Chapter 4
Agriculture-Related Industries

1. Agro-Food Marketing
2. Food Industry
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Chapter 4. Agriculture-Related Industries

1. Agro-Food Marketing

Agro-Food Marketing Channel

The agro-food marketing channel in Korea is complicated. As fresh agricultural products, in particular, are produced and supplied mostly by small farms, the marketing process involves multiple phases. In Korea, agro-food marketing was modernized after the mid-1980s when public wholesale markets were established for the first time, and it has improved further since the late 1990s, focusing on large-scale retailers. As the marketing process connects production and consumption, it affects and is affected by the pattern of consumption and purchase of consumers, while it also has a mutual influence on production and shipment by producers.

Complex Marketing Channel of Agricultural Products

Due to the multi-item production system of small farms, the shipment of agricultural and livestock products is dispersive, making the marketing process complex and increasing the marketing expenses. In addition, Korean consumers have many concerns over the quality of fresh agricultural products, such as freshness, so the marketing process is more complicated compared to western countries.

In general, the marketing channel of horticultural products, such as vegetables and fruits, flows from farms through shipment groups in producing areas, wholesale markets and retailers to consumers. It is difficult for farms to jointly ship horticultural products because

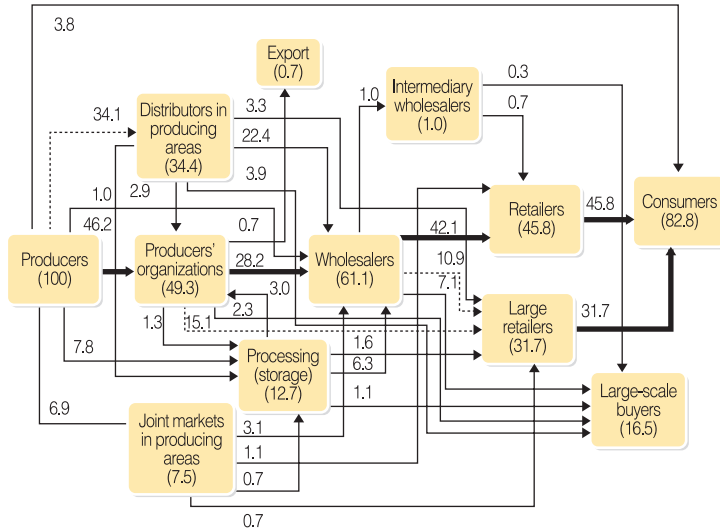
it is not easy to standardize and store such products due to their characteristics, and these products also need to go through multiple marketing procedures. Shipment groups in producing areas include the National Agricultural Cooperative Federation (or cooperative units by crop) and farming association corporations as well as distributors (dealers). In consuming areas in the recent years, large-scale distributors including large supermarkets (discount stores) and supermarket chains as well as wholesale markets have dealt with a growing volume of products, and direct transactions such as e-commerce have also expanded. Horticultural products vary in the marketing process according to the type of crops.

Grains, including rice, are distributed generally in the process from farms through rice processing complexes or commercial rice mills and stores in consuming regions to consumers. There are approximately 300 rice processing complexes (RPCs) throughout the country, which perform the functions of drying, storing, processing and selling rice. The government purchase policy, under which the government had an enormous impact on the marketing and distribution of grains in the past, has been abolished, and private economic players are now taking the initiative in the distribution of grains. In terms of grains, the role of wholesale markets is insignificant since grains can be stored easily and have been standardized to some degree. Most grains are shipped directly from processing companies in producing areas to stores in consuming regions.

Livestock products are distributed from farms through slaughterhouses, auction houses (wholesale markets) and retail stores to consumers. In several cases, livestock processing

Figure 4-1 Marketing Channel of Horticultural Products (2013)

Unit: %



Note: Thick solid arrow lines indicate the primary destinations of shipment. Thick dotted arrow lines refer to marketing channels with the ratio of 10% and over in the total distribution volume, and thin dotted arrow lines are for channels with the ratio less than 10%.

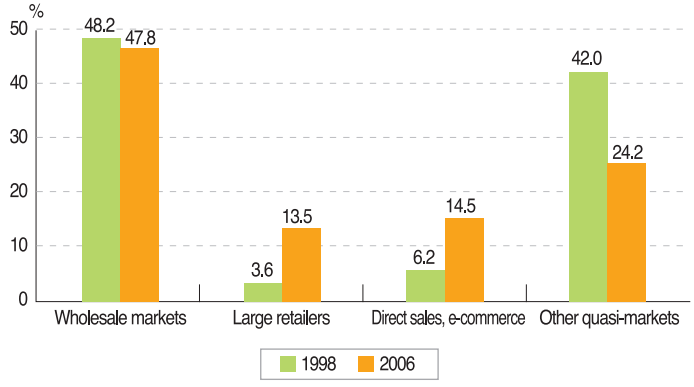
Source: Korea Agro-Fisheries and Food Trade Corporation, *The Marketing and Distribution Status of Major Agricultural Products.*

complexes (LPCs), instead of slaughterhouses or auction houses, take charge of butchery and wholesale en bloc, and their roles are gradually growing.

