand for domestic and imported goods, and 'Imp' = the imports of final and intermediate goods. Total demand = Fin + 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

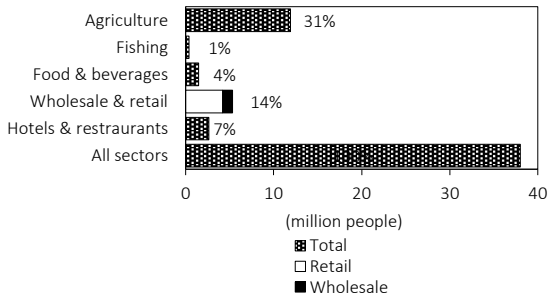
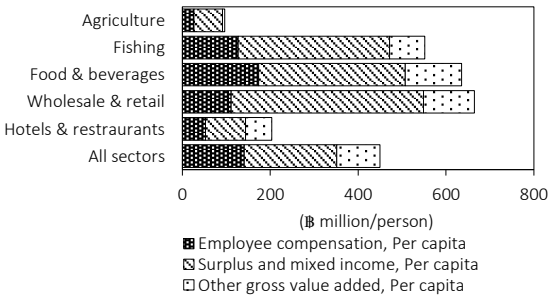


Figure 3.13. Gross VA per Capita, by Sector, 2015



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

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

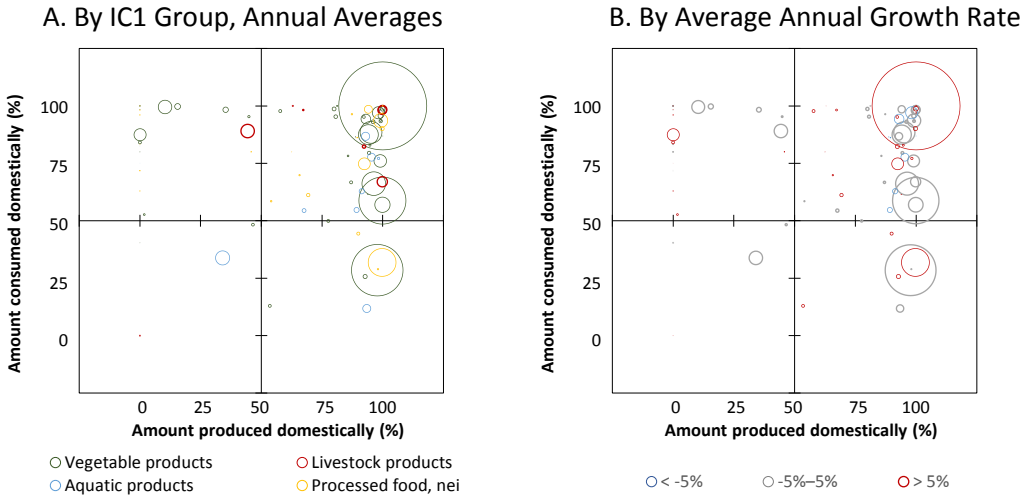
Figure 3.15 shows the structure of domestic commerce and foreign trade in 2004–2013. There are two graphs, each of which is divided into four quadrants defined by two criteria: whether agri-food goods were *produced* domestically or in foreign markets and whether they were *consumed* in domestically 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						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.