CHAPTER

04

Agriculture-related Industries

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CHAPTER 04

Agriculture-related Industries

1. Agro-food Marketing

Characteristics of Agro-food Distribution

As agro-food is alive from harvest to end-consumption, it may decay in storage and distribution, unlike manufactured products. Therefore, keeping it fresh is crucial. It is hard to standardize, grade, or homogenize agro-food products because of differences in natural conditions (climate, soil, and water), species, and production technologies. Despite seasonality in production, harvest, and shipping due to growth and storage characteristics, consumption goes all year round. Therefore, storage, transportation, and the selling period are vital to keeping product values. Besides, as supply and demand are not controllable, agro-food prices vary widely.

Agro-food distribution covers all business activities from farmers' harvest to end-consumers. In other words, distribution is a process in which multiple intermediaries and distribution facilities are involved for all conditions and obstacles in time and space from the start (harvested by farmers) to the end (purchased by end-consumers).

In the self-sufficiency economy, one produced agricultural products and consumed them as well. As the producer was the consumer, there was no need for a distribution process from harvest to consumption. However,

today, as consumption is separated from production, and the consumer's demand for various intermediate services becomes bigger, distribution's role becomes significant. In developing countries, distribution and transportation facilities lag behind, and the process between harvest and consumption is extended, resulting in a considerable price spread between the production and consumption areas. On the other hand, in developed countries, high-level mass consumption is in place. Various intermediate services in storage, processing, packaging, and transportation are well-developed and take substantial marketing margins. Therefore, countries, regardless of economic development levels, face many challenges to tackle in agro-food distribution.[1)]

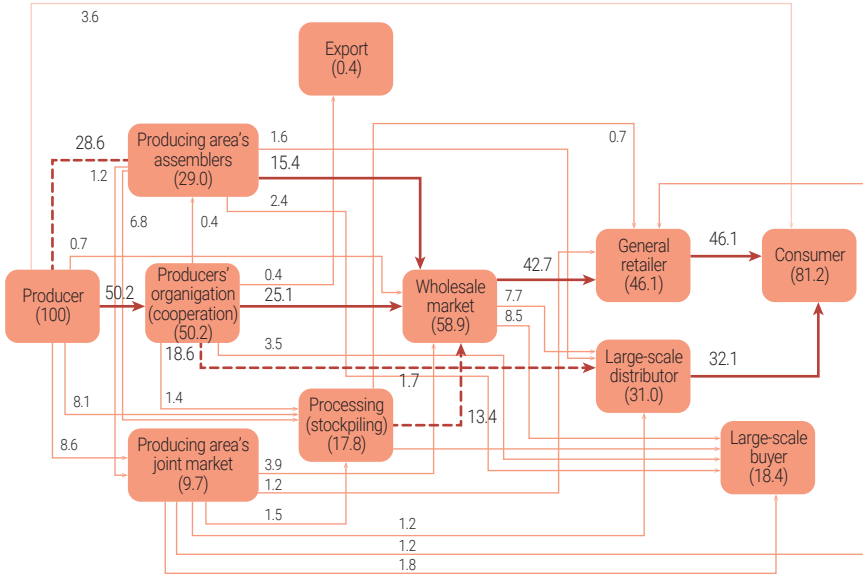
Korea's Agro-food Marketing Channel and Margin Structure

In the past, Korea's agro-food distribution was in the primitive stage with the producer-consumer direct sales and the 5-day traditional markets. After industrialization and urbanization through economic development plans since the 1960s, the mass-marketing distribution system based on wholesale markets kicked off.

Since the agro-food distribution market opening in 1996, the nation's distribution has transformed with various channels, including wholesale markets, large-scale assemblers, and direct marketers for online transactions. Amid COVID-19 in 2020, people avoid face-to-face activities, and transactions through direct marketing between the producer and the consumer have increased rapidly. So do B2C transactions through online vendors, such as

1) Agro-food marketing margin in the U.S. is about 80% of the price the consumer pays. It is nearby 50% in Japan, slightly higher than 46% in Korea. The higher ratios in the U.S. and Japan explain that their intermediate costs in distribution, including transportation, processing, and packaging, are higher than in Korea.

Figure 4-1 Distribution route of horticulture produce (2018)



Note: The thick solid arrow indicates the first shipping destination. The bold dotted arrow indicates the path with a distribution ratio of 10% or more. The thin arrow indicates a route with a distribution ratio of less than 10%.

Source: Korea Agro-Fisheries and Food Trade Corporation, 2019, *The State of Major Agricultural Product Distribution in 2018*.

Cupang and Market Kurly. Besides, B2B transactions through online bidding between producers' groups and large-scale buyers have begun recently. Wholesale markets, the main center of offline transactions, show some signs of transformation. In addition to on-site auctions based on the commodities shipped to the wholesale market, online wholesale transactions or online auctions, based on production, goods, distribution, and image information, are in a pilot project the aT and likely to expand gradually.

The Korea Agro-Fisheries and Food Trade Corporation (afterward, the aT) has published the major agro-food distribution based on its official annual survey since 1997. Currently, the aT surveys 26 items, including four food crops, two

Table 4-1 Korea's agro-food marketing margin (2018)

(in %)

Category	Consumer price (100.0)			
Average	Producer price (53.3)	Marketing margin (46.7)		
Cost		Direct/ indirect cost (33.4)		Profit (13.3)
		Direct (16.8)	Indirect (16.6)	
Stage		Shipping (9.2)	Wholesale (13.0)	Retail (24.5)

Note: 1)Weighted average of 34 items in surveyed areas (excluding 9 imported items from the total of 43 items surveyed)
2) Marketing margin = Consumer price - producer price

Source: Korea Agro-Fisheries & Food Trade Corporation, 2019, *The State of Major Agricultural Product Distribution in 2018*.

leafy vegetables, five fruit vegetables, three condiment vegetables, six fruits, two flowers, four livestock products, in terms of their production, import trends, producing areas, and marketing status, including its channels and costs.

Also, the aT conducts an annual survey on distribution costs and intermediates' margins and publish the result. According to a recent survey in 2018, the average marketing margin for all inspected items-the difference between the produce price and the consumer price-posted 46.7%. The producer price took 53.3% of the consumer price.

Marketing margins occur in three stages for producers, wholesalers, and retailers. 24.5% of the total marketing margin ratio (46.7%) goes to retailers, which is larger than the combined ratio for producers and wholesalers. The reason for this ratio breakdown is high costs happening in the retailing stage, including shop rentals, labor costs, consumer-friendly repackaging, product losses, and depletion costs.

The marketing margin consists of distribution cost and profit. The marketing margin rate of 46.7% breaks into the cost of 33.4% and the gain of 13.3%. The cost is composed of direct and indirect costs. The former is for transportation,

Table 4-2 Marketing margin rate by agro-food type (2018)

Category	2017	2018	Item
Food crops	34.8	33.7	Rice, bean, potato, sweet potato
Leafy and root vegetables	54.7	61.4	Cabbage, radish
Fruit vegetables	40.6	40.0	Watermelon, Korean melon, cucumber, cherry tomato, strawberry
Condiment vegetables	50.6	62.6	Dried pepper, garlic, onion
Fruits	48.9	45.8	Apple, pear, persimmon, grape, peach, tangerine
Flowers	55.9	55.9	Rose, chrysanthemum
Livestock	46.1	47.9	Beef, pork, chicken, egg

Source: Korea Agro-Fisheries & Food Trade Corporation, each year, *The State of Major Agricultural Product Distribution*.

packaging (packaging work and materials), shipping, services, and loss, which is mostly fixed spendings and has limitations in cost saving. The latter includes labor expenses, shop rentals, maintenance fees, utility bills, and depreciation costs.

The margin rate of fruit vegetables, fruits, and livestock products is less than 50%, while leafy and root vegetables, condiment vegetables, and flowers exceed 50%. Leafy vegetables such as cabbages have high margins because they are perishable, rendering it expensive to keep them fresh. Condiment vegetables, such as garlic and onions, require storage and depletion costs. Cut flowers' marketing margin is also high due to a short flowering period.

The comparison of distribution (via wholesale markets) margins between Korea and Japan shows that Korea's average margin is 53.8% (44.8% when including food crops-rice, bean-flowers, and livestock products), slightly lower than Japan's 54.2%. The margin ratio of the retail stage takes 25.6%p in Korea and 25.4%p in Japan. The wholesale stage takes 11~13%p and the shipping 15%p in both countries. Korea's margin in vegetables is 56.4%, a bit higher than 54.0% in Japan, while its fruits post 51.5%, lower than 54.3% in its counterpart.

Table 4-3 Korea's margin vs. Japan's margin in marketing stages (2014)

Category		Producer price	Marketing margin (%)			
			Shipping	Wholesale	Retail	Margin
Korea	Fruit & vegetable	46.2	15.6	12.7	25.6	53.8
	Vegetable	43.6	16.6	13.5	26.4	56.4
	Fruit	48.5	14.2	11.7	25.6	51.5
Japan	Fruit & vegetable	45.8	15.3	13.5	25.4	54.2
	Vegetable	46.0	15.4	14.2	24.4	54.0
	Fruit	45.7	15.0	11.3	28.0	54.3

Source: Kim Byungryul et al., Dec. 2016, *International Comparison of Agro-food Distribution Systems and Policy Directions for Distribution Improvement (1st year)*, KREI.

Table 4-4 Agro-food marketing margin by stage

Category	Producer price	Marketing margin (%)			
		Shipping	Wholesale	Retail	Margin
Fruit & vegetable	53.3	9.2	13.0	24.5	46.7

Source: Korea Agro-Fisheries & Food Trade Corporation, 2019, *The State of Major Agricultural Product Distribution in 2018*.

Distribution Structure in Shipping Stage

The economic entity in charge of agro-food distribution is a assembler or marketing agent. The assemblers break into two types: i) those directly engaged in product transactions, including ownership transfers (direct marketing organizations), and ii) others in supporting roles (marketing support organizations). The former includes wholesalers, retailers, international traders, intermediaries, and agents. The latter, not engaged in transactions, includes transporters, storage firms, lading and unlading traders, packaging firms, processors, and others in supporting roles, such as banks, insurers, consultants, inspectors, and quarantine firms.

At the shipping stage in producing areas, it is not easy for farmers to transact personally with assemblers or processors, except for large-scale farmers.

In general, farmers entrust transactions to cooperatives, local assemblers, or

agricultural corporations (farming associations or corporations). Otherwise, they transact with local assemblers in lump sum at fields in advance (forward contract).

In Korea, distribution entities in producing areas are cooperatives, farming corporations, and local assemblers. Local facilities include agro-processing centers (APCs), rice processing complexes (RPCs), shipping-point joint markets, shipping-point collection centers, and low-temperature warehouses. Most APCs and RPCs are run by local cooperatives except for some operated by farming association corporations. Joint markets are managed by local cooperatives, shipping-point collection centers by cooperatives or village cooperative units, warehouses by cooperatives, farming corporations, or private warehousing firms.

In the past, when cooperatives did not perform well, individual local assemblers dominated the market. Currently, local assemblers deal with 30% of fruits and vegetables to deliver to wholesale markets, assemblers, processors, and restaurants in consumption areas.

Local assemblers buy 50~90% of leafy vegetables with high price fluctuation risks through pre-harvest transactions and ship them to consumption areas. Local assemblers sign contracts with farm households before planting or make a purchase after harvesting. However, in many cases, they sign contracts before harvesting, supervise cultivation, and hire laborers for harvesting. Their roles are crucial as they manage crop cultivation, harvest, and price risks through pre-harvest transactions.

Korea implemented the assembler registration system in 1995. In the beginning, around 10,000 assemblers worked through registration. However, the number decreased continuously, and 11,105 in 2008 and 5,457 in 2018 were registered to 32 public wholesale markets nationwide. Currently, around 2,000 to 3,000 assemblers (2,000 individuals and 300 corporations) work for distribution.

1,118 cooperatives (923 local primary cooperatives, 116 local livestock

Table 4-5 Wholesale shippers and registered local distributors for fruits and vegetables (2018)

Category	Shipper			Local distributor		
	Individual	Group/ corp.	Sub-total	Individual	Corp.	Sub-total
No. registered	647,487	183,704	831,191	4,864	593	5,457

Source: Korea Agro-Fisheries & Food Trade Corporation.

Table 4-6 Share of forward contraction field by major crops (%) in 2018

Pre-harvest transaction (%)	Item
80% or higher	Spring cabbage (94), winter cabbage (82), spring daikon (95), highland radish (88), autumn radish (85)
50~79%	Highland cabbage (70), autumn cabbage (76), winter radish (77), watermelon (69), onion (53), spring potato (50)
30~49%	Bean (41), Autumn potato (37), garlic (31), tangerine (30)
Less than 30%	Highland potato (28), apple (12), pear (23), persimmon (8)

Source: Korea Agro-Fisheries & Food Trade Corporation, 2019, *The State of Major Agricultural Product Distribution in 2018*.

cooperatives, 45 special commodity cooperatives, 23 special cooperatives for livestock, and 11 ginseng cooperatives) are located in rural areas nationwide. They ship crops entrusted or sold by their member farmers. They exert bargaining power through large-scale shipments.

Cooperatives organized cooperative units and shipped crops produced by those units. However, such units were disbanded in 2009 and joint shipment associations for joint pricing were formed. In 2016, producers' associations became in charge of joint-shipping field vegetables.

Cooperatives develop joint shipment associations and producers' associations to scale up joint pricing. They also support joint corporations in cities and counties and develop integrated marketing organizations and alliance sales in metropolitan areas.

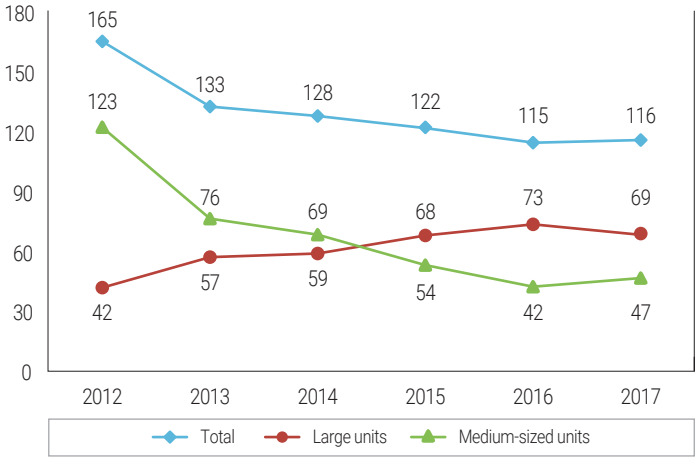
Previously, cooperatives have formed city/ county-based associations for alliance sales, such as the Kangwon association, the peach association for

Agricultural products wholesale market

Gyeonggi and Chungcheong bukdo, and the Anseong association. However, alliance-sale associations did not have the expertise, and conflicts among their participants hindered progress. In 2003, the National Agricultural Cooperative Federation (NACF) led a shift to an allied business model in cooperation with local governments. The NACF dispatched distribution personnel in its municipal offices and increased the business size from KRW 78.6 billion in 2002 to KRW 2.99 trillion in 2005. During the same period, the service charges rose from KRW 320 million to KRW 2.3 billion, helping the NACF achieve the related goal. However, while the allied business size became substantial, it was a horizontal scale-up and had limitations in enhancing sales capabilities. Also, participating stakeholders neglected quality management and failed to develop differentiated agro-food products for additional value creation.

To overcome such limitations in the allied sales business, Nonghyup established an independent corporation through joint investment among cooperatives based on the amendment of the Agricultural Cooperatives Act, and implemented the joint business corporation system to scale up, broaden, and specialize Nonghyup's economic program. A joint business corporation was established through joint investment by member cooperatives. Its purpose was to specialize and scale up

Figure 4-2 Number of integrated marketing units



Source: Korea Agro-Fisheries & Food Trade Corporation, 2018, *Policy measures for the advancement of local distribution.*

local distribution. The government tried to nurture co-marketing unions through its local distribution policy and provided subsidies to them on the condition to convert to joint business corporations within three years.

In line with the government's plan to unify the support system for local distribution, in 2011, Nonghyup planned to gradually convert alliance business units to joint business corporations. It encouraged joint business corporations to take allied business units, and formed the allied business system in cities and counties. Also, it targeted to integrate allied business units and joint business corporations in the same region by 2012.

The government introduced the concept of integrated marketing in 2011 to revitalize local distribution. In 2012, it intended to establish an organization for integrated marketing for local assemblers' scale-up and competitiveness. Eventually, the government-supported individual organizations formed an

Table 4-7 Ratio of fruits and vegetables by shipping entity

Category	2010	2014	2018
Producers' group	43.1	46.8	50.2
Local assembler	32.4	31.5	28.6
Joint market	5.8	8.8	8.6
Processing (storage)	11.8	7.4	8.1
Wholesaler	4.2	1.5	0.7
Intermediaries	-	-	-
Large scale retailor	0.6	-	0.2
General retailer	-	-	-
Export, etc.	-	-	-
Large buyer	0.3	-	-
Consumer	1.8	3.9	3.6
Total	100.0	100.0	100.0

Source: Korea Agro-Fisheries & Food Trade Corporation, each year, *The State of Major Agricultural Product Distribution*.

integrated marketing unit, which served as a channel for subsidies.

The integrated marketing unit introduced in 2012 is a core for agricultural distribution. It sells agro-food commercialized by local cooperatives or corporations to distribution channels in consumption areas. The number of integrated marketing units reduced from 165 in 2012 to 116 in 2017. Of these, medium-sized units with less than KRW 10 billion in handling decreased from 123 in 2012 to 47 in 2017. On the other hand, large units with KRW 10 billion or more in handling increased from 42 to 69 in the same period. In other words, medium-sized organizations were merged to make large ones, indicating the scale-up of integrated marketing units.

Also, farmers' associations and agricultural corporations work for local distribution. As of 2018, there were 10,163 farmers' associations and 11,617 agricultural corporations, specialized in agricultural production, processing, distribution (wholesale and retailing), agricultural services, rural tourism, and recreation services.

Table 4-8 Establishment and operation of shipping-point marketing facilities by the type of policy support (2018)

Category		No.	Ratio (%)	Items handled (tons)	Items handled per facility (tons)
Total		533	100.0	4,310,229	8,087
Government support	General	311	58.3	2,782,444	8,947
	Horticulture	22	4.1	130,256	5,921
	Hub (wide area)	12	2.3	254,321	21,193
	Others	134	25.1	904,141	6,747
	Sub-total	479	89.9	8,381,391	17,498
Local gov't support		36	6.8	127,132	3,531
Own funds		18	3.4	111,935	6,219

Source: *Final report on the analysis of APC operation in 2019.*

As cooperatives were interested in local distribution and the government expanded their distribution role through subsidies and facility support, about half of fruits and vegetables were shipped by producers' groups in 2018. Concerning rice, producers' groups ship two-thirds of the production through rice processing complexes. As a result, producers' organizations came to play a crucial role in local distribution.

Nevertheless, Korea's local distribution system is not as developed as in European countries or Japan, where cooperatives deal more than 80~90% of crops. The ratio of fruits and vegetables by shipping entity in 2018 shows producers' organizations took more than 50%, while local assemblers' share was 29%.

Fruits and vegetables go through agro-processing centers (APCs) for storage, processing, and packing, while rice through rice processing complexes (RPCs), and livestock products through livestock processing centers (LPCs). Afterward, they are shipped to wholesale markets, retailers, or processing firms.

APCs are local distribution facilities equipped with selection and packing machines. They collect massive crops from farm households and commercialize

Table 4-9 Ratio of APC-handled amount to the total of 10 major items in 2018

Item	Total amount (tons)	APC-handled amount (tons)	Ratio of APC-handled amount (%)
Apple	475,303	266,323	56.0
Pear	203,166	135,374	66.6
Tangerine	621,154	160,078	25.8
Persimmon	104,362	24,828	23.8
Tomato	388,657	99,619	25.6
Onion	1,520,969	528,641	34.8
Garlic	331,741	101,175	30.5
Cabbage	2,391,946	146,417	6.1
Potato	853,369	137,877	16.2
Carrot	73,143	19,682	26.9
Total	6,963,810	1,620,014	23.3

Source: *Final report on the analysis of APC operation in 2019.*

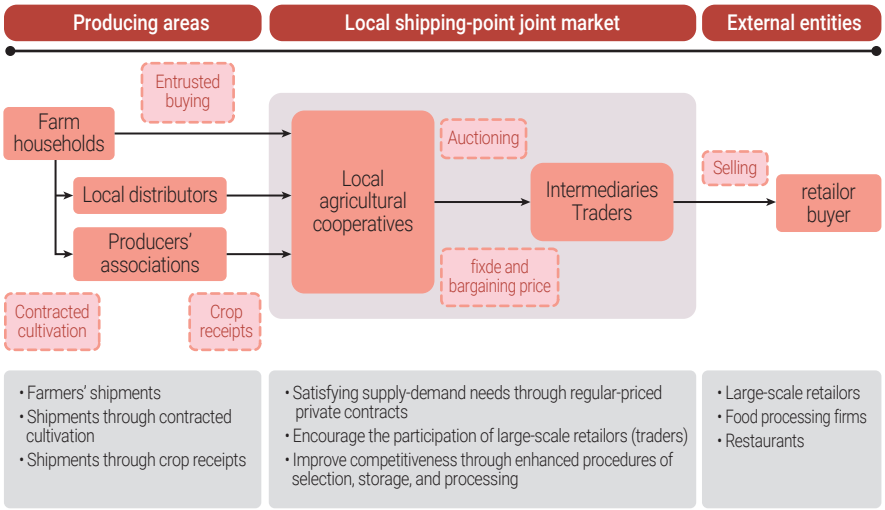
them through selection, packing, and storage.