Agricultural Marketing Channel is Rapidly Being Diversified

With the rapid economic growth, Korea has undergone dynamic social changes. The fast-changing consumption patterns following the increase in national income have led to the diversification of agricultural marketing channels. Since the mid-1980s, a total of 32 public wholesale markets have been established and operated. After the mid-1990s, the number

Figure 4-2 Changes in the Proportion of Each Marketing Channel in the Total Trade Volume of Agricultural Products



Source: MAFRA.

of large retail distributors has soared, triggering swift changes in agricultural marketing channels.

In terms of the proportion of each marketing channel in the total transfer cases, the ratio of wholesale markets slightly decreased to 48% from 1998 to 2006, while that of quasi-markets dropped significantly from 42% to 24%.[1] In case of large-scale distributors, the ratio jumped from 4% to 14% during the same period, while that of direct transactions or e-commerce rose from 6% to 15%.

In the total retail sales of major agricultural products, the marketing expenses account for 45% as of 2013, and farms receive about 55% of the unit price of products. In terms of the ratio of expenses of each marketing phase, shipment takes up 9.1%, wholesale 12.3%, and retail 23.6%. There is no big difference between

1) According to a survey conducted by the Korea Agro-Fisheries & Food Trade Corporation in 2011, 53% of major agricultural products are traded through wholesale markets.

Table 4-1 Marketing Expense of Agricultural Products of Each Phase and Composition (2013)

Unit: %

Classification	Ratio of Price Received by Farm	Marketing Expenses (Consumer Price - Price Received by Farm)						
			By Phase			By Composition		
		Total	Shipment	Wholesale	Retail	Direct Expense	Indirect Expense	Profit
All Agricultural Products	55.0	45.0	9.1	12.3	23.6	14.3	17.3	13.4
Food Crops	72.3	27.7	10.6	4.3	12.8	12.9	8.1	6.7
Leaf and Root Vegetables	32.2	67.8	25.4	14.8	27.6	30.2	12.3	25.3
Fruit-Vegetables	59.0	41.0	10.8	9.5	20.7	16.3	13.3	11.4
Condiment Vegetables	48.7	51.3	17.6	11.9	21.8	18.6	13.0	19.7
Fruits	51.4	48.6	14.1	10.1	24.4	18.7	14.6	15.3
Livestock products	51.3	48.7	2.3	17.3	29.1	9.5	25.4	13.8

Source: Korea Agro-Fisheries and Food Trade Corporation, *The Marketing Status of Major Agricultural and Fishery Products.*

the ratios of compositions in marketing expenses: the direct expense accounts for 14.3%, the indirect expense 17.3%, and profits for merchants 13.4%. In respect of the ratio of each composition in marketing expenses by commodity, the direct expense and profits take up more proportions than the indirect expense in case of horticultural crops. In terms of livestock products, on the contrary, the proportion of the indirect expense is larger than that of the direct expense and profits.

In terms of horticultural products, the proportion of marketing expense in sales stays around 42% to 45%. Marketing expenses are generally fixed, so the ratio of marketing expense in retail prices tends to decrease in a bad year and increase in a bumper year. When it comes to the proportion of marketing expense in each marketing phase, the ratio of shipment expense slightly dropped, while that of wholesale expense slightly went up.

Table 4-2 Changes in Marketing Expense of Horticultural Products of Each Phase

Unit: %

Classification		2008	2009	2010	2011	2012	2013
Ratio of Marketing Expense		44.5	44.1	42.3	41.8	43.9	45.0
Marketing Phase	Shipment	10.3	12.2	11.1	10.0	9.1	9.1
	Wholesale	9.6	9.3	7.9	8.6	12.1	12.3
	Retail	24.6	22.6	23.3	23.2	22.7	23.6

Note: The ratio of marketing expense is calculated by dividing the total marketing expense by retail price and converting it into a percentage.
Source: Korea Agro-Fisheries and Food Trade Corporation, *The Marketing Status of Major Agricultural and Fishery Products*.

Marketing Status in Producing Areas

The Shipment Volume in Producing Areas is on the Rise, But Still Low

Among the methods of shipment of agricultural products in producing areas, route sales through unit associations are the most frequently used method for all commodities, followed by individual sales and joint sales. Route sales include individual settlement, joint packaging and joint transport, while joint sales comprise selection, transport and calculation all in a joint system. Leaf and root vegetables are generally distributed in individual or route sales, condiment vegetables in route sales, and fruit and fruit-vegetables in joint or route sales. The number of joint and route sales cases has increased compared to the past. Joint calculation is still used for the shipment of fruit and fruit-vegetables, and the shipment volume with a method of joint calculation accounts for slightly over 10% in the total shipment volume. In producing areas, individual sales cases have decreased while joint sales cases have gone up because the number of joint shipment groups increased thanks to efforts made by farms and supports by the government. Joint shipment

groups include professional marketing organizations in producing areas and integrated marketing organizations. Professional marketing organizations in producing areas refer to groups that actively participate in shipment activities and are supported by the government for the establishment of agricultural product processing centers (APCs). Integrated marketing organizations usually deal with joint marketing activities between different organizations.

The type of stores to which agricultural products are sold depends on the shipment volume and characteristics of each commodity. In particular, shipment volume is a key factor in the selection of stores. According to a survey conducted by KREI in 2006, the average shipment volume of a shipper at one time is 2.6 tons for individual shippers, while the average volume for joint shipment groups is 15.6 tons, which is relatively high. In terms of transactions at wholesale markets, the survey finds that half of the total transactions were carried out for less than ten packing units (boxes, etc.) at one time. The small volume of shipment and transactions is attributed to a small-scale production structure of small farms, while shipment by joint groups is in a relatively good condition. The small shipment volume undermines the efficiency of logistics and also increases transaction expenses including the searching costs.

APCs are Key to Marketing of Agricultural Products in Producing Areas

APCs refer to centers equipped with facilities for selection, packaging and low-temperature storage, aimed at packing horticultural products including fruits and vegetables and boosting the standardization of shipment. The government has established

marketing facilities with consideration for the characteristics of commodities in major producing areas of agricultural products, nurtured these facilities as the strategic bases of distribution in producing areas, systemized the marketing structure, and reinforced bargaining capability of farms in the market, thereby supporting the establishment of APCs to overcome the limitations of small-scale farming and enhance the capacity of producing areas in responding to fast-changing marketing environment.

The volume of agricultural products traded through APCs is on the steady rise. The number of APCs was 175 in 2000, and ten or more centers have been constructed each year, which makes a total of 365 centers as of the end of 2014. In terms of marketing organizations in producing areas equipped with APCs, the trade volume per APC reaches 15,500 tons. Among groups with APCs, integrated marketing organizations deal with the highest volume of agricultural products, followed by the National Agricultural Cooperative Federation (NACF) and agricultural corporations.[2)]

Table 4-3 Establishment and Operation of Marketing Organizations in Producing Areas Equipped with APCs (2013)

Unit: number, 1,000 tons

Classification	Professional Marketing Organizations in Producing Areas		Joint Marketing Groups	Total
	National Agricultural Cooperative Federation	Farming Association Corporations		
No. of APCs	90	38	88	128
Trade Volume	1,575	403	1,372	1,978
Trade Volume per APC	17.5	10.6	15.6	15.5

Source: MAFRA, data of marketing organizations' performance.

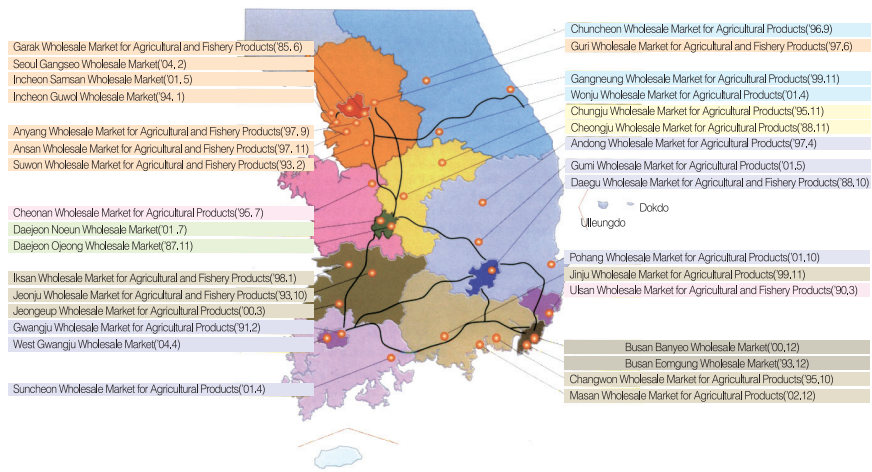
2) Based on the result of the study on 128 distribution groups in producing areas (as of 2013) as the targets of the assessment conducted by the government.