After the agricultural market opening in 1993 and the distribution service marketing opening in 1996 followed by the Uruguay Round negotiations and free trade agreements with Chile and other countries in 2004, the government invested KRW 42 trillion for agricultural restructuring plans and KRW 15 trillion for projects funded by special agricultural taxes to build modernized distribution centers (APC, RPC, and LPC) in major areas for crop production.

The number of APCs, established between 1992 and 2018, is 478. Out of them, 311 centers were built supported by the government's program for local distribution center construction, 12 centers (hub APCs) were established through the subsidy program after the free trade agreement with Chile, and 22 centers were built through the program to develop horticulture brands.

In 2018, the ratio of horticultural produce shipped after selection and packing in APCs was 23.3% of the ten major items. Currently, more than 50% of apples and pears go through APCs, which indicates that they play a vital role in

Figure 4-3 Transaction flow chart



distribution. Still, there are things to be improved.

Nonghyup's 45 joint markets are operated in producing areas. Based on speciality, they are categorized into particular commodity markets-apple, pear, Korean melon, watermelon, pepper, and garlic-in producing areas and multi-commodity markets in local cooperatives. their types include year-round and seasonal joint markets, following the opening timing. As particular commodity markets are generally operated over the production period, they are seasonal. On the other hand, multi-commodity markets are year-round.

The transaction performance of 42 joint markets in 2018 amounted to 340,000 tons or 5% of the 32 public wholesale markets' 6.84 million tons. Shippers prefer large markets, including the Garak market, as they are near consumption areas and form reference prices. Besides, as more than 50% of joint markets are older than 20 years, it is hard to revitalize them due to problems, such as facility aging, limited space, and weak logistical functions.

Wholesale Distribution Structure

Many organizations engaged in the agro-food distribution and public wholesale markets take a considerable volume of it. The central and local governments fund to construct public wholesale markets and local government supervise them, following the Act on Distribution and Price Stabilization of Agricultural and Fishery Products (afterward, the Price Stabilization Act). Another type is joint markets, which agricultural cooperatives and the NACF open and operate based on municipal mayors' approval. Besides, quasi-wholesale markets are running without the central or local governments' supervision due to no specific rules on reporting in the Price Stabilization Act.

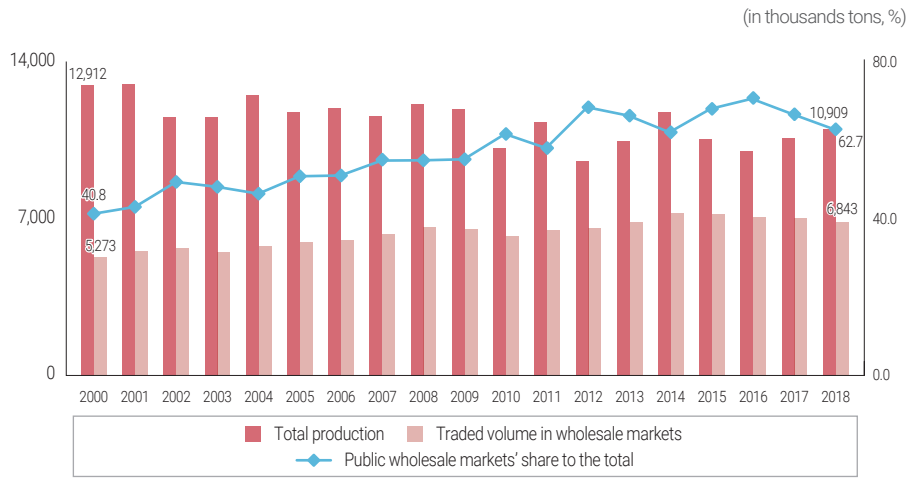
32 public wholesale markets for agricultural and fishery products, established in large cities nationwide for two decades from 1985 to 2004, represent

Table 4-10 Transaction volumes by wholesale market type (2012 ~ 2018)

	Category	2012	2013	2014	2015	2016	2017	2018
Public Wholesale market	Fruit & vegetable	106,036	109,163	101,475	110,785	118,099	115,155	117,084
	Fishery	10.187	9,696	10,559	10,530	11,576	12,713	12,149
	Sub-total	116,214	118,859	112,034	121,315	129,675	127,868	129,233
Cooperative Joint market	Fruit & vegetable	865	923	770	809	783	788	816
	Fishery	3,757	3,565	3,710	3,528	3,155	3,294	3,265
	Livestock	3,203	1,428	1,632	1,671	1,497	1,499	1,258
	Grain	1,109	1,231	666	529	525	464	632
	Medicinal crop	27	23	26	28	25	42	46
	Sub-total	8,961	7,170	6,804	6,565	5,985	6,086	6,017
Private Wholesale market	Fruit & vegetable	211	210	192	204	258	125	141
	Livestock	0	3,217	3,910	3,603	3,444	3,322	3,395
Total		125,386	129,456	122,940	131,687	139,362	137,402	138,786

Source: MAFRA, 2019, *Statistical Yearbook on Agro-fishery Wholesale Markets* (2018).

Figure 4-4 Public wholesale markets' volume traded and share to the total

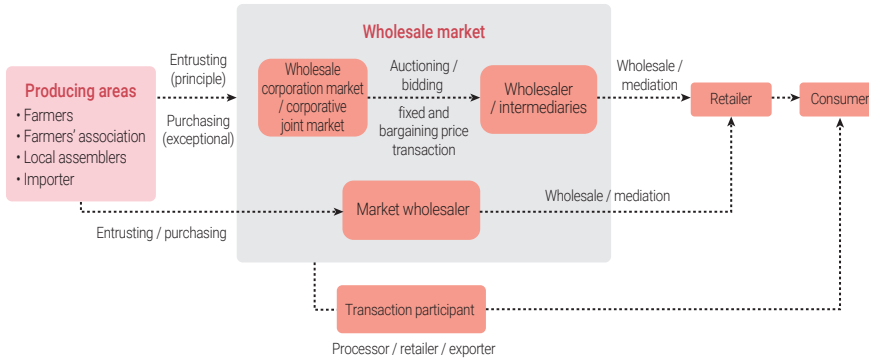


Source: MAFRA, 2019, *Statistical Yearbook on Agro-fishery Wholesale Markets* (2018); Korea Statistical Information Service (kosis.kr: Jul 18, 2019), *The Survey on Agricultural Crop Production*.

wholesale channels in Korea, taking 50% of yearly transactions in fruits and vegetables. The price set at an auction in wholesale markets, especially in the Garak wholesale market, serves as the reference price applied to retailers' transactions. The traded amount in 33 public wholesale markets posted KRW 11.62 trillion or 92.7% of the nation's total. In 2018, the amount rose to KRW 12.92 trillion, taking 93.1% of the entire wholesale transactions.

The total size of transactions through public wholesale markets rose after 2010. However, it became stagnant or shrank after 2014 due to the stagnancy or reduction in fruits and vegetables' transactions. In 2018, the traded size decreased by 2.4% from the previous year, but the total amount rose by 1.1% during the same period. The sold volume of fruits and vegetables increased by 3.8% on an annual average from 2010 to 2014 but reduced 0.9% every year after 2014. In 2018, the traded size amounted to 6.84 million tons (KRW 11.71

Figure 4-5 Wholesale markets' transaction flows



Source: MAFRA. Wholesale market website (http://market.okdab.com/: Jul 18, 2019).

trillion). The ratio of horticultural produce traded in public wholesale markets compared with the production volume of fruits and vegetables was 62.7% in 2018, indicating high reliance on those markets. Consequently, there have been problems, such as high price fluctuations and distribution inefficiency.

Public wholesale markets trade items through auctions and market wholesalers. Auctions include listed transactions and non-listing transactions. The former is used by most wholesale and joint markets. It was registered as an official trading method along with regular-priced private transactions, following the amendment of the Price Stabilization Act in 2012. The latter is a method, in which wholesalers or intermediaries collect items designated for non-listing and trade them through private contracts.

The performance by trading types in 2018 shows that listed transactions accounted for 87.6% of the total size and 86.7% of the transacted amount. The size traded through market wholesalers took 5.0% with the total amount of 6.2%.

The government incorporated regular-priced private transactions, previously

Table 4-11 Ratio of each trading method in public wholesale markets (2018)

(in thousands tons, KRW 100 millions, %)

Category		Total		Fruits and vegetables		Fisheries	
		Quantity	Amount	Quantity	Amount	Quantity	Amount
Auction	Listed	6,275 (87.6)	112,086 (86.7)	5,993 (87.6)	102,401 (87.5)	282 (88.4)	9,685 (79.7)
	Non-listing	527 (7.4)	9,193 (7.1)	509 (7.4)	8,061 (6.9)	17 (5.4)	1,131 (9.3)
	Sub-total	6,802 (95.0)	121,279 (93.8)	6,503 (95.0)	110,462 (94.3)	299 (93.8)	10,817 (89.0)
Market wholesaler (negotiation)		360 (5.0)	7,955 (6.2)	341 (5.0)	6,622 (5.7)	20 (6.2)	1,333 (11.0)
Total		7,163 (100.0)	129,234 (100.0)	6,843 (100.0)	117,084 (100.0)	319 (100.0)	12,149 (100.0)

Source: MAFRA, 2019, *Statistical Yearbook on Agro-fishery Wholesale Markets* (2018).

allowed exceptionally, into the trading principle through the revision of the Price Stabilization Act in August 2012. It intended to resolve price fluctuations caused by changes in supply and demand, contribute to stable transactions between producing and consumption areas, and reduce inefficiencies in distribution due to time and space limitations.

The Korea Agro-Fisheries and Food Trade Corporation's analysis shows

Table 4-12 Ratio of fixed and bargaining price transactions

Category	Local produce			Imported produce		
	Total	fixed and bargaining price transactions	Ratio	Total	fixed and bargaining price transactions	Ratio
2016	5,732,703	964,328	16.82%	438,989	347,283	79.11%
2017 (A)	5,641,467	1,024,321	18.16%	498,861	388,464	77.87%
2018 (B)	5,529,959	1,037,949	18.77%	464,713	367,837	79.15%
Change: (B)-(A)	-111,508	13,628	0.61%	-34,148	-20,627	1.28%

Source: Korea Agro-Fisheries & Food Trade Corporation, internal data.

that the ratio of regular-priced private transactions for local agro-food in 2018 posted 18.77%, 0.61% up from the previous year. The quantity sold through regular-priced private contracts posted 1.4 million tons-23.5%-out of 5.99 million tons in the total of local and imported agricultural products. There are many regular-priced private transactions for imports, as their unit prices are set at the customs clearance.

The government constructed public wholesale markets nationwide to rearrange quasi-wholesale markets and wholesalers for entrusted items. It abolished entrusted transactions, which caused severe damages, and introduced auctioning. As the government pursued transparency and integrity in wholesale transactions, its wholesale market development plan is appraised to be the most successful in its agricultural policy.

Recently, distribution conditions have changed in producing and consumption areas, and innovative technologies are applied to the entire distribution, trading,

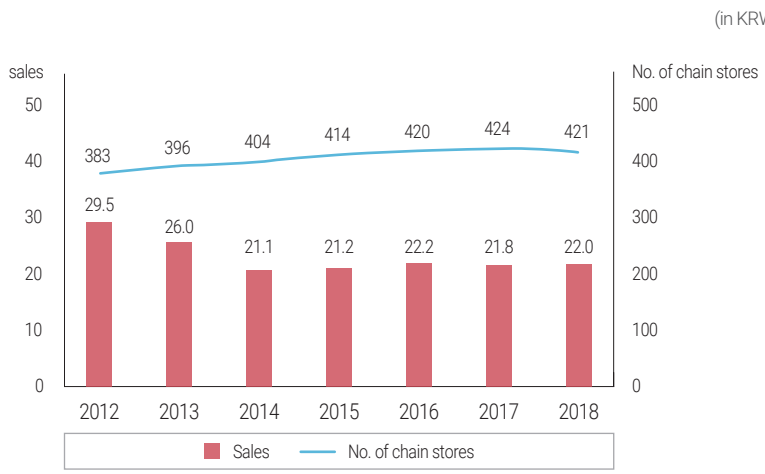
Table 4-13 Sales by retail type in Korea (2015~2019)

(in KRW trillions, %)

Category	2015		2016		2017		2018		2019(p)	
	Sales	Share	Sales	Share	Sales	Share	Sales	Share	Sales	Share
Dept. store	29.0	9.4	29.9	9.3	29.3	8.9	30.0	8.7	30.4	8.7
Discount store	32.8	10.6	33.2	10.3	33.8	10.2	33.5	9.7	32.4	9.3
Supermarket/ general store	43.5	14.1	44.4	13.8	45.6	13.8	46.5	13.5	44.2	12.7
Convenience	16.5	5.3	19.5	6.1	22.2	6.7	24.4	7.1	25.7	7.4
Specialized shop	139.3	45.2	140.9	43.8	139.1	42.0	139.9	40.6	135.4	38.9
Non-store retailer	46.8	15.2	54.0	16.8	61.2	18.5	70.3	20.4	79.6	22.9
Total	307.8	100.0	321.9	100.0	331.3	100.0	344.5	100.0	347.7	100.0

Note: 1) The sales figures exclude duty-free, automobile, and fuel sales.
2) The data for 2019 are provisional.
Source: Korean Statistical Information Service, website (kosis.kr: Jan. 3, 2020).

Figure 4-6 Big 3 Discount chain stores and their sales



Note: The figures are the sums of major big 3 discount stores (Lotte Mart, E-Mart, Homeplus).
Source: Lotte Shopping website. Saramin website. E-Mart website. e-Daily (Mar. 26, 2019).

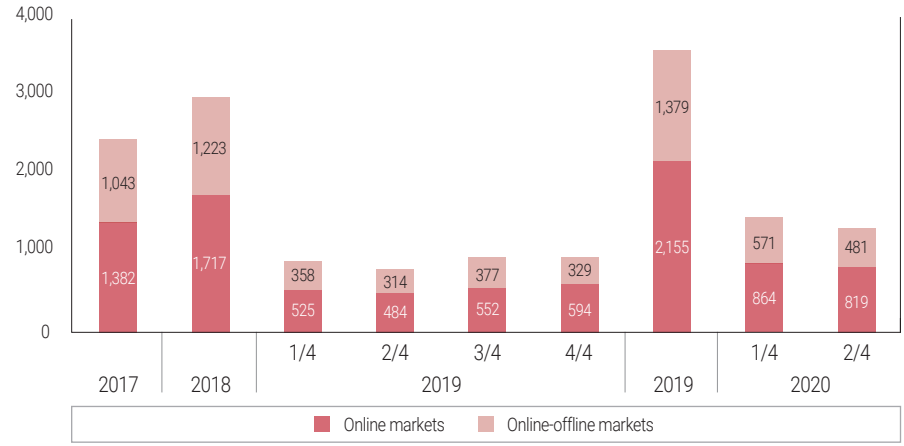
and logistics. The transformation calls for changes in wholesale markets' functions and facilities and trading methods. Against this backdrop, Korea's distribution structure needs to approach such changes from a future-oriented and inclusive perspective.

Retail Distribution Channels

Large-scale local and global distribution firms adopted modern retailing methods such as supermarkets and department stores and contributed to restructuring Korea's markets for agricultural produce distribution through systemization and franchising. In the meantime, traditional retailers, such as small local assemblers, traditional markets, and grocery shops, have declined rapidly.

Figure 4-7 Purchase amount of agro-fishery and livestock products by online marketplace type

(in KRW billions)



Source: Statistics Korea. *Service Industry Survey*.

However, large-scale assemblers' growth has recently slowed down. The sales by retailer type show that specialized retailers' sales posted KRW 140 trillion, or 40.6% of the total, followed by non-store (online) retailers' KRW 70 trillion (20.4%) and supermarkets and general stores' KRW 47 trillion (13.5%). On the other hand, department stores, hypermarkets, and specialized retailers have grown flat for five years.

In particular, the number of hypermarket chain stores peaked in 2017 and decreased to 421 in 2018. The sales peaked at KRW 30 trillion in 2012. The figures slowed down and finally declined to KRW 22 trillion in 2018.

COVID-19 has changed consumption and distribution patterns to non-face-to-face and online marketing is likely to spread fast. Amid such changes, post-pandemic innovation will transform agro-food retailing.

Online shopping malls are virtual shops where goods and services are traded virtually. If the consumer click a product based on information provided online and pay online, it is delivered to a place they choose. Agro-food sales through virtual marketplaces are on the rise, and the types of online markets vary widely.

Consumers and intermediaries used to look at and touch items to make a choice for purchasing. However, non-face-to-face transactions are likely to expand and considerably replace traditional offline transactions in the era of post-COVID-19. Food companies, restaurants, and retailers concentrate on developing home-meal replacements (HMR) and boosting online sales and delivery services. The innovative change is likely to require enormous changes in agro-food wholesaling and distribution.

Direct Transactions of Agricultural Produce

Producer-consumer direct transactions were a common way of trading in primitive or self-sufficiency economies. However, as social progress and urbanization drew clear lines between urban and rural areas, massive distribution has become mainstream, with only 10% of transactions made directly between farmers and consumers.

Nevertheless, since the 1980s, smallholding farmers, including eco-friendly, aged, or hobby farmers, and tourist farms, such as pick-your-own farms, have engaged in direct transactions with consumers through weekend marketplaces, farmers' markets, or roadside farm stands.

The U.S. enacted a law on direct transactions in 1976. In the 1980s, farmers' markets opened as a venue for local farmers to sell their produce directly to consumers every week. The number of farmers' markets grew continuously, with 1,800 in 1994, 4,000 in 2005, 8,000 in 2015, and 8,700 in 2017.

Table 4-14 Number of local food direct stores in Korea

Category	2013	2014	2015	2016	2017	2018	2019
Nationwide	32	71	103	154	188	229	469
Supported by aT	11	33	49	73	95	111	123

Source: Korea Agro-Fisheries & Food Trade Corporation (aT).

In Japan, as the government supported a nationwide drive for direct transactions in the early 1980s, farmers' associations and agricultural cooperatives started to trade with consumers through roadside farm stands and local food direct outlets. The number of direct stores increased rapidly, with 13,538 in 2005, 16,816 in 2009, 23,600 in 2015. In 2015 alone, around 50% of direct stores (11,000-11,500) were permanent stores, accounting for JPY 1 trillion (KRW 10 trillion) in sales.

In Korea, the Kim Dae-jung administration in 1998 targeted innovating distribution and vitalizing direct transactions in its agricultural policy. It helped farmers' associations open joint markets and marketplaces for direct transactions. Afterward, in May 2013, the government established a comprehensive plan for agricultural produce distribution to improve wholesale market operation, reorganize distribution platforms focusing on local cooperatives' roles, fostering large-scale livestock packers, and systemize demand and supply. In line with the plan, the government endeavored to expand direct outlets for local food and online transactions. Since then, direct transactions between farmers and consumers have become popular. The government started to support direct shop opening through the Korea Agro-Fisheries and Food Trade Corporation (aT).

In 2019, the government implemented measures to increase local food stores connected with the local food plan phase-by-phase every year. The Ministry

Table 4-15 Numbers of Nonhyup's direction stores for local food and participating farmers

Category		2016	2017	2018	2019
No.	Independent shop	18	25	34	42
	Shop-in-shop, corner shop	82	105	166	348
	Total	100	130	200	390
Participating farmers		12,923	19,201	28,911	34,272

Source: NACF.

of Agriculture, Food, and Rural Affairs (MAFRA) announced a 3-year action plan to promote local food in June 2019. It worked with Nonghyup to nurture nationwide Hanaro Mart stores for local food sales. It targeted increasing the number to 1,200 by 2022 to increase the local food distribution ratio from 4.2% in 2018 to 15% in 2022.

32 direct outlets for local food opened nationwide in 2013, and the number grew to 103 in 2015 and 229 in 2018. In 2019, the government actively supported direct store opening to help smallholders, aged farmers, and migrated farmers. As a result, 240 direct outlets opened in 2019 alone. Currently, 469 stores are in operation, and the government plans to increase the number. The Korea Agro-Fisheries and Food Trade Corporation supports 128 out of the total.