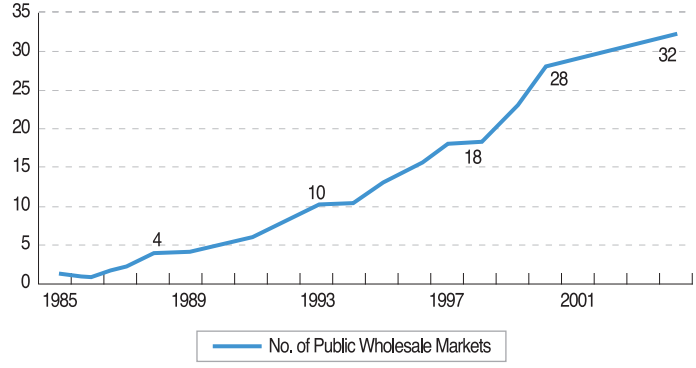
Wholesale Markets

Changing Environment of Agricultural Wholesale Markets

Among various institutions in charge of marketing of agricultural products, public wholesale markets take charge of a major part of wholesale distribution. In accordance with the Act on Distribution and Price Stabilization of Agricultural and Fishery Products, public wholesale markets are established and managed by local governments with the joint investment of the central and local governments. Besides, there are other types of public markets, such as joint markets, which are established by the NACF and local cooperatives with an approval from mayors and/or governors, and quasi-markets, which cannot be supervised by the central and local governments due to the absence of the duty for report specified under the Act. Starting from the one in Garak-dong in 1985, a total of 32 public wholesale markets have been established throughout

Figure 4-3 Distribution Map of Public Wholesale Markets and Progress of Opening





Source: MAFRA, key data from the Distribution & Consumption Policy Department.

the country as of 2004, including Seoul Gangseo Wholesale Market and West Gwangju Wholesale Market. The transactions in public wholesale markets amount to KRW 11.6 trillion, and the trade volume has increased to 7.1 million tons.

The volume of horticultural products (root and tuber crops included) traded through public wholesale markets increased by 3.5 times from 2 million tons in 1990 to 6.9 million tons in 2013. The trade volume at wholesale markets takes up 58% of the total trade volume of fruits and vegetables, which means that public wholesale markets have settled as key wholesale distribution facilities in the marketing channel of agricultural products. After the late 2000s, however, no public wholesale market has been newly constructed, so the proportion of public wholesale markets in the total distribution of agricultural products has stagnated.

At wholesale markets, wholesale market corporations, market wholesale merchants and intermediary wholesalers are selected in various ways, such as designation and approval, and their roles are divided in order to maintain fairness and transparency

Table 4-4 Proportion of Public Wholesale Markets in the Total Volume of Distributed Horticultural Products

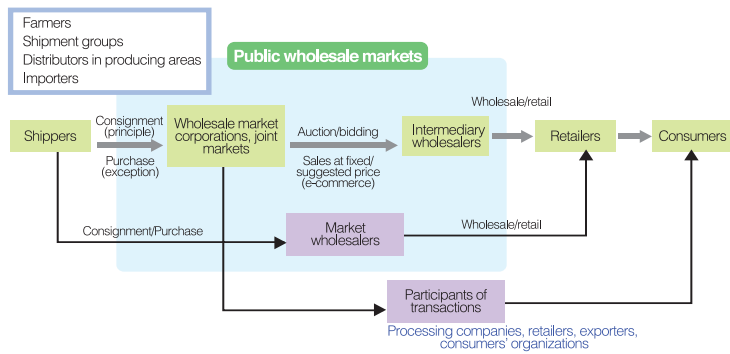
Unit: 1,000 tons, %

Classification	2000	2002	2004	2006	2008	2010	2011	2012	2013
Proportion of trades compared to the total volume of distributed products	38.6	45.9	44.8	48.8	52.4	57.0	53.4	58.5	57.8

Note: Volume of distributed products = Produced volume × Ratio of commercialized products (Vegetables 92.6%, fruits 93.2%, root and tuber crops 90.8%)
Source: *Food, Agriculture, Forestry and Fisheries Statistics* (Outputs), *The Statistical Yearbook of Agricultural & Fishery Products Wholesale Market* (Trade amount at wholesale markets).

in transactions. Wholesale market corporations are consigned to sell agricultural products on behalf of shippers, and intermediary wholesalers purchase products from the corporations on behalf of consumers. In recent years, the market wholesale merchant system has been introduced and implemented at Seoul Gangseo Wholesale Market as part of the efforts to improve the marketing structure.[3)]

Figure 4-4 Trade Players and Functions of Public Wholesale Markets



3) Market wholesale merchants refer to corporations that are designated by founders to perform the functions of collection and distribution of agricultural products as a wholesaler (purchase/consignment) and broker at wholesale markets.

Agricultural products are traded in the methods such as auction and bidding in principle at wholesale markets, and several exceptions include trades at fixed or suggested price and unlisted transactions. Fixed or suggested price is applied to trades of listed agricultural products in a small volume and for the cases in which the number of intermediary wholesalers is small, so that the wholesalers purchase products at suggested price. Unlisted transactions refer to the cases in which when the volume of products is small, intermediary wholesalers directly buy products from shippers or are consigned to sell products that are designated by founders.

In terms of performance by type of transaction, listed transactions through which wholesale market corporations are consigned to sell products take up large part of the total trades. As the market wholesale merchant system was introduced in 2004 when Gangseo Wholesale Market opened, the trade scale has expanded. The number of listed transactions by the methods of auction and bidding has reduced, while other types of transactions have been on the steady rise. At public wholesale markets, listed trades at fixed or suggested price account for 11% to 13% in the total transactions.

Table 4-5 Performance Depending on Type and Method of Transactions at Public Wholesale Markets (2013)

Unit: 1,000 tons, KRW 100 million

Classifications	Listed Transactions (Corporations and Joint Markets)			Unlisted Transactions (Intermediary Wholesalers of Particular Commodity)			Transactions by Market Wholesale Merchants		
	Auction & Bidding	Fixed or Suggested Price	Total	Consigned Sales	Purchase & Sales	Total	Consigned Sales	Purchase & Sales	Total
Volume	5,362	680	6,042	392	145	537	180	98	277
Amount	84,098	12,221	96,319	4,285	3,201	7,486	3,365	1,992	5,357

Source: MAFRA, *The Statistical Yearbook of Agricultural & Fishery Products Wholesale Market.*

Fruits are mostly traded at fixed or suggested price, while vegetables are traded by unlisted transactions.

The Accomplishments and Limitations of Public Wholesale Markets

Since 1985, a total of 32 public wholesale markets have been established and the trade volume has also been on the rise, contributing to securing stable marketing channels for shippers even in the structure of small farms. Meanwhile, the listed transactions by auction have settled down and formed prices of products through fair trades, providing stable marketing channels for producers and securing price settlement. Public wholesale markets have also performed the role as the bases that supply products to consumers on a stable basis, keeping up with rapid urbanization. In recent years, however, transactions at wholesale markets have stagnated due to the following reasons.

First, wholesale markets are short of capacity to respond to the expansion of the retail phase and the recent changes in the pattern of consumption. While the number of large retail companies has soared since the late 1990s, wholesale markets lack the function of commercialization through small packaging, processing and selection and the function of safety control. The influence of large retailers has expanded, but wholesale markets' capabilities for collection, distribution and price setting have still stagnated.

Second, there are not sufficient facilities for transactions of agricultural products that can enhance the marketing environment. Producing regions are short of facilities for low-temperature storage, processing and packaging. Mechanization of the process of

unloading products, which can reduce marketing expenses, has not shown much progress.

Third, marketing players at wholesale markets lack capacities for active collection and distribution. Wholesale market corporations are used to consignment and auction systems, so they cannot properly perform the role of collection as sales agents of producing areas with consideration for needs of consuming regions. In addition, as intermediary wholesalers operate their business in a small scale, their distribution capability is limited, increasing marketing expenses. Therefore, wholesale markets should develop and provide training for producing areas and reinforce its function of supporting small-scale merchants. Wholesale markets have to improve their operation system by moving their focus from fairness to efficiency. To this end, the trade system should be operated more flexibly, and the scale of markets should be expanded by merging wholesale market corporations and intermediary wholesalers.

Large Retailers

Influence of Large Retailers Increases

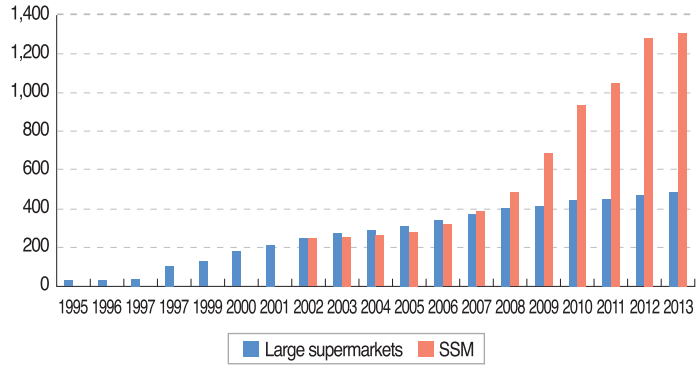
Since 1996 when the service market related to marketing and distribution was opened, large retailers, such as large supermarkets (discount stores), have shown rapid growth. Until 1995, traditional supermarkets took up 75.7% of the total supermarkets in the country, but the proportion remarkably fell to 24.7% in 2005, and that of department stores decreased from 16.0% to 6.1% in the same period.[4] In contrast, the proportion of large retailers has increased

4) Traditional supermarkets are mostly operated in a space smaller than 991m^2 and focus on food products, and are located in residential areas as a community-based business.

from 8.3% to 69.2% since the mid-1990s. This happened because large retailers in Korea put their focus on food products and directly compete against traditional supermarkets, while the traditional ones lack price competitiveness and the diversity of commodities compared to large supermarkets due to their small scale and the number of stores. In other words, large retailers have reinforced their control in the market with the strategies of oligopoly and integrated purchase under the chain store system.

The number of large supermarkets increased from around 100 in 1999 to 300 in 2005 and 386 in 2008, and their sales surged to approximately KRW 30 trillion. With the rapid increase in the number of stores, large supermarkets took the initiative in retail marketing in the industry. Since the late 2000s, however, the number of large supermarkets has stagnated, while super supermarkets (SSMs) have been growing, leading changes in retail marketing.