To break down the total of local food stores nationwide, Nonghyup manages 390 stores in 2019. 42 of them are independent stores, and 348 are shop-in-shops or corner shops in Nonghyup's Hanaro Mart.

Distribution Policy for Agricultural Produce

Marketing Arrangement and Marketing Order

The marketing arrangements and the marketing orders were programs to adjust the supply of agricultural produce during the Great Depression in the U.S.

Agricultural producers changed shipping volumes to respond to overproduction, regulate product quality, or set the standards. As the marketing arrangement was a voluntary program, farmers who did not participate received relatively more benefits. Because of the free-rider issue, the government applied the marketing order which required all beneficiaries' participation.

In Korea, Article 10 of the Act of Distribution and Price Stabilization of Agricultural and Fishery Products specifies the marketing arrangement as follows: "The representatives of producers, local assemblers, storage business operators, wholesalers, retailers and consumers of major agricultural and fishery products (hereinafter, referred to as "producers, etc.") may enter into an agreement to adjust production or to adjust shipment (hereinafter, referred to as "distribution agreement") for the automatic adjustment of the supply of and demand for and improvements in the quality of the relevant agricultural and fishery products." Also, the Article regulates that the Minister of Agriculture, Food and Rural Affairs or the Minister of Oceans and Fisheries may order producers of perishable products to adjust production or shipment for a specific period, in consultation with the Fair Trade Commission.

Under the Act, the distribution control committee is in operation, consisting of the representatives of producers, local assemblers, storage business operators, wholesalers, retailers, and consumers. The target items (ten items, including highland cabbage, winter cabbage, garlic, onion, tangerine, and kiwi fruit) were selected based on production specialization and concentration in major production areas. Producers who signed for distribution control follow the committee's order and receive payments for their losses and expenditures. They also have favorable conditions for contract-based cultivation and subsidy support.

Positive effects from distribution control include: i) price stabilization through

reduced uncertainty, ii) price and income increase, iii) enhanced distribution order, iv) market power's transfer to producers, v) market information and efficiency, vi) quality improvement, vii) demand expansion through R&D and advertising. On the other hand, consumer price increase, consumers' choice reduction, and the free-rider issue are possible adverse effects.

Check-off Program

Check-off programs collect funds mandatorily or voluntarily based on producer organizations' decision to use them for specific purposes. In general, producers of a specific agricultural commodity or local assemblers collect a particular amount of funds (usually, 1~2% of the collaborative sales) and use them to expand consumption through advertising, market pioneering, education, and research.

The government introduced the check-off program to nurture agricultural commodity producers' organizations nationwide. Thus, it has used matching funds by providing 100% of the funds collected by producers' organizations. The check-off program has expanded in quantity. However, there is a criticism that its performance failed to meet expectations, as only a few producers participated in the program, and stakeholders pursued their selfish interest.

To improve the program, the government revised the Act on the Formation and Operation of the Check-off Program, and expanded the target scope from the members of a mandatory check-off program to all farmers or fishers for the relevant commodity. The revised law prepared grounds for promoting check-off programs by raising producers' participation. Besides, it set rules to prevent free-riders from getting access to various supports for production, distribution, and demand and supply control. Currently, twelve mandatory and thirteen arbitrary check-off programs for 25 commodities are in operation. Also, the

setup of mandatory programs for onion and garlic is in progress to prevent the commodities' price plunges. The check-off mechanism is vital to promote consumption, supply control, and research led by commodity producers. It is time for the government and stakeholders, including producers, to cooperate using the check-off mechanism to increase Korean agro-fishery products' competitiveness.

Future Outlook and Tasks

Korea's agricultural product distribution has changed fast for decades. Public wholesale markets led the change in the 1980s and 1990s. In the 2000s, mega-retailers' influence became significant. In the future, as consumers tend to eat out increasingly, the restaurant industry is likely to grow further. Along with the trend, its demand for agricultural products will increase.

COVID-19 will speed up the transformation in the agricultural product distribution. Face-to-face transactions are continuously replaced with virtual transactions. As consumers get familiar with e-commerce for agro-food purchases (B2C) and retailers and restaurants expand their purchases online (B2B), commodity producers need to appropriately respond to the trend. Local distribution facilities (APCs and RPCs) are set for offline transactions by packing produce and shipping to wholesale markets. Now it is time for them to upgrade equipment and labor forces for customized packing and processing in e-commerce. Thus, the government's policy direction for distribution is to build electronic frameworks for storage, packing, processing, and transportation to effectively respond to virtual demand.

Although 33 public wholesale markets nationwide have functioned for offline transactions for agricultural produce shipping and auctioning, they need to get

ready for a massive transformation. There should be platforms for virtual trades in wholesale markets or between producers and consumers, such as online auctions and transaction systems. In Europe, online auctions are already popular based on producer information, product quality, standards, and images. Then, products are delivered after deals are made. Korea can follow Europe's example. Furthermore, it can build platforms for producers' and consumers' associations to participate in online auctioning or regular-priced private contracts.

Trust building is crucial for agricultural product distribution. In particular, to expand online transactions in the post-COVID-19 era, farmers and producers' organizations should pursue trustworthy qualities and standards customized for consumers. Also, intermediaries should make deals based on trust so that consumers will increase virtual purchases.

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2. Food Industry

Korean people's income increases, and so do their expenses for processed food and dine-out. Against this backdrop, there have been endeavors to link the food industry and agriculture. As the former can raise agricultural produce values and expand its markets, the linkage between the two is significant for the government's policy direction.

The food industry's scope includes food processing, food marketing, and food- service sectors. In a broad sense, it includes food processing, commodity mediation, transportation/ storage, food processing machines, packing, restaurants, and wholesaling/ retailing.

The government enacted the Food Industry Promotion Act in 2008 to implement food policies to nurture the traditional food sector, globalize Korean food (hansik), and support research activities and medium-sized food manufactures. The Ministry of Agriculture, Food, and Rural Affairs (MAFRA) has announced a plan to promote the food industry every five year in 2008, 2013, and 2018.

State of the Food Industry

Food Manufacturing

Agriculture's share in the national economy has shrunken, but the food industry's significance in agriculture-related industries has become bigger gradually. The ratio of agricultural production to all sectors reduced from 3.3% in 2000 to 1.9% in 2019. However, the food industry's share in agriculture-

Table 4-16 Ratio of agriculture and food-related industries

	2000			2010			2019		
	Added value (KRW billions)	Ratio		Added value (KRW billions)	Ratio		Added value (KRW billions)	Ratio(%)	
		to (A)	to (B)		to (A)	to (B)		to (B)	to (B)
Total added value (A)	819,508	100.0		1,299,273	100.0		1,685,594	100.0	
Agri.-related industries (B)	73,103	8.9	100.0	84,423	6.5	100.0	95,437	5.7	100.0
Agri. production	27,070	3.3	37.0	30,888	2.4	36.6	32,859	1.9	34.4
Food industry	46,033	5.6	63.0	53,535	4.1	63.4	62,578	3.7	65.6
- Food manufacturing	16,094	(2.0)	22.0	17,372	(1.3)	20.6	22,265	(1.3)	23.3
- Foodservice	29,939	(3.7)	41.0	36,163	(2.8)	42.8	40,313	(2.4)	42.2

Note: 1) The Table uses raw data by economic activity in 2015.
2) The food service sector includes lodging and restaurants.
Source: Bank of Korea (BOK), National Accounts.

related industries rose from 63.0% to 65.6%.

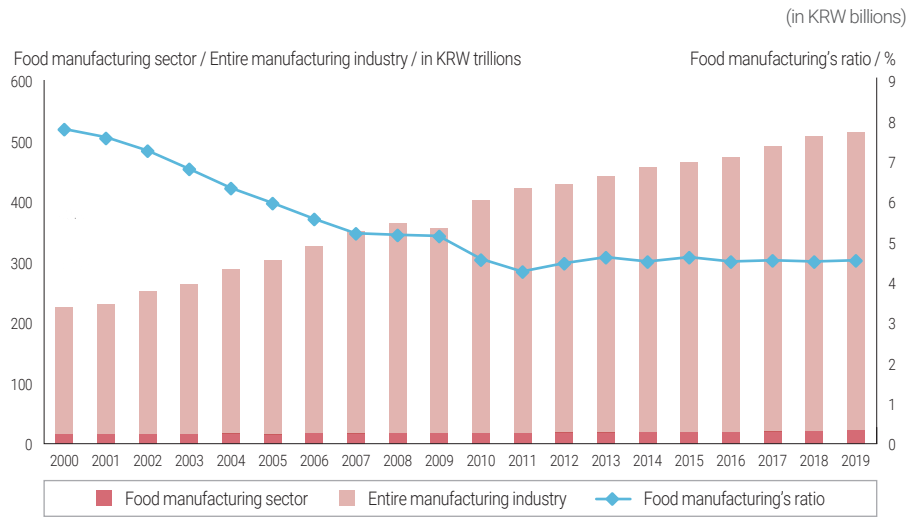
The food manufacturing sector's ratio to the gross domestic product (GDP) is on the decline. Its production amount and values continuously grew, but the growth rate has slowed down compared with other manufacturing industries due to changes in the industrial structure[2)].

The food manufacturing industry's added value rose from KRW 16.1 trillion in 2000 to KRW 22.3 trillion in 2019. However, the food manufacturing industry's added value compared with the entire manufacturing sectors decreased from 7.8% in 2000 to 4.5% in 2019.

The number of food manufacturers and production size have increased

2) Korea's manufacturing industry breaks down to 12 sectors, including food/ beverage manufacturing, textile/ leather product manufacturing, wood/ paper/ printing/ reproduction, coke and refined petroleum product manufacturing, chemicals/ chemical product manufacturing, non-metallic mineral manufacturing, primary metal manufacturing, metal product processing, computer/ electronics/ optical device manufacturing, electrical equipment manufacturing, machinery/ equipment manufacturing, and transportation equipment manufacturing. The computer/ electronics/ optical device manufacturing sector and the machinery/ equipment manufacturing grew by 17.8% and 0.8%, respectively, in 2019 compared with 2000. On the other hand, all other sectors declined.

Figure 4-8 Changes in food manufacturing's ratio in added value (real) to total manufacturing



Note: The data used is GDP and GNI (raw data of each year) by economic activity in national accounts of the Bank of Korea.
Source: Bank of Korea, National Accounts.

Table 4-17 Number of food manufacturers and sales volume

Year		No. of firms (Number)	Sales (in KRW 100 millions)	Sales per firm (in KRW 100 millions)
1990		4,654	147,108	31.6
1995		6,248	262,342	42.0
2000		6,421	371,997	57.9
2005		8,389	482,642	57.5
2010		4,269	654,462	153.3
2015		5,133	887,409	172.9
2016		5,274	866,112	164.2
2017		5,481	897,179	163.7
2018		5,616	920,132	163.8
Avg. change per year (%)	1990-2000	3.3	9.7	6.2
	2000-2010	-4.0	5.8	10.2
	2010-2018	3.5	4.4	0.8

Note: The figures for 1990~2005 are firms with five or more employees. The figures for 2007~2013 are firms with ten or more employees.
Source: Statistics Korea, each year, the Mining and Manufacturing Survey.

Table 4-18 Food manufactures' employment size and sales (2018)

Sector	Grocery manufacturing		Beverage manufacturing		Entire food manufacturing	
Employment size	No. of firms	Sales (KRW 100 millions)	No. of firms	Sales (KRW 100 millions)	No. of firms	Sales (KRW 100 millions)
10 ~ 19	2,471	96,540	90	1,822	2,561	98,362
20 ~ 49	1,939	175,801	97	12,395	2,036	188,196
50 ~ 99	581	158,140	39	20,328	620	178,468
100 ~ 199	224	146,703	25	31,578	249	178,281
200 ~ 299	77	104,594	11	23,775	88	128,369
300 ~ 499	32	57,688	9	29,047	41	86,735
500 or more	21	61,721	-	-	21	61,721
Total	5,345	801,187	271	118,945	5,616	920,132

Source: Statistics Korea, the Mining and Manufacturing Survey.

continuously since 2010. The sales per firm rose from KRW15.33 billion in 2010 to KRW 16.38 billion in 2018, posting annual growth of 0.95% during the period.

81.9% of food manufacturers with ten or more employees are small firms with 50 or fewer employees.

Foodservice Industry

The foodservice industry is growing fast thanks to changes in dietary habits and food cultures impacted by the five-day workweek, women's social advancement, interest in health and leisure, and the population aging. Its progress has changed agro-food consumption patterns from fresh agricultural produce to processed food and dine-out. Also, foodservice types-previously, Korean, Chinese, Japanese, and Western restaurants-have become diverse with the rapid growth of family restaurants, franchised restaurants, fusion restaurants, and catering services.

Concerning food expenses for urban households, the home-cooked meal expenses decreased from 51.9% in 2006 to 49.9% in 2019, while the dine-out

Table 4-19 Changes in households' food purchase and dine-out spending (as of 2015)

(in KRW, %)

Year	Total spending (A)	Food expenses (B)	B/A	Dine-out expenses (C)	C/A
2006	479,882	248,895	51.9	230,987	48.1
2007	489,825	249,440	50.9	240,385	49.1
2008	510,281	262,175	51.4	248,106	48.6
2009	503,455	262,698	52.2	240,757	47.8
2010	529,615	279,893	52.8	249,722	47.2
2011	558,869	300,839	53.8	258,030	46.2
2012	576,854	309,755	53.7	267,099	46.3
2013	580,296	308,622	53.2	271,674	46.8
2014	589,032	308,520	52.4	280,512	47.6
2015	587,125	306,744	52.2	280,381	47.8
2016	582,371	300,750	51.6	281,621	48.4
2017	701,275	360,273	51.4	341,002	48.6
2018	702,805	366,672	52.2	336,133	47.8
2019	666,110	332,558	49.9	333,552	50.1
Avg. change per year (2006-2019)	2.6	2.3	-	2.9	-

Source: Statistics Korea, each year, the Household Income and Expenditure Survey.

spending increased from 48.1% to 50.1% during the same period.

Restaurant and catering services grow, and so does the food ingredients sector, including fresh-cut food. As lifestyle changes and distribution technologies progress, distribution patterns have transformed from an original state to a convenient form for easy use.

Fresh-cut food sales grew by 22.9% annually on average after 2008 (7.9 times increase in a decade), posting KRW 181.7 billion in 2018. In particular, its sales increased by 48.3% between 2016 and 2017. (See the Table below.)

Table 4-20 Fresh-cut food production and sales

(in KRW millions, %)

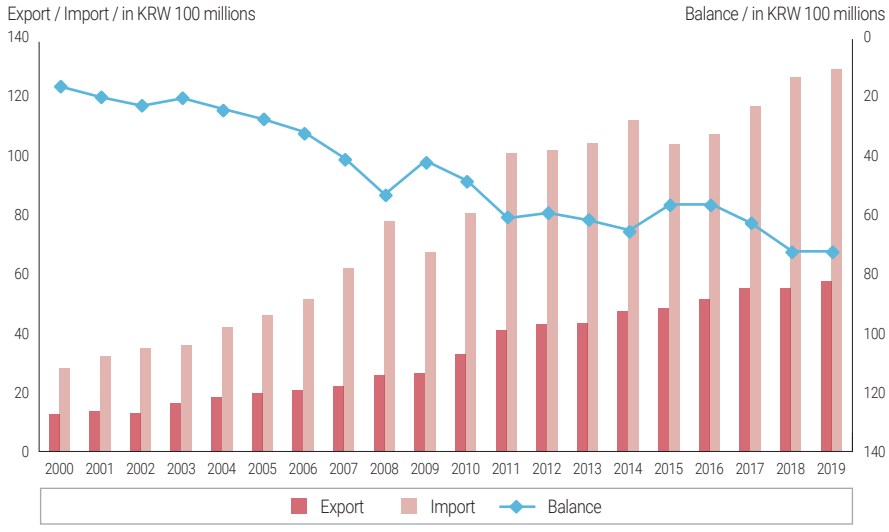
Year	Production	Sales
2008	23,497	23,119
2010	44,283	43,217
2011	61,052	60,071
2012	69,204	65,256
2013	83,219	78,340
2014	76,297	83,439
2015	82,115	95,566
2016	96,263	109.959
2017	137,160	163,041
2018	156,965	181,734
Avg. change per year (2008-2018)	20.9	22.9

Source: Ministry of Food and Drug Safety, each year, the Production of Food and Food Additives.

Food Imports

While food exports have slowed down, imports rise continuously, resulting in trade deficits. Imports rose by 8.7% every year from KRW 1.29 billion in 2000 to KRW 5.79 billion in 2019. In the meantime, exports increased by 8.5% per year from KRW 2.87 billion to KRW 12.99 billion. Consequently, trade deficits increased from KRW 1.58 billion to KRW KRW 7.19 billion during the same period. As Korea exports goods, including ramen (instant noodles), sugar, coffee products, and beverages, to Japan, the U.S., Russia, and China, it needs to diversify export items and destinations.

Figure 4-9 Food import and export trends



Note: 1) Korea's trade statistics are used for export amounts from 2000 to 2010. For the other figures, IHS Markit data is used.
2) Food item codes are defined as HS Codes 04, 11, and 15~24.
Source: Trade Statistics, IHS Markit.

Use of Local Ingredients in the Food Industry

Agriculture supplies high-quality commodities to food manufacturers, contributing to the food industry's progress and public health. As the food industry uses local agricultural products, it raises agricultural products' values, expands farmers' income, and contributes to agricultural progress. In other words, agriculture and the food industry are in a win-win relationship.

Therefore, the food industry can play a vital role in expanding the demand for local produce. Besides, it can help to redefine agriculture's role and contribute to cultural development. An increase in exports, including Korean food restaurants and traditional food, is likely to raise Korea's international status by

Table 4-21 Food manufacturers' use of local ingredients

(in KRW millions, %)

Year	Total ingredients used (A)	Local ingredients used (B)	Local's share (B/A×100)
2012	1,504	448	29.7
2013	1,508	470	31.2
2014	1,565	489	31.3
2015	1,634	515	31.5
2016	1,651	519	31.4
2017	1,715	538	31.4
2018	1,787	559	31.3

Source: MAFRA, the 2019 Survey on the food industry's ingredient consumption.

globalizing Korean food and spreading its food culture.

Agricultural and livestock products used for food manufacturers' production amounted to 17.87 million tons in 2018. Local products took 31.3% of the total. The total of food ingredients by year grew every year: 15.04 million tons in 2012, 15.08 million tons in 2013, 15.65 million tons in 2014, 16.34 million tons in 2015, 16.51 million tons in 2016, 17.15 million tons in 2017, and 17.87 million tons in 2018. Local produce also increased every year, with a 3.9% increase in 2018 from the previous year.

Korea's agricultural policy should shift its focus from agricultural products' supply to consumption or consumers' markets. Therefore, promoting the food industry's use of local ingredients has significance in increasing agriculture's values.

Based on this thought, the government plans to nurture agro-processing firms for local produce, increase demand for processed local products, promote the production and consumption of traditional food products, identify traditional food items, and globalize Korean food.

Major Policies for the Food Industry

Nurturing the Traditional Food Industry

The list of traditional Korean foods includes royal court foods, regional dishes, and dishes for special occasions, such as weddings and funerals. Traditional foods are made from ingredients locally produced. In particular, regional dishes mean foods popular in a region generation after another generation which are cooked with a specific region's cuisine using ingredients grown in the area. As regional foods are seasonal dishes made with local food materials, they are similar to slow foods or local foods, based on the concept that dishes made with seasonal ingredients locally produced will keep the doctor away.

Traditional liquor, sauces, vinegar, tea, rice cakes, and kimchi represent traditional Korean foods. Their market grew by 12.7% from KRW 550 billion in 2016 to KRW 620 billion in 2018. The government has fostered the nation's excellent cuisine styles and values by discovering traditional culinary masters, building production bases, and advertising for consumption.

For example, the government selects excellent traditional liquor, links liquor distilling to tourism, and expands consumption at home and abroad. Its distillery visit program selects an excellent distillery, develops it for tourism, and appoints a celebrity as a PR ambassador for marketing purposes. The Korean culinary master program has picked 78 masters in traditional liquor, cookie, sauce, rice cake, and kimchi since 1994 to keep the tradition of Korea's culinary culture.

Promoting Traditional Korean Cuisine (*Hansik*)

The Ministry of Agriculture, Food, and Rural Affairs has implemented a policy to globalize traditional Korean food since 2008 to spread it worldwide and create economic values. For the goal, it put various programs into action

to build a base for globalization, improve Korean restaurants' competitiveness worldwide, advertise Korea's culinary culture. It enacted the Korean Food Promotion Act in August 2019 to prepare a legal base for promoting Korean food. With the spread of K-pop and the Korean Wave, Korean food advertising and experience programs have gained more attention than before. Against this backdrop, the government has endeavored to nurture Korean cuisine professionals and send culinary interns to other countries for Korean food marketing.