Figure 4-5 Changes in the Number of Large Supermarkets and SSMs



Source: Korea Chainstores Association, *The Yearbook of Retail Industry.*

Large retailers have formed new marketing channels different from those for wholesale markets and contributed to diversifying the channels and improving marketing efficiency. If agricultural products are distributed through wholesale markets, the marketing procedure comprises five to six phases: producers → shipment groups in producing areas → wholesale market corporations → intermediary wholesalers → retailers → consumers. When large retailers purchase products directly from producing areas, on the contrary, the marketing process can be shortened to three or four phases: producers → shipment groups in producing areas → large retailers → consumers.

As the competition between retailers became fierce, the need for enhancing marketing efficiency has grown. Accordingly, contract transactions and vertical integration between marketing phases have emerged. As the number of stores of large retailers such as supermarkets, department stores and discount stores increases, their own wholesale function to procure agricultural products from producing areas is being strengthened, triggering the expansion of direct sales and purchase in producing areas. In particular, the number of large supermarkets has significantly grown since 2000 with the increase in direct purchase in producing areas. While it is hard to trade standardized vegetables under contract directly in producing areas, the direct purchase of fruits has been vitalized. The proportion of direct purchase of fruits in producing areas led by large retailers doubled from 35.4% in 1999 to 61.3% in 2005, and that of vegetables also increased substantially from 21.9% in 1999 to 51.3% in 2005. These days, large retailers buy fruits directly from producing areas outside Korea. Accordingly, the proportion of direct

Table 4-6 Changes in Proportions of Fruits and Vegetables Directly Purchased by Large Retailers from Producing Areas

Unit: %

	Domestic products			Imports	
	1999	2002	2005	2010	2014
Fruit	35.4	47.5	61.3	31.0	47.0
Vegetables	21.9	37.5	51.3	-	-

Note: Imports indicate global sourcing.
Source: Kim Donghwan et al. (1999, 2002), Seo Seongcheon and Kim Byeongryul (2005), Lee Yongsun et al. (2014).

purchase went up from 31% in 2010 to 47% in 2014.

The purchasing market of large retailers is largely led by the purchaser. While there are numerous suppliers that wish to provide agricultural products of similar quality, a smaller number of large retailers can select local suppliers for their products. Thus, the market is dominated by purchasing parties, and large retailers hold sway over the market. The market share of the top four companies in terms of sales in the retail market rose from 2.0% in 1995 to 42.9% in 2006.

Pros and Cons of Increased Market Dominance of Large Retailers

Large retailers lead the agricultural product purchasing market, spreading positive effects by expanding the production scale in producing areas, improving product quality, and encouraging producers to organize groups in producing areas. Based on their control in the retail market, large retailers attract intermediary wholesalers and market wholesale merchants at wholesale markets, consigned merchants and dealers in quasi-markets,

and cooperatives, cooperative units by crop, farming association corporations and large-scale farms as vendors, reducing purchasing price through competition. They are also establishing the supply chain management (SCM) system by implementing vertical marketing or channel integration among producing areas, vendors and their distribution centers, in order to provide quality agricultural products on a stable and efficient basis at proper time and price. In other words, large retailers are making efforts to enhance the efficiency of logistics by forming such a system. Furthermore, large retailers actively identify the needs of consumers, reflect them in the supply of products, and provide a convenient environment where consumers can purchase various products at one time.

The market dominance of large retailers is increasing, and they are using their leverage in the market to expand their own "private brands" (PB) lines. Producers are often pressured to modify their products to retailers' specifications, supply them at lower costs, and to bear the burden of marketing and logistics expenses.

Direct Transactions

Various Types of Direct Transactions Have Emerged in Recent Years

Farmers' markets and direct sales stores for local food are where local agricultural products are traded directly between producers and consumers. Farmers' markets have long existed, providing an open-air environment for transactions. The number of markets for direct transactions increased from 681 in 2012 to 734 in 2014, and the trade amount also grew from KRW 135.3 billion in 2012 to KRW 187.2 billion in 2014. In case of local food stores, the number of

shops has recently jumped from 3 in 2012 to 53 in 2014. In recent years, more various types of direct transactions have emerged.

New types of direct transactions include "Seasonal Food Package," the program through which consumers make payments in advance and receive seasonal food packages from farms for a certain period of time, and a direct transaction platform, which is similar to community supported agriculture (CSA), the system in which a curator of agricultural products connects consumers with farms in the production phase.

Table 4-7 Status of Farmers' Markets and Direct Markets of Local Food

Unit: store, KRW 100 million

Classification		2012	2013	2014	2016 (Target)
Farmers' Market	No. of Markets	681	703	734	-
	Trade Amount	1,353	1,619	1,872	-
Direct Sales Store	No. of Stores	3	32	53	120
	Trade Amount	13,647	16,081	26,634	60,303

Source: Data released by MAFRA (July 2014).