In 2020, the government plans to hold a Korean food event as a sideline to a large-scale ceremony and promote Korean food online. It will cooperate with local governments to discover and foster excellent ideas for culinary tourism. The Korean Culinary Culture Center plans to hold lectures on Korean cuisine and experience programs targeting international visitors.

Enhancing the Infrastructure

For competitiveness in the food industry, the government needs to set up infrastructures to foster professionals, provide information, promote technology transfer, link to agriculture. For trust building with consumers and product standardization, the government has enacted or revised food criteria and operated the country of origin labeling. It tries to create jobs for the youth by providing education in food and restaurant businesses. The government also collects and analyzes related statistics to share them with foodservice providers and use them for policy directions.

Enhancing a link between agriculture and the food industry is vital for creating added values in the former. The government encourages producers' associations and food businesses to cooperate for contract-based cultivation and supports dealings on credit to promote joint growth between the two

sectors and expand consumption. It also supports building an infrastructure to transfer superior technologies developed and obligates small food businesses to follow the HACCP principles. To help them meet up to the guidelines, it provides grants to upgrade their manufacturing facilities for better quality and safety.

Food Research and Development

R&D investments in the food industry is less than 1% of the nation's total[3]. In 2019, the government's R&D investment in the food industry amounted to KRW 0.18 trillion out of KRW 20 trillion in total. the R&D investment in the food industry was 0.38% compared with the sales, lower than 2.22% in the manufacturing (Bank of Korea's corporate management analysis in 2018). However, as Korea's food technological levels are 79.8%[4] of the advanced countries and lag by 4.0 years, the nation needs to keep up by nurturing professionals and technological infrastructures.

With the enactment of the Food Industry Promotion Act in 2007, the government set a ground for food technology development. It selected the field of high value-added food for technological development projects. In detail, those projects sponsored ideas to enhance agro-food functions, commercialize traditional foods, develop food quality and distribution technology for safe supply, and improve packing skills and equipment. In 2019, the government changed directions for its projects to pioneer new markets following the consumption trends and focused on applying state-of-art technologies to food products.

The food R&D budget doubled from KRW 18.3 billion in 2010 to 38.3 billion

3) The government's R&D budget for 2019 was KRW 20.53 trillion. General accounts took KRW 16.37 trillion of the total with special accounts KRW 2.43 trillion, funds KRW 1.73 trillion (Han Woong-yong and Kim Joo-il (2019: 1), *The Analysis of the Government's R&D Budget*, Korea Institute of Science & Technology Evaluation and Planning.)
4) Korea Institute of S&T Evaluation and Planning (2018: 64), *Evaluation on Technologies in 2018*.

in 2015. However, it declined to KRW 21.0 billion in 2019. The government used matching funds for R&D support. While, large conglomerates invested 50% of the total cost with medium-sized companies 40% and small ones 25%, the government supported the rest. Research tasks were selected through evaluation processes. Research outcomes between 2015 and 2019 included 234 technology transfers, 1,026 applications for intellectual property rights, and KRW 2.03 billion of royalties

Fostering the Functional Food Industry

As consumers become more interested in health with their income growth, the functional food sector is rising worldwide. Korea's market size grew by 11% per year, from KRW 2.0 trillion in 2014 to KRW 3.1 trillion in 2018. The global market also increased by 5.9% annually from USD 96.4 billion in 2012 to USD 136 billion in 2018. In the future, as the government will allow regular foods' function claims for ingredients with scientific grounds, the functional food market is likely to grow further. Accordingly, the government will make guidelines on function claims and revise the regulation on function claims and claims that are not deemed unfair.

With improved function claim rules, research on agro-food resources to replace imported ingredients with local ones is underway. So are the endeavors to build infrastructures for local agricultural produce's use in functional food.

Nurturing Small Food Manufacturers

In 2018, 81.9% of food manufactures were small firms hiring less than 50 employees. The government provides consulting services to small food companies to improve their competitiveness and select and foster excellent businesses. Consulting services include management counselling, mentoring,

and site visits for problem solving. Small companies can request in-depth consulting on eight fields, including management, accounting, design, and HACCP guidelines or short-term counseling to resolve their specific problems. As small companies face limitations in investing in food quality and sanitation, the government provides them with specialists' consulting on those areas.

Also, the government helps cooperative businesses between farmers and small food companies to find sales channels. As of May 2020, the Ministry of Agriculture, Food, and Rural Affairs, in cooperation with the Ministry of SMEs and Startups, selected 474 companies and gave particular space in the post office shopping mall to advertise and sell their products. Also, small food manufacturers had opportunities such as meetings with buyers and food exhibitions to pioneer new sales channels.

Fostering a National Food Cluster

After concluding the FTA negotiations with the U.S. in 2007, the government planned to create a national food cluster in Iksan, Jeolla namdo Province in 2009. Its purpose was to drive agricultural and fishery development by enhancing food industry infrastructures. The national food cluster is complex for food manufacturers, food research centers, and business support facilities.

As of December 2019, 90 firms were located in the complex. The government constructed technological support facilities for functionality evaluation, quality control, packing, pilot planting, and sauce development. It also built online platforms to help the companies in the cluster resolve business problems and open online shops in overseas online shopping malls, such as Alibaba and Amazon.

In the future, the government plans to attract new food corporations to the cluster by giving investment incentives. It will also construct tech-facilities for functional food and home-meal replacements to secure future growth engines.

3. Agricultural Input Industry

In Korea, as in advanced countries, the stable supply of high-quality, low-cost farm machinery brought about productivity increase and cost-saving, contributing to food security and the green revolution. So it can be said that agricultural progress in Korea and other countries has been possible thanks to stable machine supply through collaborative endeavors among their governments, research institutes, universities, and the agricultural machinery industry.

Korea's farm machine market amounts to KRW 18 trillion, taking over 40% of agricultural production (KRW 44 trillion). Therefore, the farm machinery sector significantly influences the nation's entire economy.

Recently, research and development in high-tech machinery gain more attention with the emergence of smart farming and the 4th industrial revolution. Various precise farm machines for sustainable agriculture will be in considerable demand. The government, research institutes, and farm machine manufacturers should cooperate to go beyond the current quantity-oriented growth.

Agricultural Machinery Industry

Market Trends

Korea's agricultural mechanization was fast and broad in the 1990s. During the decade, the government-supported farm machine supply amounted to 300,000 machines per year to a total of 3.4 million.

In the 2000s, the production of high-performing large machines grew with

Table 4-22 Production of major agricultural machinery

Category	2000	2005	2010	2015	2016	2017	2018
Power tiller	7,005	4,793	3,877	3,081	1,573	1,447	1,865
Tractor	23,315	31,594	30,343	48,850	49,056	48,831	59,147
Rice transplanter	20,854	5,640	7,312	3,856	2,007	2,492	1,803
Combine-harvester	11,714	4,136	4,665	2,231	2,437	1,907	1,371
Master	9,890	17,837	18,551	20,369	19,162	21,942	19,968
Total	72,778	64,000	64,748	78,387	74,235	76,619	84,154

Source: Korea Agricultural Machinery Industry Cooperative and the Korea Society for Agricultural Machinery, each year, *the Yearbook on Agricultural Machinery*.

rising demand. From 2005 to 2015, the number of machines supplied was less than 700,000. However, the amount increased after 2015, with high demand for farm tractors and masters. 500,000 tractors and 200,000 masters were supplied after 2015. On the other hand, power tillers, rice transplanters, and combine-harvesters were in slow demand.

As precise high-tech machines replace small and obsolete devices, the number of machines held by farmers is decreasing. However, the trend does not

Table 4-23 Number of agricultural machines held by farmers

Category	2000	2005	2010	2015	2016	2017	2018
Power tiller	939,219	819,684	698,145	598,279	582,352	567,070	544,411
Tractor	191,631	227,873	264,834	282,860	285,968	290,146	290,258
Rice transplanter	341,978	332,393	276,310	213,405	202,320	195,704	187,466
Binder	72,315	60,008	-	-	-	-	-
Combine-harvester	86,982	86,825	81,004	78,984	77,349	77,012	74,700
Master	378,814	392,505	407,997	407,134	408,247	407,203	402,782
Grain drier	55,573	70,363	77,830	78,311	78,589	79,029	76,554
Total	2,066,512	1,989,651	1,806,120	1,658,973	1,634,825	1,616,164	1,576,171

Source: MAFRA, each year, *Major Statistics on agro-fishery food*.

mean that mechanization goes backward. In fact, it progresses further.

The number of all machinery types declined except for tractors, masters, and grain driers. The production of tractors, masters, and grain driers peaked in 2010 and then slowed down. It has decreased after its model changed from the walk to the rider, regarding the rice transplanter. The number of combine-harvesters has also declined with the introduction of new large-scale models.

Agricultural Machinery Imports and Exports

As farm households replace their obsolete devices with high-performing machines, the number of machines they hold has decreased. While local demand has declined, the export volume is on the rise.

With the shrinking demand in the local market (currently, KRW 1 trillion equivalent to USD 1 billion), Korean machine manufacturers should turn to international markets.

They are aware of the situation and try to pioneer global markets. The export volume has increased every year, and it first exceeded USD 1 billion in 2018. In the meantime, farm machines' import has grown continuously. Recently, it posted USD 550 million, resulting in a trade surplus of USD 500 million.

Tractors are the largest contributor to exports, sharing 50% of the total. Their export volume expanded over ten times from USD 45 million in 2000 to

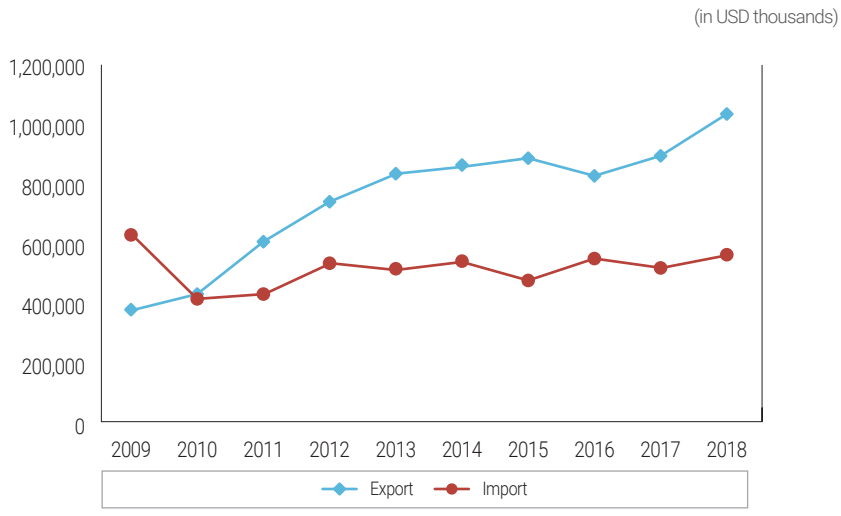
Table 4-24 Imports and exports of agricultural machinery

(in USD thousands)

Category	2009	2010	2015	2016	2017	2018
Export (a)	375,457	433,557	891,364	828,551	900,549	1,042,190
Import (b)	632,205	419,125	475,922	547,401	521,632	561,142
Balance (a-b)	13,252	14,432	415,442	281,150	378,917	481,048

Source: Korea Agricultural Machinery Industry Cooperative, each year, *Major statistics on imports and exports*.

Figure 4-10 Imports and exports of agricultural machinery



Source: Korea Agricultural Machinery Industry Cooperative and the Korea Society for Agricultural Machinery, each year, *the Yearbook on Agricultural Machinery*.

USD 550 million recently. Machine components position the second in terms of export volume. Small machines, including engines, rice polishers, pest control machines, small farm devices, and threshers, are also exported, although their volumes are small.

The largest importer of Korean machinery is the U.S., taking 55% of the total export, followed by Uzbekistan (5%, USD 50 million), Japan (4%, USD 40 million), and Australia and China (3%, USD 30 million, each).

The Asia-Pacific region's farm machine markets are expected to grow fast and take over 25% of Korea's export. Besides, its export to the Commonwealth of the Independent States and Middle East nations will rise further.

Table 4-25 Export size by machine type

(in USD thousands)

Category	2000	2005	2010	2015	2016	2017	2018
Tractor	45,143	203,608	222,693	556,093	532,256	545,196	652,487
Components	28,622	46,769	47,128	120,686	101,938	102,574	114,751
Working machines	2,083	8,138	51,929	73,969	66,970	73,156	89,084
Others	9,415	10,762	33,357	97,288	87,692	143,836	161,621
Pump	16,260	-	-	-	-	-	-
Rice transplanter	1,484	11,284	10,631	4,345	5,281	6,438	346
Rice polisher	4,968	28,242	44,807	18,732	20,783	18,719	16,833
Combine-harvester	4,417	8,543	14,573	12,852	4,133	4,955	1,971
Pest control machine	2,685	6,245	4,431	7,399	9,498	5,675	5,096
Engine	1,211	8,517	1,546	-	-	-	-
Small devices	16,236	8,695	2,149	-	-	-	-
Thresher	55	78	172	-	-	-	-
Tiller	2,225	59	141	-	-	-	-
Total	134,804	340,940	433,557	891,364	828,551	900,549	1,042,189

Note: Engines, small devices, threshers, and tillers belong to components in 2015 and afterward.

Source: Korea Agricultural Machinery Industry Cooperative, each year, *Major Statistics on Imports and Exports and the Yearbook on Agricultural Machinery*.

Table 4-26 Export volume by country (2018)

(in USD thousands)

Country	2018		2017	Change (a/b)
	Sum (a)	Ratio	Sum (b)	
U.S.	579,395	55.6%	416,654	139.1%
Uzbekistan	49,240	4.7%	60,557	81.3%
Japan	38,897	3.7%	28,816	135.0%
Australia	30,828	3.0%	28,658	107.6%
China	29,053	2.8%	32,729	88.8%
Vietnam	7,871	0.8%	13,055	60.3%
Others	306,906	29.4%	320,080	95.9%
Total	1,042,190	100.0%	900,549	115.7%

Source: Korea Agricultural Machinery Industry Cooperative and the Korea Society for Agricultural Machinery, 2019, *the Yearbook on Agricultural Machinery*.

Agricultural Machinery Sharing Programs

The government has implemented various sharing programs to encourage smallholders' machine use. It executed programs, such as farmers' clubs for sharingmachines in the 1970s, mechanized farming associations and farming service firms in the 1980s and 1990s. These programs contributed to mechanizing agriculture. With the emergence of precise farming in the 2000s, the agricultural sector recognized the significance of machinery co-ownership and sharing to increase income and save costs.

Rice straw bailer

The government set a 5-year plan (2002-2006) for mechanization, including machine rental service. As machine use was widespread in rice farming, the government focused on dry-field farming to introduce sharing methods. One of the methods was the machine rental service. The 5-year plan had goals as follows: i) rice processing centers for machinery sharing in rice farming and agricultural firms' farming services, ii) machine rental services through farming associations or local governments; and support for farm machinery banks for their rental/lease services, iii) machine sharing by production area concerning field crops.

Following the plan, the central and local governments equally share the budget necessary to install rental centers, and local governments take charge of installing managing them. As of 2019, local governments operate 143 rental centers with 80,000 machines. 60% of farm households rent tools through the centers.

Industry Outlook

The local market for farm machinery has declined. However, the demand for large or high-performing machines will rise continuously.

After the mid-2010s, the global market moves toward precise, high-tech, and smart machinery. Excellent examples are GPS and GIS-based agricultural drones and driverless tractors. Their market share will grow for smart farming. Also, IoT and AI-based R&D activities for farming robots continue to make robots for harvesting and weeding.

Future directions for the agricultural machinery industry are summarized as follows. First, it has to secure the local market. As consumers prefer large precise machines with high performance, the industry should follow the trend. Second, local manufacturers should seek ways to increase exports to major trading partners and diversify export destinations. In particular, they have to focus on the Asia-Pacific region, expected to grow further, to develop customized machines and provide maintenance services. Third, it is necessary to pioneer new markets through smart farming R&D efforts.

Chemical Fertilizer Industry

Domestic Market

After the 1960s, the Korean government implemented programs to increase agricultural production-significantly, for rice production. It put full energy on producing chemical fertilizers as an effective solution for production expansion. Consequently, their consumption grew fast but started to decline after the 1990s. With the emergence of eco-friendly farming, the government changed its direction to eradicating subsidies for chemical fertilizers and reduced their use.

Table 4-27 Fertilizer production and consumption per year

(in thousands tons (ingredient amount))

Category	Production	Consumption	Self-sufficiency%	Consumption (kg) per ha
2000	1,546	801	211	382
2005	1,461	722	202	376
2010	1,006	423	238	233
2011	950	447	212	249
2012	897	472	190	267
2013	890	459	194	262
2014	860	453	190	258
2015	775	439	177	261
2016	769	450	171	268
2017	843	442	191	270
2018	853	446	191	268

Source: MAFRA, each year, *Major Statistics of Agro-fishery Food each year. Korea Fertilizer Industry Association, the Yearbook on Fertilizers*.

In terms of ingredient amount, local consumption decreased from 950,000 tons per year in the mid-1990s to less than 450,000 tons[5] now.

Concerning nitrogen fertilizers, they used to take half of the total production at 470,000 tons, but reduced to 250,000 tons. Phosphate and potassic fertilizers have been less used than nitrogen fertilizers, but the speed of reduction has been fast. The former has decreased from 220,000 tons to 90,000 tons, with the latter from 260,000 tons to 100,000 tons.

The consumption per unit area has decreased, too. The consumption per ha (in terms of ingredient amount) amounted to 500kg until the 1990s. It peaked at 233kg per ha in 2000 and has stayed flat at 265kg since 2015. The reduction in mineral fertilizer consumption has slowed down since 2010, indicating that it will be hard for organic fertilizers to replace chemical ones completely.

5) Local consumption is less than half of the total production. In other words, half of the total remain in inventory or exported.

Table 4-28 Fertilize consumption by country (kg per ha)

	Korea[1)]	Japan	China	Holland	France	Germany	Belgium	Spain	U.S.
2002	412.13	333.54	377.46	428.82	211.28	220.07	327.89	164.45	112.52
2005	643.36	347.97	423.41	337.81	192.46	208.76	329.14	142.14	118.60
2006	469.85	332.83	452.05	353.15	190.38	194.42	316.45	142.33	126.20
2007	511.04	350.47	469.35	302.14	209.34	221.87	355.18	157.72	123.27
2008	441.05	278.23	482.88	267.71	152.45	159.58	242.89	106.54	112.43
2009	331.96	238.93	498.85	238.17	120.56	181.41	300.00	96.93	108.49
2010	336.05	259.83	515.41	293.33	150.54	211.60	344.12	130.68	117.12
2011	334.91	263.88	533.41	246.81	141.30	191.49	338.18	122.62	132.33
2012	481.01	247.15	551.00	289.81	160.79	198.92	348.69	122.58	132.59
2013	361.26	244.64	559.00	231.13	169.42	203.47	340.31	143.60	137.90
2014	366.11	260.33	567.26	247.85	168.43	217.66	322.48	151.36	135.65
2015	368.99	240.98	506.11	269.13	170.40	202.22	323.85	151.50	137.03
2016	380.28	242.18	503.32	288.92	163.14	197.23	318.48	143.97	138.59

Note: As the figures are World bank estimates, there may be differences with local statistics.

Source: World Bank, World Development Indicators online.

As a result, although chemical fertilizer use decreases continuously, the average use of 265kg per ha-considered to be the minimum to keep productivity-will continue for the time being.

Compared with other countries, Korea's fertilizer use is relatively high: three times higher than the U.S. (138kg), 2.5 times higher than Spain (143kg) and France (166kg). Korea's consumption is 60% larger than Japan (247kg) with similar agricultural conditions, but 30% less than China (537kg).

As countries have different crops for cultivation, natural environments, and farming types, it is hard to compare them directly. However, as Korea consumes a large amount of fertilizers, it should pay attention to possible problems from chemical use.

Table 4-29 Fertilizer imports and exports

(in thousands tons, USD millions)

Category		2000	2005	2010	2015	2016	2017	2018
Export	Volume	1,342	1,479	1,529	691	865	1,168	1,162
	Amount (USD)	190	292	399	250	249	191	276
Import	Volume	952	1,315	714	670	721	731	734

Note: Import is for fertilizer ingredients such as urea and potassium chloride.

Source: MAFRA, each year, *Major Statistics on Agro-fishery food*.

Fertilizer Imports and Exports

The characteristic in Korea's fertilizer trades is that exporting items are complete products, but imported ones are raw materials. Most raw materials for local production are imported overseas, implying limitations to raising Korean fertilizer manufacturers' competitiveness.

Annual export volume is 1 million tons with imported volume 700,000 tons. The export is double the import. In terms of the total sum in 2013, the export amounted to USD 360 million, 3.5 times bigger than the import (USD 1.28 billion).

Fertilizer Supply and demand

The Korean government actively intervened in fertilizer production and supply for food security, using Nonhyup as its policy executor. However, it stopped its involvement and put fertilizer supply and demand into the market system. It abolished subsidies for fertilizer purchases. Although there was temporary support after a price surge in raw ingredients, the government has maintained its "no subsidy" stance.

From 2010 to 2012, the government again gave subsidies for fertilizers customized for precise and eco-friendly farming. However, it abolished the

Table 4-30 Major changes in chemical fertilizer supply system

Policy goals	Major details
1988-1990: liberalization of fertilizer sales	The government discontinued the operation of the fertilizer account. The NACF's government-commissioned fertilizer supply system was abolished, which enabled the NACF's autonomous purchase and pricing.
1991-June 2005: Compensation for the loss from the difference in selling prices	The government made up for a loss from price differences to offset the factors of increasing production costs due to soaring international prices of raw materials for fertilizer manufacturing.
July 2005-June 2008: Liberalization of sales	-
June 2008-2009: Compensation for the loss from the difference in selling prices	Same reason as above
2010-2012: Supply of customized fertilizers	The government's support for customized fertilizers
2013-till now: Abolition of fertilizer support	The government abolished all subsidies to regular fertilizers (excluding soil conditioners)

Source: Korea Fertilizer Association, internal data.

support, too. Currently, the market system controls fertilizer supply and demand autonomously.

Outlook and Tasks

As the local fertilizer market's stagnant growth results in a decline in fertilizer manufacturers' operation, they should seek new growth engines in markets for bio-fertilizers and microelement fertilizers.

In a long-term view of competitiveness and progress, the industry should improve technologies and follow restructuring. Local manufacturers should turn to international markets for growth. The government should support their endeavors through assistance for their participation in overseas exhibitions, partnership building with countries producing raw ingredients, and agricultural ODA relationships. Besides, it is vital to secure raw ingredients for the export increase and develop functional products.

Pesticide Industry

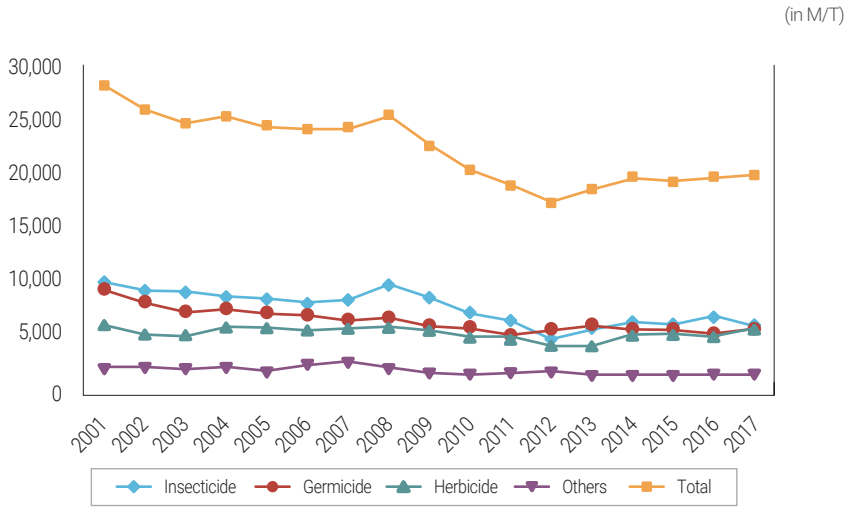
Domestic Market, Export, and Import

The local pesticide market has declined gradually, from 25,000 tons per year in the 1990s to 20,000 tons today.

In the 1990s, the ratios of pesticides for horticulture and rice farming were similar, each taking a third of the market. However, in the 2000s, horticultural pesticides took a larger share in the market. Currently, as herbicides take a bigger portion than pesticides for rice cultivation, the market shares of horticultural pesticides, herbicides, and chemicals for rice are 50%, 30%, and 10%, respectively.

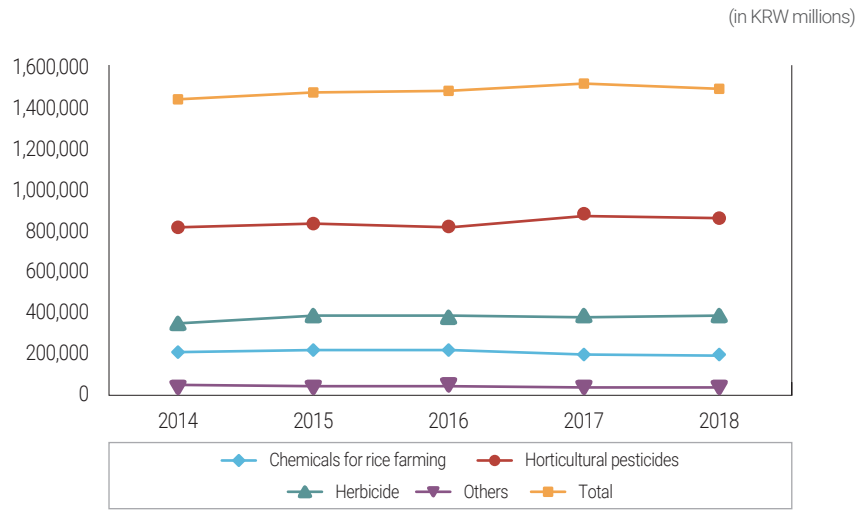
Korea's pesticide production grew, posting KRW 500 billion in the early 1990s, KRW 1 trillion in the mid-2000s, and KRW 1.5 trillion in 2018. As of 2018,

Figure 4-11 Pesticide production trends(supply quantity)



Source: Korea Crop Protection Association, each year, *The Statistical Yearbook on Pesticides*.

Figure 4-12 Pesticide production trends(supply value)



Source: Korea Crop Protection Association, 2019, *the Statistical Yearbook on Pesticides*.

horticultural pesticides took the largest market share with 55% (KRW 800 billion), followed by herbicides (25%, KRW 400 billion) and chemicals for rice cultivation (15%, KRW 200 billion).

Compared with other countries, Korea uses a large volume of pesticides relatively. The usage per ha is 12kg, which is five times larger than the U.S. (2.5kg) and three times larger than Germany (3.9kg) and Spain (3.5kg). However, it uses as much as Japan (11.8kg) and China (13.0kg), whose agricultural environments are similar to Korea. Compared with the Netherlands, with a focus on horticulture, Korea uses 1.5 times more pesticides.

While the pesticide export recently posted USD 110 million, its import is on the rise, resulting in trade deficits. In recent years, the average sum of imports amounted to USD 700 million, causing a trade deficit of USD 550 million.

The gap results from local manufacturers' reliance on raw material imports

Table 4-31 Pesticide usage by country

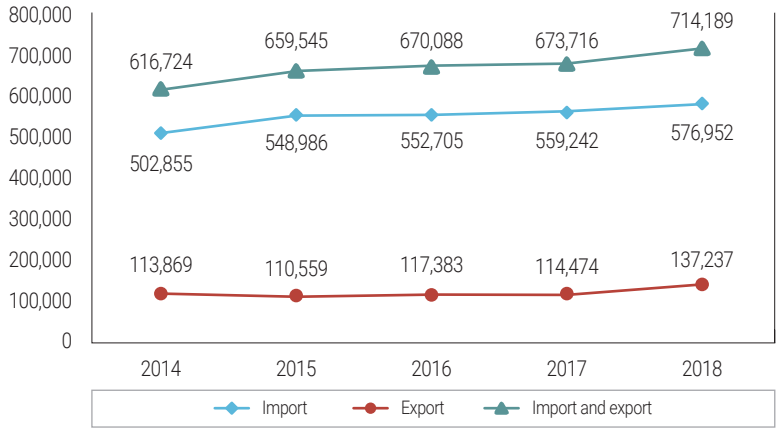
(In kg/ha)

	Korea	Japan	China	Holland	France	Germany	Belgium	Spain	U.S.
1990	11.89	15.22	5.87	10.70	5.14	2.52	-	1.96	2.14
1995	13.02	15.84	8.38	13.76	4.34	2.49	-	1.49	2.30
2000	13.39	16.53	9.91	12.06	5.02	2.93	10.83	1.89	2.41
2005	13.44	13.60	11.71	9.37	4.02	3.01	11.32	2.30	2.30
2010	11.91	12.10	14.41	9.05	3.21	3.39	5.43	2.27	2.34
2011	11.27	11.36	14.65	10.51	3.17	3.62	6.78	3.15	2.46
2012	10.08	12.03	14.82	10.84	3.30	3.78	7.44	2.77	2.59
2013	10.93	11.63	14.79	9.98	3.45	3.62	7.04	3.16	2.58
2014	11.70	11.85	14.82	8.48	3.88	3.80	7.73	3.55	2.57
2015	11.60	12.05	13.05	7.51	3.42	3.99	6.86	3.43	2.56
2016	12.04	11.41	13.06	7.86	3.72	3.92	6.89	3.63	2.55
2017	12.37	11.76	13.07	7.90	3.63	4.03	6.68	3.59	2.54

Source: FAO.

Figure 4-13 Pesticide imports and exports

(in USD thousands)



Source: Korea Crop Protection Association, each year, *the Statistical Yearbook on Pesticides*.

due to lack of development skills. The average sum of raw material imports is USD 500 million, taking 80% of the total.

Enhancing Pesticide Supervision

The government announced its plan to implement the positive list system (PLS) for pesticides in October 2011 to prevent pesticide abuse and enhance safety measures for imported agricultural produce. It prepared legal grounds for the implementation, such as revising the Food Sanitation Act and the notification to the PLS to the World Trade Organization. On January 1, 2017, it applied the system to nut products and tropical fruits[6]. Then, in 2019, the system became in full swing for all agricultural products.

The PLS, introduced to enhance pesticide safety, regulates producers to follow the maximum residue limits (MRLs) for registered pesticides. Concerning pesticides whose MRLs are not established, the standard of less than 0.01ppm is applied. The PLS allows farmers to use pesticides with set MRLs as previously. However, new rules are applied to chemicals whose MRLs are not set.

Under the previous system, pesticides without set MRLs follow i) CODEX rules, ii) the minimum limits for similar crops, and iii) the minimum limits for the relevant pesticide. Namely, the system allowed the use of pesticides without MRLs for specific items. However, the LS only allows chemicals with the MRLs established for specific items. Japan (2006), the E.U. (2008), and Taiwan (2006) already enacted similar regulations. The U.S., Australia, and Canada apply stricter rules (0mg/ kg) than Korea (0.01mg/ kg).

6) 110 agricultural products following herb medicine rules are exempted, while 31 products following food standards are included.

Table 4-32 Maximum residue limits with the introduction with PLS

Category			Previous	Revised
Usage standard			Possible to use all except regulated substances	Impossible to use any except permissible substances
Residue inspection rules	MRLs established		MRLs applicable	*Same as left-hand side*
	No MRLs	Agro-product	(Principle for application) 1) CODEX rules for the crop 2) Minimum standard for similar crops 3) Minimum standard (0.05mg/kg) for the pesticide	(Uniform rule applicable) 0.01mg/kg
		Processed product	1) CODEX rules 2) Residue within the raw material' MRL range permissible. Namely, based on the content of the raw material, its residue limit is applied. When water content is changed in the drying process, moisture content is considered.	1) *Deleted* 2) *Same as left-hand side*

Note: 1) 110 products following herb medicine rules are exempted from the PLS.
2) 7 times of chili's MRLs is applicable to dried chilies (chili powders and chili threads), 6 times of tea's MRLs to green tea extracts, 4 times of fresh ginseng's MRLs to dried or red ginseng, 8 times of fresh ginseng's MRLs to ginseng or red ginseng concentrate.

Source: Ministry of Food and Drug Safety, the National Agricultural Products Quality Management Service.

Industry Outlook

Despite the reducing demand, Korea's pesticide market has grown, posting KRW 1.5 trillion currently. However, as Korean manufacturers rely heavily on raw ingredient imports, the import exceeds the export with no change in the trend.

As the Korean market is stagnant in terms of demand, local companies should seek export opportunities. However, their high reliance on imported raw materials is a barrier to growth. Therefore, the government has to support their endeavors by providing related information and diversifying subsides. Partnerships among local corporations or with global counterparts will be vital for expanding exports. Besides, the government need to offer Korean pesticides for ODA projects.

Seed Industry

Local Seed Market

The number of seed companies has grown from 415 in 2000 to 2,400 in 2018. By crop, vegetable seed companies take the largest share with 27%, followed by fruits (15.5%), flowers (11.9%), and mushrooms (8.9%).

Approximately 2,500 companies are in operation, but most of them are small. A few of them based on overseas investments have specialized technologies for new variety development, quality management, and processing.

Table 4-33 Number of registered seed firms

Category	Food crop	Fruit	Vegetable	Flower	Mushroom	Mulberry	Others	Total
2000	7	174	72	42	89	17	14	415
2006	18	235	163	110	115	26	69	736
2010	32	283	181	149	121	29	129	924
2015	69	494	277	231	130	35	463	1,699
2016	78	587	341	253	161	43	556	2,019
2017	104	560	486	279	220	39	763	2,451
2018	104	381	665	294	220	39	763	2,466

Source: Korea Seed and Variety Service, Jul. 2019.

Seed Supply and Demand

Although there are fluctuations year by year, the government-led seed production and supply is around 35,000 tons. When calculating based on crop seed consumption and certified seeds, the seed renewal rate is not high. The renewal rate of four seeds supplied by the government was 24.8% in 2017 and 24.6% in 2018. The rice seed's renewal rate, the highest of all, was 37.4% in 2017 and 40.8% in 2018, followed by the bean seed (37.9% in 2017 and 35.4% in 2018). Potato and barley seeds were renewed by 18% and 10%, respectively.

Table 4-34 Supply of certified seeds

(in tons)

	2000	2005	2010	2015	2016	2017	2018
Rice	12,982	15,732	26,252	23,983	24,255	19,469	21,975
Barley	2,177	1,664	3,084	2,369	2,336	3,218	2,621
(Wheat)	-	-	(504)	(614)	(509)	(675)	(396)
Bean	500	1,058	1,019	977	1,127	1,071	1,094
Maize	215	77	83	24	-	-	-
Potato	8,176	8,264	8,281	8,211	8,354	7,809	8,204

Source: MAFRA, 2019, *Major Statistics on Agro-fishery Food*.

Table 4-35 Seed renewal rates

(in tons)

Category		Rice	Barley	Bean	Potato	Total
2017	Used	52,075	28,631	2,824	43,626	127,156
	Supplied	19,469	3,218	1,071	7,809	31,567
	Renewed	37.4%	11.2%	37.9%	17.9%	24.8%
2018	Used	53,850	34,435	3,089	46,196	137,570
	Supplied	21,975	2,621	1,094	8,204	33,894
	Renewed	40.8%	7.6%	35.4%	17.8%	24.6%

The seed production is categorized into local production and overseas gathering (imports). Before the 1990s, most seeds were produced locally. However, the volume has decreased from 30% in the 2000s to 10% these days, while overseas imports rose consistently. After 2015, seed imports amounted to USD 50 million, as local production faces challenges, such as increasing production costs and low technological levels.

Vegetable seeds are the largest contributor to exports, accounting for over 90% of the total. The sum of exports has increased consistently: USD 10 million in the 1990s, USD 20 million in the 2010s, and USD 50 million these days. Export targets are countries such as Japan, the U.S., China, and India. The net import amount has expanded, but the increase is small relatively at a slow speed. As a

Table 4-36 Vegetable seed production by year

(in kg, USD thousands)

Category	Local production (A)	Seed imports	Total (B)	A/B	Sum of imports
2000	606,095	1,446,278	2,052,373	0.30	13,742
2005	447,638	1,229,709	1,677,347	0.27	24,561
2010	215,714	1,022,459	1,238,173	0.17	29,045
2015	272,804	1,787,962	2,060,766	0.13	54,209
2016	211,182	1,330,790	1,541,972	0.14	48,349
2017	166,073	1,405,085	1,571,158	0.11	48,380
2018	142,732	1,391,262	1,533,994	0.09	51,804
2019	200,089	1,400,232	1,600,321	0.13	49,913

Source: Korean Seed Association.

Table 4-37 Vegetable seed imports and exports by year

(in USD thousands)

	2000	2005	2010	2015	2016	2017	2018	2019
Export sum (A)	18,002	15,277	23,042	45,510	50,521	50,930	45,559	51,110
Net import sum (B)	11,521	5,710	9,729	14,561	13,468	16,979	18,105	19,986
A-B	6,481	9,567	13,313	30,949	37,053	33,951	27,454	31,124

Note: The sum of net imports is total imports, excluding the sum of overseas gatherings.
Source: Korea Seed Association.

result, the trade surplus expanded from USD 6.5 million in 2000 to USD 13.31 million in 2010 and USD 31.0 million in 2019.

Outlook and Tasks

In terms of technology, Korea's seed companies lag behind their counterparts in advanced countries. Their R&D investment in new varieties is much smaller than global seed firms. However, Korea has to invest in research and development and scale up local firms to enhance seed sovereignty. The government has to select agricultural produce and varieties for efficient R&D investments.

Concerning the protection of genetic resources and functional seed

development such as seeds with disaster tolerance, the government needs to introduce the access and benefit-sharing system.

Also, it is essential to secure competitiveness by advancing the local seed industry. The government should put full energy into the Golden Seed Project (GSP) underway right now.

Things to be considered to nurture the seed industry are as follows:

First, the government should consider the private sector's participation in seed development and supply. Second, it should foster professionals in the private sector and expand individual breeders' capabilities. Third, it is vital to protect newly-developed seeds and their outcomes with a specific period of support. This measure will boost research and development. Fourth, the government has to set up plans to build seed development production infrastructures to increase seed exports.

4. Food Consumption & Related Policy

With various changes in economic, demographic, and distribution conditions, consumers' attitudes and thoughts toward food have reshaped, affecting food consumption. Korea's food consumption transformed from quantity growth to quality improvement in the late 1980s. Previously, consumers thought highly of food prices and quantities. However, after the late 1980s, they came to prioritize quality, safety, and nutrition.

The government's food consumption policy targets food selection, consumption, and nutrient intake. The government considers distribution, pricing, safety/ quality, nutrition, and dietary education, regarding food consumption. Before the 1980s, the government focused on distribution and pricing related to food consumption. However, after the decade, as consumers' interest shifted to quality, its policy focus also moved to food safety and quality. These days, the public's interest in dietary and nutrient information is getting bigger.

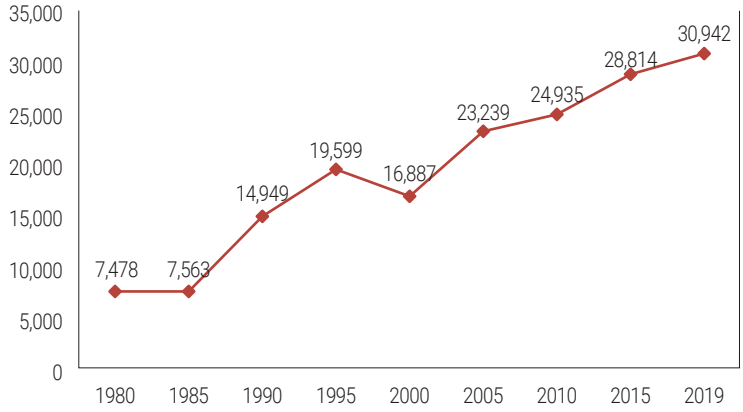
Changes in Agro-food Consumption

Economic Factors

With economic development, Korea's gross national income (GNI) per capita has continuously increased. In 1980, its GNI per capita (in constant prices as of 2015) amounted to USD 7,478. However, it grew over four times compared with 2000 (USD 16,887). The figure expanded further: USD 28,814 in 2015 and USD 30,942 in 2019. Despite income increase and economic growth, income disparity

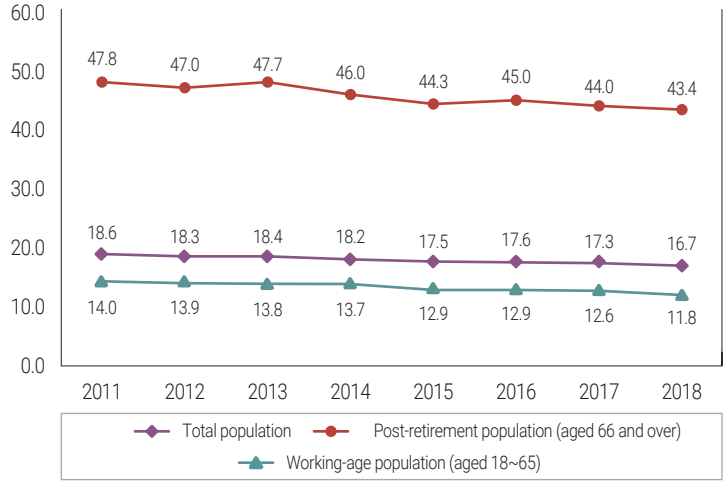
Figure 4-14 Changes in GNI per capita (constant prices in 2015)

(in USD)



Source: Statistics Korea, each year, *National Accounts*.