Outlook and Tasks

In Korea, the marketing and distribution of agricultural products have rapidly changed for the past three decades. Those who led such changes in the marketing system of agricultural products in the 1980s and 1990s were public wholesale markets, while large retailers took the initiative from the 2000s. In the future, systematization will be intensified as the direct purchase system in producing areas will be strengthened under the lead of large retailers. Moreover, the food service industry will expand further with the increase in dining-out, and this change will lead to the expansion of the food distribution

market. Consumers will demand an efficient supply of differentiated products.

The government promoted the establishment of public wholesale markets, starting with Garak Wholesale Market in 1986 and carried out this project until the 1990s. The government also employed the auction system to enhance transparency in the price setting process. In the 1990s, it increased support to expand distribution facilities in producing areas in response to the market opening under the WTO system. After the 2000s, the government has focused on supporting the specialization and expansion of distribution groups in producing regions to reinforce the competitiveness of marketing players.

In order to respond to fast-changing needs of consumers, it is crucial to expand the scale of shipment in producing areas. To this end, a yearlong supply system should be established by forming partnership not only between small-scale groups in the same region but also between organizations from different areas. It is also important to enhance the marketing capacity of shipment groups in producing areas and to reorganize relevant laws and regulations to eradicate unfair transactions by large retailers utilizing their market power. Wholesale markets, the largest channel for distributing agricultural products, should enhance flexibility in their trade system by shifting a focus from fairness to efficiency, and improve their facilities and equipment for reinforcing their logistics function. In order to keep up with a new pattern of consumption demanding high-class and differentiated products, it is essential to standardize the grading process and continuously develop the technology for postharvest management.

2. Food Industry

Rising income levels have led to increasing household food expenditures as more families dine out or consume processed foods. Such changes have led to a rising effort to link the food industry to the domestic agricultural sector. The food industry is receiving policy focus not only due to its potential for increasing the value added of agricultural products, but for expanding their market as well.

The food industry encompasses the food processing industry, the food marketing industry, and the food service industry. A wider definition of its scope includes the food manufacturing industry, collection and brokerage of agricultural food materials, transportation and warehousing, food manufacturing equipment or container industry, packaging, food service industry, and the food wholesale and retail industries.

The successful development of the food industry is highly dependent on a quality certification and food safety management system that enables consumers to choose domestic agricultural products and foods. The government has initiated a wide variety of certification systems, such as the environmentally-friendly agricultural product certification system, as well as traceability programs, the Good Agricultural Practices (GAP), and the Hazard Analysis and Critical Control Point (HACCP) to ensure food safety.

Current Status of Food Industry

Food Processing Industry

While the share of the agricultural sector in the nation's

economy continues to fall each year, the relative importance of the food industry in the agriculture-related industry is rising. An examination of the value added and percentage by industry shows that the share of the agriculture and forestry industry in the total industry continued to fall from 4.6% in 2000 to 2.3% in 2013, while the share of the food industry in the agriculture-related industry rose from 45.5% to 61.6% during the same period.

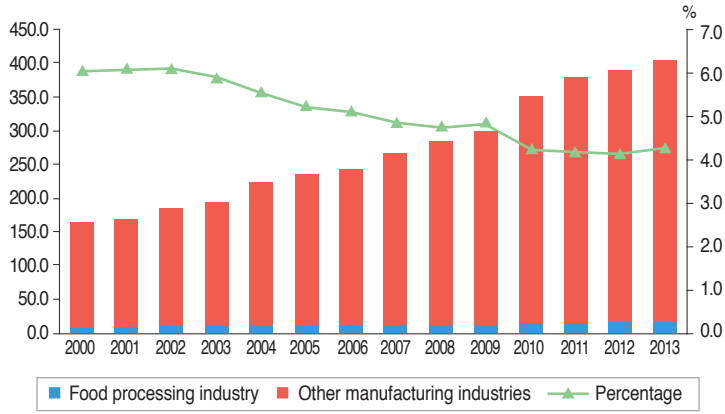
Table 4-8 The Share of Agriculture and Food-related Industry

Unit: %

	2000			2005			2013		
	Valued added (1 billion won)	Percentage		Valued added (1 billion won)	Percentage		Valued added (1 billion won)	Percentage	
		Compared to value added (A)	Compared to agriculture-related industry (B)		Compared to value added (A)	Compared to agriculture-related industry (B)		Compared to value added (A)	Compared to agriculture-related industry (B)
Total value added (A)	538,547	100.0		775,832	100.0		1,303,238	100.0	
Agriculture-related industry (B)	45,744	8.5	100.0	49,717	6.4	100.0	79,241	6.1	100.0
Agriculture and forestry sector	24,939	4.6	54.5	25,853	3.3	52.0	30,437	2.3	38.4
Food industry	20,805	3.9	45.5	23,864	3.1	48.0	48,804	3.7	61.6
Food processing industry	9,623	(1.8)	(21.0)	11,251	(1.5)	(22.6)	17,234	(1.3)	(21.7)
Food service industry	11,182	(2.1)	(24.4)	12,613	(1.6)	(25.4)	31,570	(2.4)	(39.8)

Source: The Bank of Korea, Inter-industry Relation Table, National Accounts.