Figure 4-15 Relative poverty rates (in disposable income)



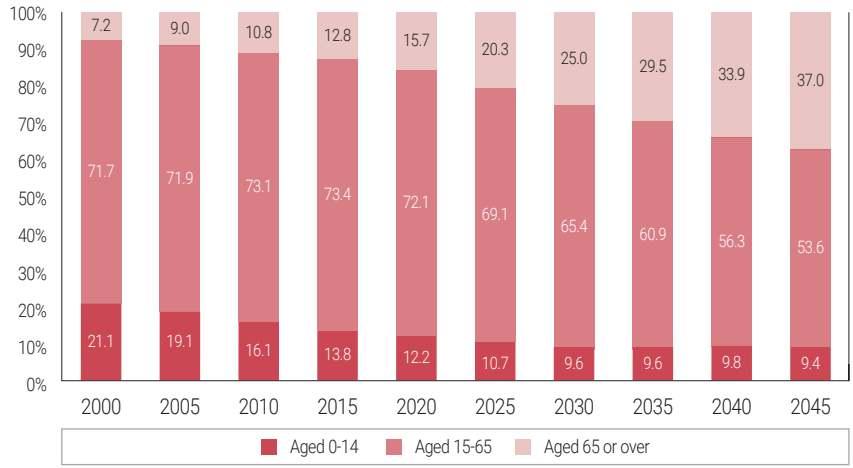
Source: Statistics Korea, each year, *the Survey of Household Finances and Living Conditions*.

and inequality issues remain unsolved. In particular, post-retirement people's relative poverty rate is around 45%, higher than in other age groups.

Demographic Factors

Korea undergoes population aging with a rapidity due to decreasing birth rates and increasing life expectancy. The senior population (aged 65 or over) was 3.1% in 1970 but rose to 7.2% in 2000. In 2018, it surged to 14.3% of the total, making Korea into an aging society. Its share is likely to increase to 20.3% in 2025, leading Korea into a post-aged society. The aged population will expand further to 25.0% in 2030 and 37.0% in 2045. On the other hand, the age groups of 0-14 and 15-64 are shrinking. The ratio of the aged 0-14 decreased from 21.1% in 2000 to 12.2% in 2020, is expected to go down to 9.4% in 2045. The ratio of the aged 15-64 stayed at 70% from 2000 to 2020, but is likely to drop to 53.6% in

Figure 4-16 Demographic changes and outlook



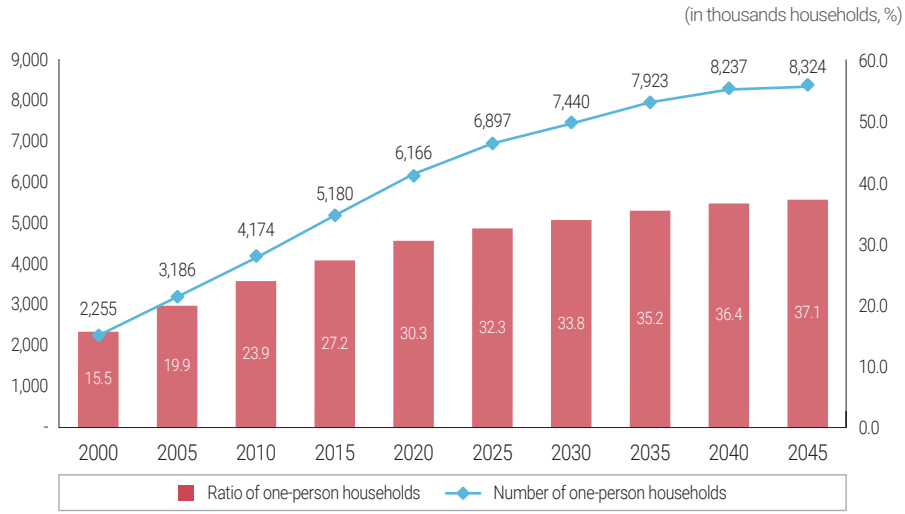
Source: Statistics Korea, each year, *The Projected Population*.

2045-half of the total population.

As the number of one-person households has increased rapidly with income improvement, aging, delayed entry into first marriage, and individualism, they become more significant in the consumption market. Their ratio to the entire households redoubled from 9.0% (1.01 million households) in 1990 to 15.5% (2.26 million households) in 2000. It is expected to increase to 30.3% (6.17 million households) in 2020 and 37.1% (8.32 million households) in 2045.

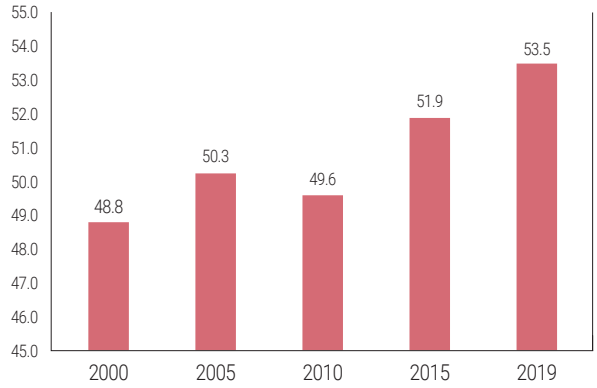
Also, women's participation in economic activities is gradually rising with low birthrates and high education. Their participation ratio improved from 42.8% in 1980 to 48.8% in 2000, 51.9% in 2015, 53.5% in 2019. The rate of female householders was 18.5% in 2000 but surged to 30.4% in 2017. It is likely to rise to 38.8% in 2045.

Figure 4-17 Number of one-person households and projections (as of 2017)



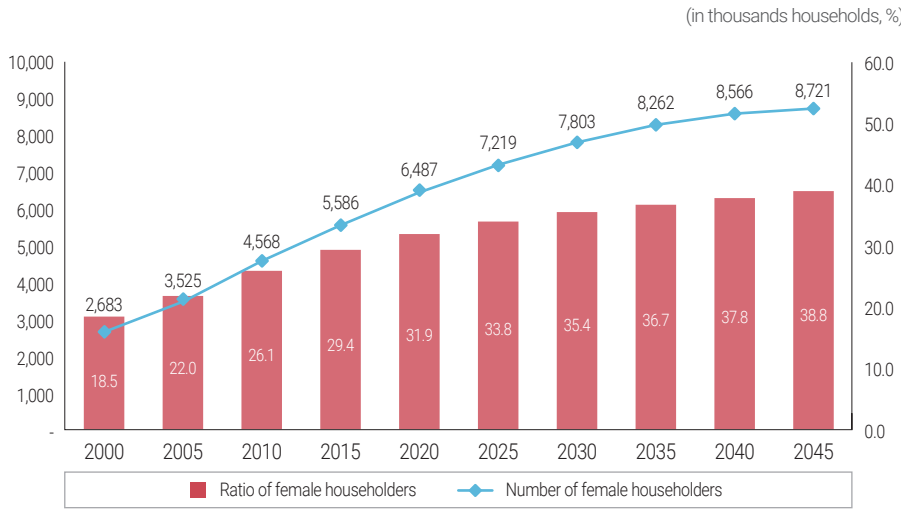
Source: Statistics Korea, each year, *The Projected Population*.

Figure 4-18 Women's participation ratio in economic activities



Source: Statistics Korea, each year, *the Economically Active Population Survey*.

Figure 4-19 Number of female householders and projections



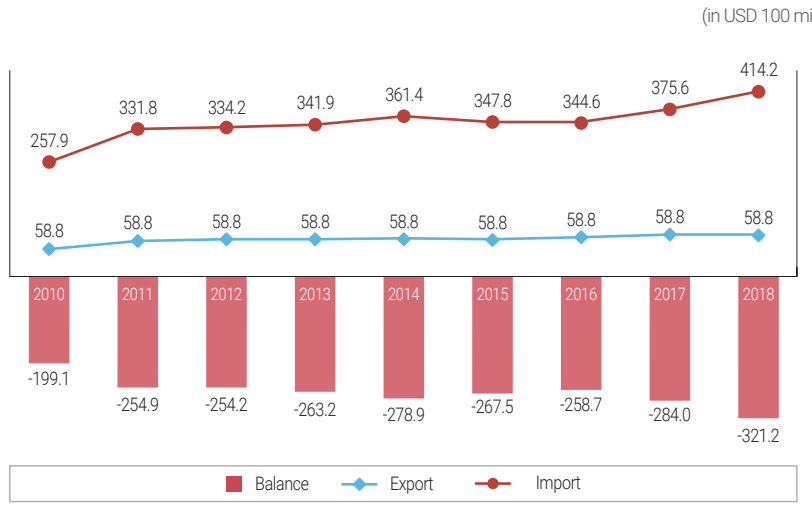
Source: Statistics Korea, each year, *the Projected Population*.

Distribution Factors

With income increase, Western-style dietary patterns, and free trades, agro-food imports have increased by 1.6 times (USD 15.6 billion) from USD 25.8 billion in 2010 to USD 41.4 billion in 2018. As imports expanded sharply compared with exports, trade deficits have widened: USD 19.9 billion in 2010 to USD 32.1 billion in 2018 (up 1.6 times or USD 12.2 billion).

As consumers pursue shopping convenience and bulk purchasing, mega marts, department stores, and convenience stores became popular in Korea. The convenience stores' sales grew by 13.0% annually between 2010 and 2014. Distribution channels such as mega marts and department stores saw their sales rising by 5% every year during the same period. However, while the growth

Figure 4-20 Agro-food trades



Source: Ministry of Agriculture, Food, and Rural Affairs, each year, *the Major Statistics of Agriculture, Food, and Rural Affairs*.

Table 4-38 Sales by retailer type

(in KRW billions, %)

Category	2015	2016	2017	2018	2019	Avg. annual changes
Department store	29,029	29,911	29,324	29,968	30,386	1.1
Mega mart	32,778	33,234	33,798	33,454	32,425	-0.3
Duty-free shop	9,198	12,276	14,466	18,960	24,859	28.2
Supermarket/ groceries	43,481	44,368	45,593	46,457	44,178	0.4
Convenience store	16,456	19,481	22,238	24,407	25,692	11.8
Automobile/ fuel retailer	91,304	90,138	94,508	101,552	100,646	2.5
Specialized retailer	139,283	140,898	139,120	139,884	135,393	-0.7
Non-store retailer	46,789	54,047	61,241	70,323	79,582	14.2
Total	408,317	424,353	440,288	465,005	473,162	3.8

Source: Statistics Korea, each year, *the Service Industry Survey*.

Table 4-39 Agro-food's transactions online

(in KRW billions, %)

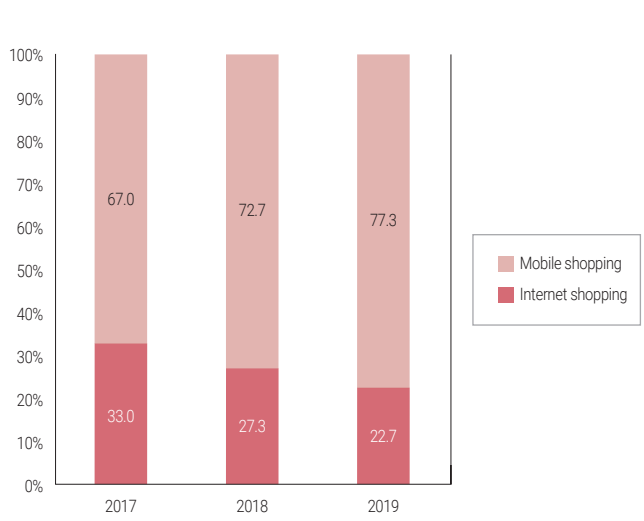
Category	2017	2018	2019
Total (A)	94,186	113,314	135,264
Food and beverage	7,997	10,494	13,429
Agro-fishery & livestock products	2,425	2,941	3,534
Food service	2,733	5,263	9,733
Total of Agro-food and food service (B)	13,154	18,698	26,696
Ratio (B/A)	14.0	16.5	19.7

Source: Statistics Korea, each year, *the Online Shopping Survey*.

of mega marts and department stores has slowed down between 2015 and 2019, duty-free shops, non-store retailers, and conveniences stores overgrew, posting 28.2%, 14.2%, and 11.8%, respectively.

These days, online shopping has expanded with IT progress and various internet services. Consumers get easy access to production information at home and abroad. In 2017, online transactions of agro-food doubled from KRW 13 trillion to KRW 27 trillion. With the surge in food and beverage transactions online, they took 19.7% of the total virtual transactions. In particular, agro-food

Figure 4-21 Agro-food transactions online by outlet



Source: Statistics Korea, each year, *the Online Shopping Survey*.

purchases through mobile applications have increased. Mobile purchases took 67% of the entire virtual transactions in 2017 and 77.3% in 2019.

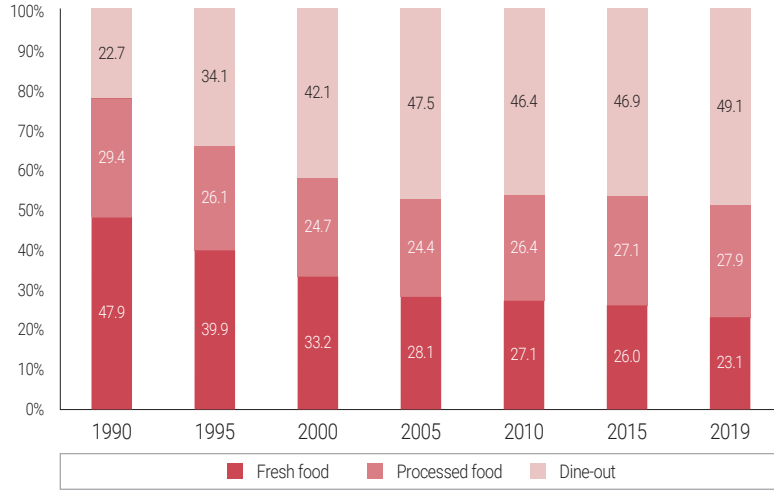
Agro-food Consumption Structure and Pattern Changes

Food Spending

As more people dine out, the spending in restaurants has increased. In 1990, dine-out expenses took 22.7% of households' food expenses. The ratio increased to 49.1% in 2019. Processed food expenses took 28% of the total food spending between 1990 and 2019. However, the percentage of fresh food expenses declined from 47.9% in 1990 to 28.1% in 2005 and 23.1% in 2019.

The growth of average expenditure (in real prices, excluding dine-outs) per

Figure 4-22 Expenditure ratio by food type



Source: Statistics Korea, each year, *the Household Income and Expenditure Survey*.

year from 2010 to 2019 is 0.7%. By food type, the ratio of spending on meat and processed meat products in 2019 was the biggest with 18.1%, followed by fruits and processed fruits products (10.7%), tea/ beverage/ liquor (10.7%), grains and processed grain products (9.5%), and vegetables and processed vegetable products (9.4%). The year-on-year change in spending between 2010 and 2019 was largest with fishery products and processed fishery products (-2.7%), followed by dairy products and eggs (-2.1%), and grains and processed grain products (-2.0%).

Table 4-40 Changes in monthly spending by agro-food type

(in KRW thousands, %)

Category	2010	2015	2019	Avg. changes per year (2010-2019)
Consumption spending	2,199.0	2193.0	2,343.0	0.7
Food and beverage	330.6 (100.0)	597.9 (100.0)	319.4 (100.0)	-0.4
Grains & processed grain products	36.5 (11.0)	32.2 (5.2)	30.3 (9.5)	-2.0
Bread & rice cake	20.4 (6.2)	19.2 (3.1)	19.8 (6.2)	-0.4
Meat & processed meat products	55.0 (16.6)	57.3 (9.2)	57.7 (18.1)	0.5
Fishery products and processed fishery products	36.1 (10.9)	31.5 (5.1)	28.1 (8.8)	-2.7
Dairy products & eggs	30.5 (9.2)	25.8 (4.1)	25.1 (7.9)	-2.1
Fat & oils	2.6 (0.8)	2.7 (0.4)	2.6 (0.8)	0.0
Fruits & processed fruit products	35.7 (10.8)	37.6 (6.0)	34.2 (10.7)	-0.5
Vegetables & processed vegetable products	33.6 (10.2)	33.3 (5.4)	30.1 (9.4)	-1.2
Seaweed and processed seaweed products	3.5 (1.1)	3.7 (0.6)	3.3 (1.0)	-0.7
Sweets & snacks	24.5 (7.4)	23.9 (3.8)	24.7 (7.7)	0.1
Seasoning products	13.6 (4.1)	11.2 (1.8)	11.5 (3.6)	-1.9
Others	11.6 (3.5)	11.1 (1.8)	17.9 (5.6)	4.9
Tea, beverage, & liquor	27.0 (8.2)	28.1 (4.5)	34.2 (10.7)	2.7

Note: Real expenditures in food and beverage excluding dine-out expenses.

Source: Statistics Korea, each year, *the Household Income and Expenditure Survey*.

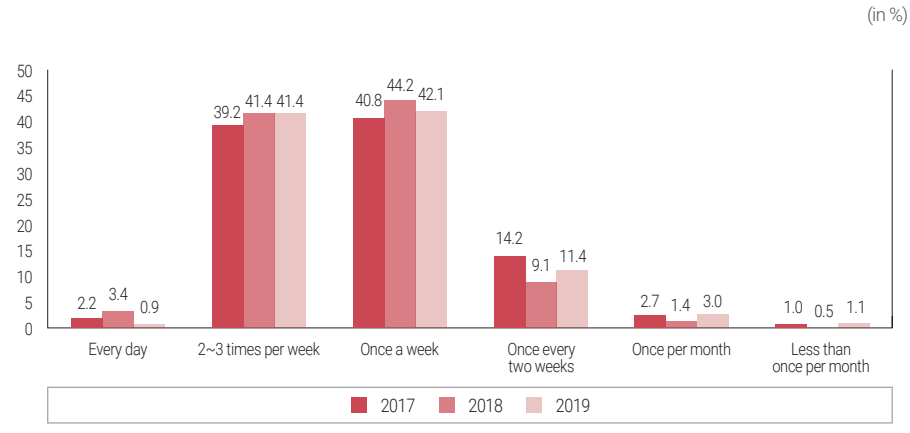
Food Consumption Patterns

Korean consumers purchase food at mega marts or small supermarkets once or two to three times per week. More consumers visit grocery markets operated by large conglomerates instead of traditional markets. The ratio of consumers shopping in the former was 13.3% in 2017 and increased by 6.9% to 20.2% in 2019. On the other hand, the proportion of buying in traditional markets decreased from 21.7% in 2017 to 14.7% in 2019.

As Korean consumers pursue convenient shopping, they gradually prefer buying food on the internet or mobile platforms. In 2017, 69.8% of consumers did not use online shopping stores, but the percentage reduced to 55.4% in 2019. Consumers bought more food online than before. In 2019, the year-on-year increase in online buying was 35.4%, while the year-on-year decrease was 2.6%.

As consumers pursue convenience and get interested in ethical consumption

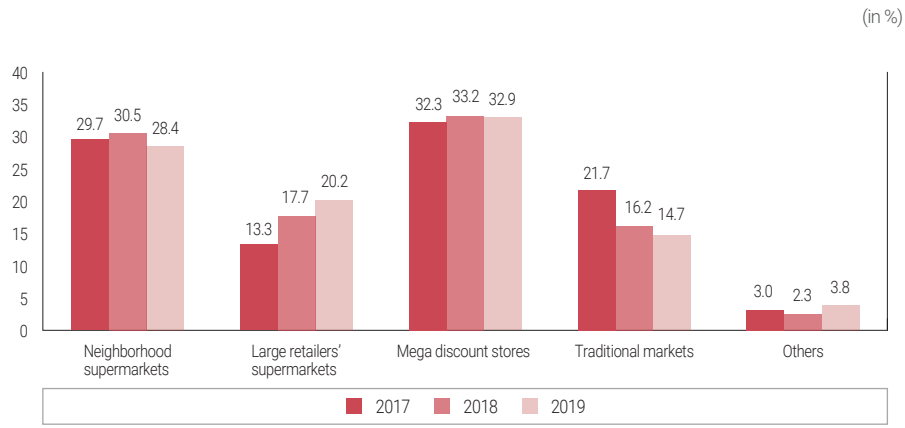
Figure 4-23 Food purchase frequency



Source: KREI, each year, *the Survey on Food Consumption Patterns*.

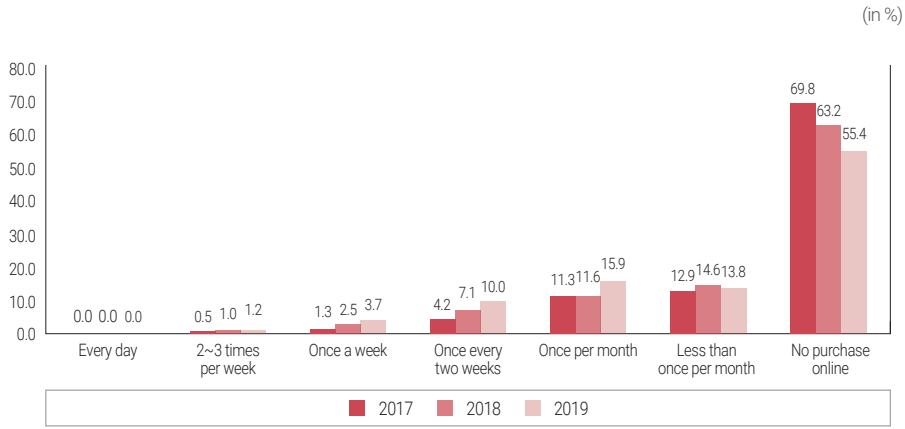
and health, their purchases of eco-friendly products and home-meal replacements have gradually increased. The proportion of consumers buying

Figure 4-24 Food purchasing places



Source: KREI, each year, *the Survey on Food Consumption Patterns*.

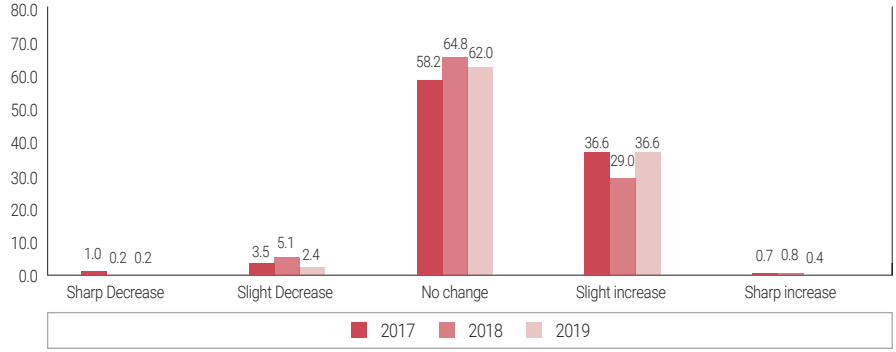
Figure 4-25 Online purchase frequency



Source: KREI, each year, *the Survey on Food Consumption Patterns*.

Figure 4-26 Year-on-year change in online purchase frequency

(in %)



Source: KREI, each year, *the Survey on Food Consumption Patterns*.

eco-friendly goods rose from 52.3% in 2017 to 58.7% in 2019. The ratio for home-meal replacements increased from 77.1% to 80.4% during the same period. Also, more consumers buy functional food. 79.2% of consumers buy in person all or some of the functional goods they take.

Figure 4-27 Eco-friendly food purchase

(in %)

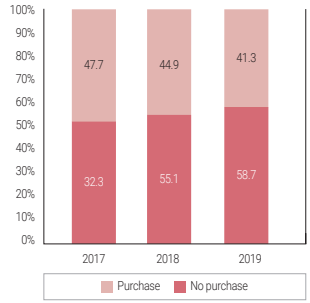
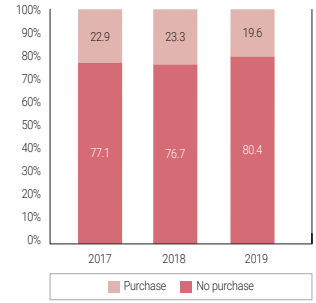


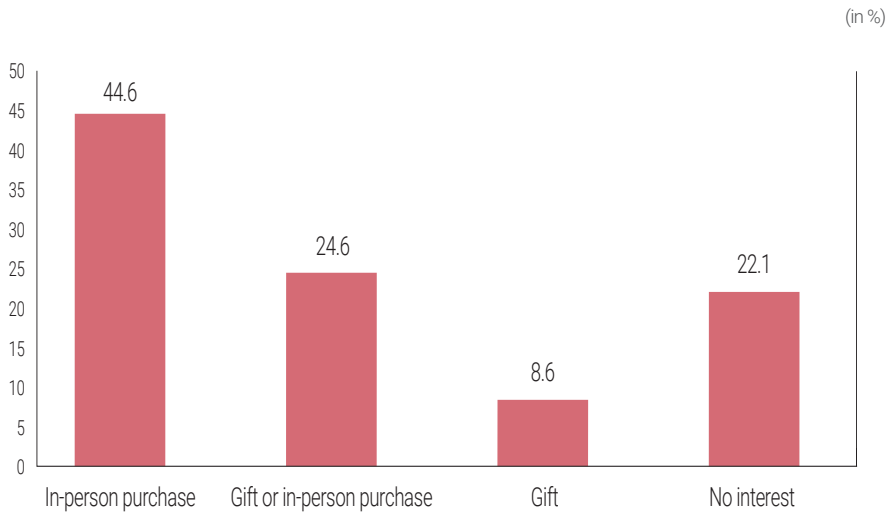
Figure 4-28 Home-meal replacement

(in %)



Source: KREI, each year, *the Survey on Food Consumption Patterns*.

Figure 4-29 Functional food purchase



Source: KREI, each year, *the Survey on Food Consumption Patterns*.

Nutrition and Dietary Life

Rice consumption has shrunken continuously, but the grain's percentage is still large (19.2% in 2018). Other food groups with high rates of intake are vegetables (16.9%), beverage (13.8%), meat (8.6%), fruits (8.6%), milk (7.9%), and liquor (7.3%).

The consumption of vegetables (44.8g), fruits (36.0g), potatoes (9.1g), and beans (5.1g) decreased in 2018 compared with 2008. On the other hand, the intake of beverage (139.0g), meat (45.1g), fish and seashell (41.8g), seaweed (18.5g), and milk surged during the same period.

Despite consumers' interest in health and nutrition, their consumption of animal products has rapidly increased thanks to Western-style dietary patterns and dine-outs. Consequently, the energy intake from fat increased from 7.2%

Table 4-41 Amount of intake by food group

(in g, %)

Category	2008(A)		2018(B)		Change (B-A)	
	Intake	Ratio	Intake	Ratio	Intake	Ratio
Grains	292.1	22.13	288.4	19.16	-3.7	-3.0
Potatoes	37.1	2.81	28.0	1.86	-9.1	-1.0
Sweets	7.7	0.58	10.6	0.70	2.9	0.1
Beans	36.9	2.80	31.8	2.11	-5.1	-0.7
Seeds & nuts	2.7	0.20	5.1	0.34	2.4	0.1
Vegetables	298.9	22.64	254.1	16.88	-44.8	-5.8
Fruits	165.2	12.51	129.2	8.58	-36.0	-3.9
Seaweed	5.4	0.41	23.9	1.59	18.5	1.2
Beverage	69.4	5.26	208.4	13.84	139.0	8.6
Liquor	98.6	7.47	109.5	7.27	10.9	-0.2
sauce	35.3	2.67	35.4	2.35	0.1	-0.3
Fat & oils	7.9	0.60	7.0	0.46	-0.9	-0.1
Meat	84.7	6.42	129.8	8.62	45.1	2.2
Eggs	23.7	1.80	31.0	2.06	7.3	0.3
Fish & shellfish	52.6	3.98	94.4	6.27	41.8	2.3
Milk	101.5	7.69	118.3	7.86	16.8	0.2
Others	0.3	0.02	0.6	0.04	0.3	0.0
Total	1,320.10	100.0	1,505.60	100.0	185.5	0.0

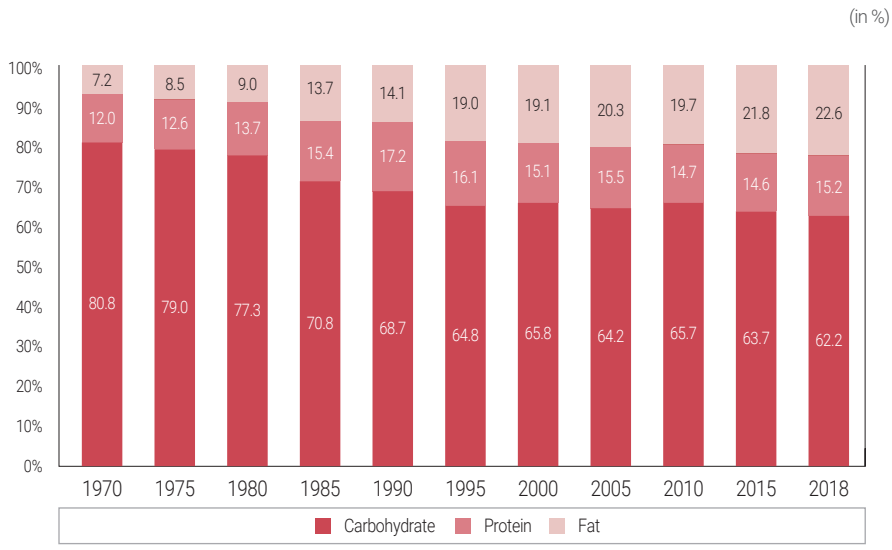
Note: 1) The survey targets include the whole population aged 1 or older. The projected population of 2005 is used to standardize ages.

2) Vegetables include mushrooms.

Source: Ministry of Health and Welfare, the Korea Disease Control and Prevention Agency, each year, *the National Health and Nutrition Examination Survey*.

in 1971 to 14.1% in 1990 and 22.6% in 2018. On the other hand, the energy gained from carbohydrate has decreased from 80.8% in 1970 to 68.7% in 1990 (12.1%p down) and 62.2% in 2018 (6.5%p down).

Figure 4-30 Energy intake rate by nutrient



Source: Ministry of Health and Welfare, the Korea Disease Control and Prevention Agency, each year, *the National Health and Nutrition Examination Survey*.

Korea's Food Consumption Policies

Food Safety and Quality Management

The Ministry of Agriculture, Food, and Rural Affairs (MAFRA), the Ministry of Food and Drug Safety, and the Ministry of Maritime Affairs and Fisheries supervise food-related policies from production to consumption. The Office of Food and Drug Safety was raised to the ministry status in 2013 and has since overseen agro-food safety. However, safety management in the production stage is entrusted to MAFRA and the Ministry of Maritime Affairs and Fisheries. The three ministries are in cooperation to secure safety and improve food quality.

The representative vehicles for the food safety and quality policy

is certification systems, such as the Good Agricultural Practice (GAP), environment-friendly certification, the Hazard Analysis Critical Control Points (HACCP), and the country-of-origin labeling.

GAP and HACCP are safety management systems in the production stage to secure safety and sanitation through preventive measures against hazardous elements. MAFRA is in charge of GAP. Concerning HACCP, the Ministry of Food and Drug Safety is responsible for the overall management. Meanwhile, MAFRA is in charge of livestock farms, slaughterhouses, and milk collection centers, and the Ministry of Maritime Affairs and Fisheries in fishery products. The environment-friendly certificate system covers organic agricultural and livestock products, pesticide-free produce, antibiotic-free livestock products, and organic products, and MAFRA oversees the certification.

The country-of-origin labeling is in place to protect producers and consumers, secure consumers' trust, and form high-end markets. It kicked off for agricultural produce in 1991. The scope expanded to include processed food in 1993, beef for grilled dishes in restaurants in 2007. Currently, 222 domestic agro-products, 161 imported agricultural products and processed items, and 268 processed agricultural goods should follow the labeling regulation. So do 24 items served in restaurants. Besides, other certificates or labeling systems are in place for agro-fishery and livestock products.

The government also operates the traceability system to identify causes and take immediate measures when safety issues occur. It executed the system targeting farm households in the GAP pilot program from 2003 to 2005. The government executed the system targeting beef in 2009, pork in 2014, and chickens, ducks, and eggs in 2020. For other agro-fishery products, the government recommends autonomous registration. Meanwhile, baby food, special food for pregnant and breastfeeding mothers, and food for medical

purposes mandatorily follows the traceability rules. The Ministry of Food and Drug Safety manages processed and functional food traceability. MAFRA is in charge of agricultural and livestock products, while the Ministry of Maritime Affairs and Fisheries supervises fishery products.

Dietary Life and Nutrition Policy

Policy directions for dietary life and nutrition have significance with Westernization, economic development, income increase, and health interest. The dietary life and nutrition policy includes measures to keep the public healthy and nutritious based on collaborations among various fields, such as food production and supply, public health, and education. The policy target before the 1980s focused on eradicating malnutrition, and the government was not keen on the problem. However, changes in economic and demographic conditions after the mid-1990s transformed Koreans' dietary styles. As various chronic diseases caused by bad dietary habits increased, the government realized the significance of the dietary life and nutrition policy.

In 1995, the government established the National Health Promotion Act and obligated the central and local governments to implement nutrition improvement programs. It installed the funds for public health promotion and prepared legal grounds for its programs and research to improve public health. After the 2000s, the government shifted its focus to public education to help Koreans realize dietary problems and develop good nutritional habits.

After the 2000s, the government enacted the Special Act on Safety Management of Children's Dietary Lifestyle (supervised by the Ministry of Food and Drug Safety) in 2008, Dietary Education Support Act (managed by MAFRA) in 2009, and the National Nutrition Act (supervised by the Ministry of Health and Welfare). Following the Special Act on Safety Management of Children's Dietary

Lifestyle, the government set a list of high-calorie low-nutritious foods to block or restrict their advertising. Also, it ran a program to operate meal services for children. After enacting Dietary Education Support Act, the government planned and implemented diet education programs. The National Nutrition Act also prepared a base for the government to prepare nutrition management plans and put them into action.

Previously, the Ministry of Health and Welfare and the Ministry of Food and Drug Safety led the dietary life and nutrition policy. However, as the linkage of all stages from food production to consumption becomes significant, MAFRA's roles have expanded. MAFRA is in charge of the diet education policy. It also runs an agro-food voucher program on a pilot basis in 2020 to improve the vulnerable's nutritional balance.

5. Trade Liberalization and Agricultural Trade

Korea's agricultural trade has transformed from the drive for exports in the 1950s to reliance on imports today. During the 1950s, primary commodities played a crucial role as a source for acquiring foreign currencies. However, as the nation has shifted its focus for economic growth to industrialization and exports since the 1960s, the importance of agriculture in the whole economy has shrunken. The share of agricultural products in exports plummeted from over 40% in the early 1960s to less than 1% in 2014. The government's agricultural trade policy was behind such transformations. It implemented plans to increase agricultural exports in line with its export-oriented economic policy between the 1960s and the 1970s. In the 1990s, the government was eager to expand agricultural exports amid trade liberalization. At the same time, controlling a surge in imports was another challenge to tackle. Korea's trade policy has been in line with the World Trade organization (WTO), which commenced after the conclusion the Uruguay Round (UR) negotiations. This section will give an overview of Korea's agricultural trade and related policy.

Agricultural Market Opening

Before the UR Negotiations

Korea has pursued trade liberalization since its drive for economic development in the 1960s. As an export-oriented economy, Korea considered participating in the multilateral trade system was a prerequisite. So it joined the GATT (General Agreements on Tariffs and Trade) in 1967 with the status of

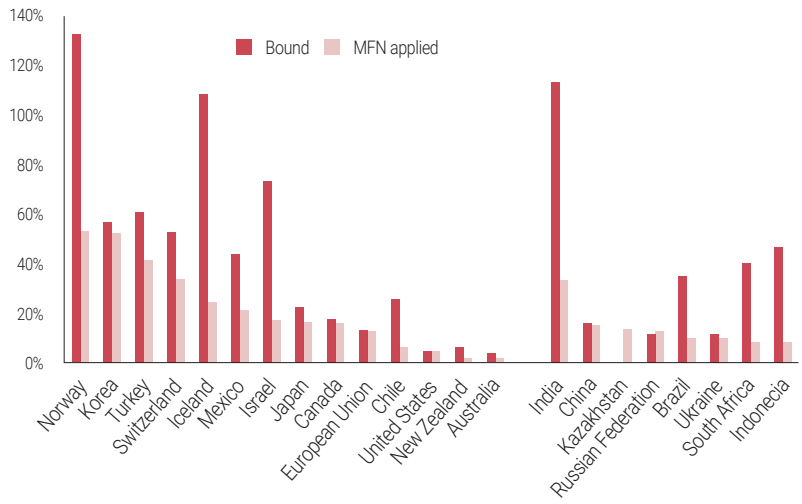
a developing country. In the late 1970s, the government took measures to lower import barriers after the economy achieved an export goal of USD 10 billion. Its economic growth from exports led to an increase in foreign currency reserves and brought international pressures to open its market. Locally, there was a call from the non-agricultural sectors to relieve restrictions on agricultural product imports. Accordingly, the government established import liberation measures for agricultural products in 1978 and put them into action.

However, trade partners such as the U.S. urged Korea to open its agricultural market further. After concluding the Korea-U.S. trade negotiations in 1988, Korea lowered the barriers for 243 agricultural, forestry, and fishery products between 1989 and 1991. GATT□took an issue of Korea's trade surplus in the late 1980s and requested consultations with the nation to determine whether to continue applying the Section B of Article XVIII to it, which allows developing countries to impose quantitative restrictions on imports when they have problems with the balance of payments. After the GATT□negotiations, Korea agreed to abandon applying the balance of payment clause in October 1989. The government relieved import restrictions on 273 items in two phases over six years, from 1992 to 1997. As the UR negotiations were concluded during the first phase (1992-1994), the government listed the second-phase items in line with the UR agreement.

The Result of the UR Negotiations (1986-1994)

The conclusion of UR negotiations in 1994 resulted in accelerating reforms and liberalization in the agricultural sector locally and internationally. All WTO members had to remove import restrictions, including upper ceilings in quantity, discretionary import licensing, and non-tariff measures. Those restrictions were replaced with ordinary customs duties ("tariffication"). However, as Annex

Figure 4-31 Bound and MFN applied tariffs for agricultural products, 2012



Source: WTO, Tangerman

5 of the UR Agreement on Agriculture allowed special treatment in specific circumstances, Korea used it to delay rice tariffication for ten years from 1995 to 2004, while allowing a tariff-rate quota (TRQ) for 1-4% (51,307-205,228 tons) of domestic consumption for the period. When implementing the UR Agreement, the nation maintained its developing country status, which allowed tariff reductions at an average rate of 24% over ten years from 1995. The average bound rate for agricultural products in Korea was 56.0% in 2014, relatively higher than in other countries. As determined to expand market access in the UR Agreement on Agriculture, Korea followed the principle and increased market access quotas (TRQs) for 63 agricultural products, including rice, barley, potato, bean, maize, and peanut.

Korea's bound tariffs for agricultural products are diverse by commodity:

Table 4-42 Key items tariff rates and tariff-rate quotas (TRQs)

	Tariff concession (%)		Tariff-rates quota (tons)		
	Benchmark rate	Concession rate	1st-year TRQ (%)	Final-year TRQ (%)	Duration
Pepper	300	270	4,311(50%)	7,185(50%)	1995~2004
Garlic	400	360	8,680(50%)	14,467(50%)	
Onion	150	135	12,369(50%)	20,645(50%)	
Sesame	700	630	6,731(40%)	6,731(40%)	
Beef	44.5	40.0	123,000(43,6)	225,000(41,6%)	1995~2000
Pork	37	25	21,930(25%)	18,275(25%)	1996~1997.6
Chicken meat	35	20	7,700(20%)	6,500(20%)	
Powered skim milk	220	176	621(20%)	1,034(20%)	1995~2004
Orange	90	50	15,000(50%)	57,017(50%)	
Rice	-	-	51,307 (5%)	102,614(5%)	1995~1999
			102,614(5%)	205,228(5%)	2000~2004
Barley	333	299.7	14,150(20%)	23,582(20%)	1995~2004
Bean	541	487	1,032,152(5%)	1,032,152(5%)	
Maize	365	328	6,102,100(3%)	6,102,100(1.8%)	
Potato	338	304	11,286(30%)	18,810(30%)	
Sweet potato	428	385	11,121(20%)	18,535(20%)	

Source: MAFRA, 1994, UR Negotiation Results on Key Items, Worksheets.

very high for grains (487% for soybean, 328% for maize, and 300% for barley), high for vegetables and fruits (270% for red pepper, 135% for onion, and 45% for tomato, apple, and grape each), low for meat (40% for beef, 25% for pork, and 18% for chicken). However, as TRQs were set for many essential products, low in-quota tariffs were applied to most imports.

Rice Market Opening

In the UR negotiations, Korea picked rice for special treatment with respect to tariffication (Paragraph 2 of Article 4 of the UR Agreement on Agriculture). Although the UR talks set the rule of removing non-tariff barriers, some

countries, including Korea and Japan, insisted on putting a grace period for staple crops. The idea was accepted and an exceptional rule was applied to rice through Annex 5. As a result, Korea postponed the tariffication of rice for a decade from 1995 to 2004.

Protest against opening of agricultural products market

Annex 5(B) of the WTO Agreement on Agriculture provided the basis for rice negotiations with Korea. Although there were countries, such as Japan and Taiwan, that received special treatment but converted to tariffication (TRQs), Korea decided to extend special treatment for another decade from 2005 to 2014. The background idea for the decision was that the DDA (Doha Development Agenda) would require radical tariff reductions for agricultural products. So the government notified the WTO of its intention to commence negotiations on rice on January 21, 2004.

Nine WTO member nations, including the U.S., China, Thailand, Australia, India, Pakistan, Argentina, Egypt, and Canada, expressed their intention to participate in the talks with Korea. The negotiations kicked off first with the U.S. on May 6, 2004. After 50 consultations with those countries, Korea concluded a deal on rice. The agreement was that Korea would maintain special treatment for ten more years from 2005 to 2014 and then increase the minimum market access (MMA) annually from 225,575 tons (4.4% of local consumption from 1988 to 1990) in 2005 to 408,700 tons (7.96%) in 2014. In 2008, there was a discussion on abandoning special treatment to switch to tariffication for rice. However, it failed to reach a conclusion.

As Korea ended special treatment on rice in 2014, the government notified the

WTO that it would set a tariff of 513% for over-quota imported rice starting in 2015. Five rice exporters to Korea, including the U.S., China, Thailand, Australia, and Vietnam, raised an issue on the tariff level to the WTO. The consultations with the countries were completed after establishing country-specific quotas for the five countries in 2019. The WTO issued a certification for the deal on January 24, 2020.

WTO and DDA Negotiations

The UR Agreements were implemented separately for developed and developing member nations. The former had to complete the implementation period in six years in 2000 while the latter in ten years in 2004. Following the timeline, the WTO initiated a new market liberalization plan by launching the Doha Development Agenda (DDA) at its ministerial conference in Doha, Qatar, in November 2001.

The DDA was expected to finish by the end of 2004. However, there was a wide gap in opinions between developed and developing nations, and the talks have not moved further until now. The hot potato on the table was how to apply special and differential treatment for developing members, especially for China, concerning tariffs and subsidies. The other tricky issue—especially for India—was whether to categorize the public stockholding for food security as a green box.

The Korean government has actively participated in multilateral talks to express the nation's agricultural state and respond to market liberalization. Locally, it has expanded financial support for farmers to get ready for changes in global trends.

Korea's Status Change as a Developing Country

Korea signed into GATT as a developing nation in 1967 and maintained the

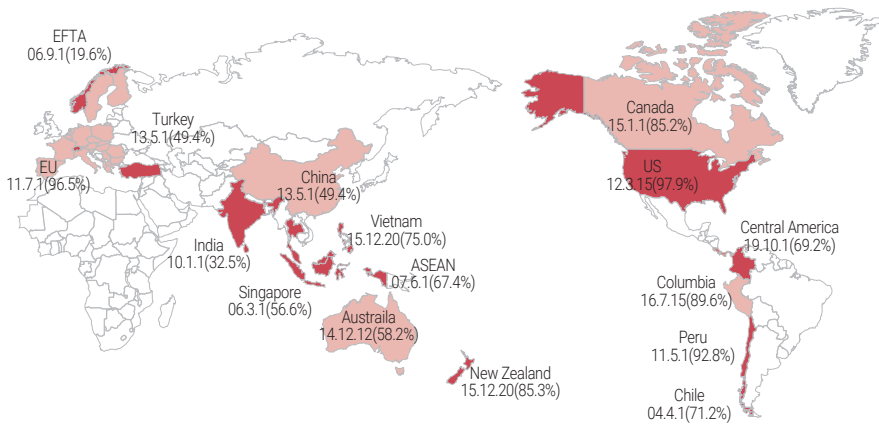
status until recently. Due to the position, it enjoyed several advantages in the UR concerning tariffs and subsidies. However, when the nation joined the OECD in 1997 after remarkable economic achievements, its status as a developing country in GATT was challenged. There was no clear line between developed and developing members in the WTO and the member nations announced their status. The problem was some members challenged others for taking advantage of provisions applicable only to developing countries. In 2019, the U.S. proposed that the WTO strip some members of the status if they meet specific criteria such as G-20 or OECD membership, or 0.5% share of the entire global trade.

On October 25, 2019, Korea announced that it would not seek the WTO's special treatment reserved for developing countries despite local farmers' strong objections. However, the government clarified that it would keep the developing-country status and only seek no special treatment in future trade negotiations. It persuaded the farmers that the decision would not elicit any inmediate harmful effects on agriculture and additional commitments. Besides, the government announced that it would endeavor to protect sensitive areas in agriculture such as rice in future negotiations.

Negotiations for Free Trade Agreements

Korea shifted further to trade liberalization after the financial crisis in the late 1990s. Following its new policy direction, the government pursued regionalism and bilateralism through free trade agreements (FTA) to revitalize the economy by attracting foreign capital inflows, and exploiting new export markets. The government signed its first FTA with Chile in 2004. Afterward, it signed and implemented 16 FTAs with 57 countries, such as Singapore, the European Free Trade Association (EFTA), the Association of Southeast Asian Nations (ASEAN), India, the E.U., Peru, the U.S., Turkey, Australia, Canada, China, Vietnam, New

Figure 4-32 Korea's free trade agreements (as of June 2020)



Note : In parentheses, the number is tariff elimination rate of the agricultural products in the country-specific FTA (the proportion of the number of items (HS10 units) for which tariff rates are entirely abolished from the total number of agricultural products).

Zealand, Colombia, and Central America (Panama, Costa Rica, Honduras, El Salvador, Nicaragua). Besides, the FTA deals with the U.K., Indonesia, and Israel were concluded and currently in preparation for implementation. The Regional Comprehensive Economic Partnership (RCEP), which is a free trade agreement between the Asia-Pacific nations, namely Korea, Australia, Brunei, Cambodia, China, Indonesia, Japan, Laos, Malaysia, Myanmar, New Zealand, the Philippines, Singapore, Thailand, and Vietnam, was signed on November 15, 2020. ASEAN leaders stated that India, which pulled out of the RCEP negotiations, was welcome to return and join the bloc whenever it was ready. Any other state or customs territory may join the RCEP 18 months after it comes into force.

Korea is still negotiating the Korea-China-Japan FTA, the FTA with Southern Common Market (MERCOSUR), and others with Malaysia, Ecuador, and Russia. Through the deals with China and, Japan and with the RCEP, Korea plans to lay

the groundwork for economic integration in Northeast and East Asia. FTAs with Central and Southern American economies are expected to provide strategic advantages to target Latin American markets with vast natural resources.

While pioneering into overseas markets, the nation also increased its market opening for agricultural products. Its first deal with Chile excluded most agricultural commodities to minimize impacts on the local agricultural sector. Some items, such as grape, kiwi, and pork, were listed for the tariff phase-out. For its deal with ASEAN, the government maintained its stance to exclude sensitive items. In negotiations with the U.S., it tried to exempt rice and rice products from the free trade list. Two countries' negotiators agreed to establish seasonal tariffs on grape and orange to reduce impacts on Korea's agriculture. However, the Korean public believed that Korea made the most significant concessions. The agreement's provisions immediately removed or phased out tariffs on U.S. goods, including beef, pork, and chicken, except rice. After the free trade deal with the E.U., the Korean government eliminated its trade barriers to dairy products, pork, and other agricultural products, except rice. Although its trade deal with China were expected to shock the local agricultural sector, the government kept its strong stance on rice and excluded it from the free trade list, reducing adverse impacts on local farmers.

Agricultural Exports

Exports by Item

Korea's exports jumped from USD 33 million in 1960 to USD 7.21 trillion in 2019, while the share of agricultural exports has plummeted since the early 1960s. After peaking at 43.1% in 1962, it dropped to 16.2% in 1970, 6.7% in 1980, and 2.2% in

Table 4-43 Korea's agricultural exports

Year	Agricultural product	Vegetables	Fruits	Livestock products	Forest products	Total
2000	1,134	186	45	144	255	1,532
2005	1,899	231	121	173	150	2,222
2010	3,722	277	195	146	214	4,082
2015	5,221	310	250	497	387	6,104
2016	5,581	336	299	458	425	6,465
2017	6,047	348	273	341	439	6,827
2018	5,985	377	311	418	524	6,926
2019	6,148	429	352	461	419	7,028

Source: MAFRA, each year, *Major Statistics on Agriculture, Forestry, Livestock and Food*;; The Korea Agro-Fisheries & Food Trade Corp. (www.kati.net/), Jun. 10, 2020.

1990. Since 2012, it has stayed around 1%.

The nation's agricultural product exports have undergone many changes. During the 1950s and 1960s, rice, cocoons, ginseng, and tobacco were main export items. In the 1970s, canned mushroom, chestnut, mushroom, arrow root, and medicinal herb contributed to export growth, while rice exports decreased sharply. Since the 1980s, fruits, vegetables (kimchi, bell pepper, cherry tomato, and eggplant), processed food, pork, floricultural products, traditional products (ginseng, tobacco, and chestnut) surged, diversifying the nation's exports.

Since the 1990s, the government has tried to expand the exports of fruits, vegetables, flowers, and pork with high values. Traditional food, such as kimchi and fermented soybean paste, contributed to increasing farm households' income. Exports of fruits, such as apples, pears, and citrus fruits, grew up, so did vegetables, including cucumber, tomato, onion, eggplant, carrot, and kimchi. Rose, lily, chrysanthemum, cactus, and orchid also increased Korea's export volume.

In 2019, agricultural products with an export volume of USD 100 million or larger included tobacco (USD 717 million), noodles (USD 467 million), beer (USD

146 million), drinking water (USD 140 million), cigarette (USD 133 million), sauces (USD 125 million), sucrose (USD 120 million), biscuit (USD 116 million), kimchi (USD 105 million), and bakery products (USD 101 million).

Exports by Country

The major importers of Korea's agricultural products are Japan, China, the U.S., Hong Kong, and Vietnam. Over half of Korea's agricultural exports go to the five countries. However, their share to the total exports decreased from 72% in 2000 to 60.7% in 2019.

Japan is the largest market for Korean agricultural products. However, its share declined from 45.5% in 2000 to 20.3% in 2019. Chestnut, pine mushroom, kimchi, cucumber, tomato, bell pepper, and flower are the main items exporting

Table 4-44 Agricultural Export of Korea by Country

Unit: million dollars

	Japan	China	US	Hong Kong	Vietnam	Others
2000	697 (45.5)	118 (7.7)	145 (9.5)	134 (8.7)	8 (0.6)	406 (26.9)
2005	713 (32.1)	231 (10.4)	280 (12.6)	124 (5.6)	17 (0.8)	856 (38.5)
2010	1,023 (25.1)	556 (13.6)	377 (9.2)	216 (5.3)	121 (3.0)	1,789 (43.8)
2015	1,168 (19.1)	1,047 (17.2)	627 (10.3)	347 (5.7)	371 (6.1)	2,544 (41.7)
2016	1,159 (17.9)	1,097 (17.0)	716 (11.1)	330 (5.1)	403 (6.2)	2,760 (42.7)
2017	1,314 (19.2)	986 (14.4)	746 (10.9)	340 (5.0)	375 (5.5)	3,066 (44.9)
2018	1,324 (19.1)	1,111 (16.0)	802 (11.6)	371 (5.4)	447 (6.5)	2,870 (41.4)
2019	1,427 (20.3)	1,106 (15.7)	874 (12.4)	353 (5.0)	514 (7.3)	2,754 (39.2)

Note: Figures in brackets refer to percentages of the total.

Source: MAFRA, each year, *Major Statistics on Agriculture, Forestry, Livestock and Food*;, The Korea Agro-Fisheries & Food Trade Corp. (www.kati.net/), Jun. 10, 2020.

to Japan. China is the second-largest market and imports sucrose, candy, chewing gum, ginseng, and liquor. Its import volume was USD 1.11 billion (15.7%) in 2014. The U.S. imports increased from 9.5% to 12.4% from 2000 to 2019. It mainly imported noodles, candy, fermented soybean paste, and pear. The share of Vietnam's imports soared from 0.6% in 2000 to 7.3% in 2019. It imported chicken and mushroom.

Agricultural Imports

Imports by Item

Korea's imports of agricultural and forest products rose from USD 82 million in 1960 to USD 34.3 billion in 2019. The agricultural products' share of the total declined every year: 24% in 1960, 14% in 1980, 5.3% in 2000, 4.6% in 2005. Following the nation's free trade agreements with various countries, the ratio rebounded to 5.3% in 2010 and 6.8% in 2019. As of 2019, the nation's agricultural imports tripled from the early 2000s.

Cereal grains, pulses, and potatoes take the largest share of Korea's imports. Grain imports soared from 2 million tons in 1970 to 5 million tons in 1980, 10 million tons in 1990, and 16 million tons in 2019. With a spike in grain imports, the country's grain self-sufficiency rate plummeted: 80.5% in 1970 to 56.0% in 1980, 43.1% in 1990, 29.7% in 2000, and 21.7% in 2019. The main importing items include maize/ wheat (animal feed), wheat, and bean. Maize imports surged after the mid-1970s with a sharp rise in demand for animal feed due to increased meat consumption. In 2019, 10 million tons of maize were shipped from the U.S., Brazil, Ukraine, and Russia. Wheat is imported for animal feed and human food. Korea imported 3.6 million tons of wheat from the U.S., Australia, Canada, and

Table 4-45 Agricultural Imports of Korea

Unit: million dollars

Year	Agricultural products	Vegetables	Fruits	Livestock Products	Forest Products	Total
2000	5,105	187	349	1,679	1,667	8,450
2005	7,397	330	616	2,361	2,131	11,889
2010	13,988	720	945	3,123	5,219	22,330
2015	17,902	922	1,736	5,729	6,592	30,223
2016	17,666	961	1,760	5,807	6,200	29,673
2017	18,594	955	1,943	6,603	7,097	32,294
2018	19,903	976	2,149	7,522	7,877	35,302
2019	19,876	945	1,988	7,786	6,643	34,305

Source: MAFRA, each year, *Major Statistics on Agriculture, Forestry, Livestock and Food*.

Ukraine in 2019. Soybean was self-sufficient until the 1960s. However, as its consumption rose, the imports surged from 36,000 tons in 1970 to 1.3 million tons in 2019. It is mostly shipped from the U.S., Brazil, Argentina, and China. Rice imports increased every year following the UR agreement, reaching 410,000 tons in 2014.

Livestock product imports jumped to 499,000 tons in 2003, mainly due to increased beef imports after the late 1970s. In 2004, meat imports fell to 370,000 tons as beef imports from the U.S. were prohibited due to the bovine spongiform encephalopathy (BSE) at the end of 2003. After the Korean government lifted the ban on American beef in 2007, beef imports rebounded. Livestock product imports increased again to 1,043,000 tons in 2019—three times up from 2004.

Fruit imports have surged since the late 1980s with the agricultural market opening, from USD 36 million in 1990 to USD 350 million in 2000. After the free trade deals with Chile and the U.S., the figure reached USD 1.99 billion in 2019, six times up from 2000. The main items imported were banana, orange, pineapple, and grape initially, and expanded to include cherry, kiwi, mango,

lemon, cashew, grapefruit, and cranberry. Vegetable imports amounted to USD 945 million in2019, a significant surge from USD 0.3 million in 1970. Imports from China include chili pepper, garlic, and onion.

Imports by Country

Korea's import markets for agricultural products vary compared with export markets relying heavily on a couple of trade partners. The U.S., China, Australia, Brazil, and Indonesia are the largest five exporters to Korea. They took 63.1% of the total in 2000, but the share decreased to 56.4% in 2019. New Zealand, Canada, Thailand, Chile, Malaysia, and Vietnam export over USD 100 million worth of agricultural goods to Korea every year.

In 2019, the U.S. exported USD 8.95 billion worth of agricultural products to Korea, holding the largest market share of 26.1%. It exports maize, beef, wheat, pork, soybean, orange, and cherry to Korea. China is the second-largest exporter to Korea, with a market share of 12.9%. Its agricultural exports amounted to USD 4.41 billion in 2019. Soybean, rice, chili pepper, and kimchi are the main products China exports to Korea. As one of the largest agricultural producers, Australia is the third-largest, exporting beef, noodle, cane sugar, wheat, and barley. Its export size to Korea reached USD 2.46 billion in 2019, 3.2 times higher than in 2000. Imports from Brazil and Chile have skyrocketed since the 2000s. Brazil's agricultural exports amounted to USD□2.23 billion in 2019, ten times up from USD 210 million in 2000. The main items shipped to Korea are maize, soybean, and coffee. Imports from Chile soared 19 times from USD 40 million in 2000 to USD 776 million in 2019, with rising demand for grape, pork, and wine after the Korea-Chile free trade agreement came into force.

Table 4-46 Korea's Agricultural Import by Country

Unit: million dollars

	US	China	Australia	Brazil	Indonesia	Others
2000	2,434 (28.9)	1,405 (16.7)	776 (9.2)	218 (2.6)	382 (4.5)	3,219 (38.2)
2005	2,199 (18.5)	2,217 (18.6)	1,360 (11.4)	582 (4.9)	362 (3.0)	5,170 (43.5)
2010	4,468 (24.4)	2,822 (15.4)	1,601 (8.7)	1,466 (8.0)	593 (3.2)	7,397 (40.3)
2015	7,000 (23.2)	4,438 (14.7)	2,422 (8.0)	2,201 (7.3)	1,082 (3.6)	13,080 (43.3)
2016	6,852 (23.1)	4,425 (14.9)	2,594 (8.7)	2,079 (7.0)	1,088 (3.7)	12,635 (42.6)
2017	7,829 (24.2)	4,455 (13.8)	2,818 (8.7)	1,839 (5.7)	1,195 (3.7)	14,158 (43.8)
2018	9,373 (26.6)	4,603 (13.0)	2,552 (7.2)	1,966 (5.6)	1,399 (4.0)	15,410 (43.7)
2019	8,953 (26.1)	4,411 (12.9)	2,464 (7.2)	2,229 (6.5)	1,255 (3.7)	14,993 (43.7)

Note: Figures in brackets refer to percentages of the total.

Source: MAFRA, each year, *Major Statistics on Agriculture, Forestry, Livestock and Food*;; The Korea Agro-Fisheries & Food Trade Corp. (www.kati.net/), Jun. 10, 2020.

Outlook and Tasks

Korea's agricultural policies in response to market liberalization were restricted considerably by the WTO regulations. So Korea shifted its focus to minimizing market distortions within the boundaries of the WTO rules. The examples are as follows: I) direct payments, II) the agricultural industry's linkage to other sectors, such as food processing and storage, III) marketing programs for branding and distribution, and 4) farmers' education. Import regulation policies are likely to be removed or relaxed except for regulations on sanitary and phyto-sanitary measures. Furthermore, the government will have to reduce customs duties.

Agricultural trade is expected to expand significantly, driven by imports

rather than by exports. The demand for a wide range of high-quality agricultural products is likely to increase in line with Korea's economic growth and demographic changes. In particular, imports in feed grain and meat will rise with the growing demand. Trading partners and items will expand, too. With the market liberalization trend, Korea will diversify its import and export destinations. Due to diversified trading routes, harmful pests and foods may find their way into Korea. Therefore, establishing measures to protect both the national health and natural environment from harmful pests, disease, and food will emerge as the most crucial task in the agricultural trade policy. Despite the gradual decline in the share of the local agricultural industry due to market liberalization, social needs for multifunctionality (environment preservation, balanced national development, traditional culture succession fostering, and food security) are increasing. Accordingly, another significant challenge facing the agricultural trade policy is how to achieve a balance between changes in the agricultural trade environment and the social need for agriculture.

The cracks in the international commerce order, such as the U.S.-China trade disputes, the U.K.'s withdrawal from the E.U., and the Korea-Japan trade conflicts, and the conclusion of free trade agreements such as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), the U.S.-Mexico-Canada Agreement (USMCA), and the Regional Comprehensive Economic Partnership (RCEP), and the COVID-19 situation will fasten the withdrawal of the trade liberalization trend, which the world has pursued after World War II.

As the Doha Development Agenda (DDA) pursued by the WTO regime seems to lose its force after the ministerial conference in Nairobi in 2015, it is not likely to function as a new trade principle. As the U.S. pursues protectionism, its trade conflicts with China are escalating into diplomatic and military problems. As

the U.K. decided to leave the E.U., the European economy is likely to slow down. Meanwhile, the Trans-Pacific Partnership (TPP) made a disappointing start as the U.S. President Trump declared a withdrawal from the pact. Worse, the global pandemic is expected to cause uncertainties in international trade.

However, as Korea is heavily reliant on exports, it has to pursue trading with other countries. It will be challenging to maintain the trade policy amid protectionism, as the nation may have to make more concessions for agricultural products. Besides, as the government abandoned its status as a developing country, it will face more challenges in trade negotiations. With the expected global economic recession and protectionism, the government should enhance food security and self-sufficiency rates.