Figure 4-6 Change in the Share of Food Processing Industry's Value Added



The food processing industry's share of the total gross domestic product (GDP), as well as the manufacturing industry's value added, is on downward trend. That is because total production and added value of the food processing industry continued to increase, but growth momentum of the industry relatively slowed compared to other manufacturing industries.

Valued added of the food processing industry increased from 10 trillion won in 2000 to 17.2 trillion won in 2013, but the share of food processing industry's value added in the total value added of the manufacturing industry decreased from 6.1% in 2000 to 4.3% in 2013.

The number of businesses, sales, and production of the food processing industry have increased steadily since 2007. Sales per business grew from 11.31 billion won in 2007 to 16.75 billion won in 2013, with an average annual increase of 6.8%.

Table 4-9 The Number of Businesses and Sales of the Food Processing Industry

Year	Number of businesses	Sales (shipped)(100 million won)	Sales per business(100 million won)
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
2006	8,495	489,461	57.6
2007	4,257	481,490	113.1
2008	4,061	552,116	136.0
2009	4,169	607,713	145.8
2011	4,360	702,082	161.0
2012	4,423	751,499	169.9
2013	4,616	773,205	167.5

Note: The figure from 1990 to 2006 includes businesses with 5 or more employees, and the figure from 2007 to 2013 includes businesses with 10 or more employees.
Source: Statistics Korea, Mining and Manufacturing Industry Survey, each year.

Among food processing companies with more than 10 employees, companies with less than 50 employees account for 81.3%, showing that the overall size of food processing businesses is small.

Table 4-10 Sales of Food Processing Companies by Employment Size (2013)

Category	Food Processing Industry		Beverage Processing Industry	
Number of employees	Number of businesses	Sales (100 million won)	Number of businesses	Sales (100 million won)
10-19	2,032	70,237	91	1,372
20-49	1,543	140,960	90	14,406
50-99	487	144,775	28	13,628
100-199	214	144,141	19	24,358
200-299	61	78,110	9	27,666
300-499	23	52,571	5	16,953
500 or more	14	44,028	-	-
Total	4,374	674,823	242	98,382

Source: Statistics Korea, Mining and Manufacturing Industry Survey, each year.

Food Service Industry

The development of the food service industry is attributable to the five-day workweek, increasing participation of women in the labor market, rising interests in health and leisure, and changing eating habits and food culture stemming from the conspicuous trend toward nuclear families and an aging population. The major food consumption items shifted from fresh produce to processed foods and eating away from home. In terms of the food service industry structure, a rapid rise of western-style restaurants, including family restaurants, fast food and pizza, and fusion restaurants, franchises and the catering industry resulted in diversification of the food service industry that had formerly been divided into Korean, Chinese, Japanese and western restaurants.

The percentage of expenditure on food at home for urban households in their total food expenditure decreased from 55.5% in 2003 to 50.8% in 2014, while the percentage of expenditure on food away from home increased from 44.5% to 49.2% in the same period.

The growth of the food service and catering industry led to a concurrent increase in the food materials supply industry including the fresh-cut produce industry as changing lifestyles and improvements in transportation and distribution technologies changed the structure of the food distribution industry, from dealing mainly in fresh foods to more packaged and ready-to-eat products.

The size of the food materials supply industry rose significantly from 10 trillion won in 2000 to 25 trillion won in 2012. As food materials distributors get bigger and set up systems in line with growing franchising and advanced food service, the market share of big companies is expected to increase further.

Table 4-11 Monthly Food Expenditure and Changing Expenditure Structure in Dining Out per Household (2010 constant price)

Unit: won, %

Year	Gross expenditure (A)	Food expenditure (B)	B/A	Eating-out expenses (C)	C/A
2003	633,967	351,867	55.5	282,100	44.5
2004	642,607	345,479	53.8	297,128	46.2
2005	631,563	338,461	53.6	293,102	46.4
2006	628,093	339,511	54.1	288,582	45.9
2007	628,928	333,643	53.0	295,285	47.0
2008	639,808	341,472	53.4	298,336	46.6
2009	597,807	316,739	53.0	281,068	47.0
2010	602,604	316,936	52.6	285,668	47.4
2011	594,804	313,942	52.8	280,862	47.2
2012	599,659	310,585	51.8	289,074	48.2
2013	598,314	307,117	51.3	291,197	48.7
2014	608,361	308,814	50.8	299,547	49.2

Source: Statistics Korea, Household Survey, each year.

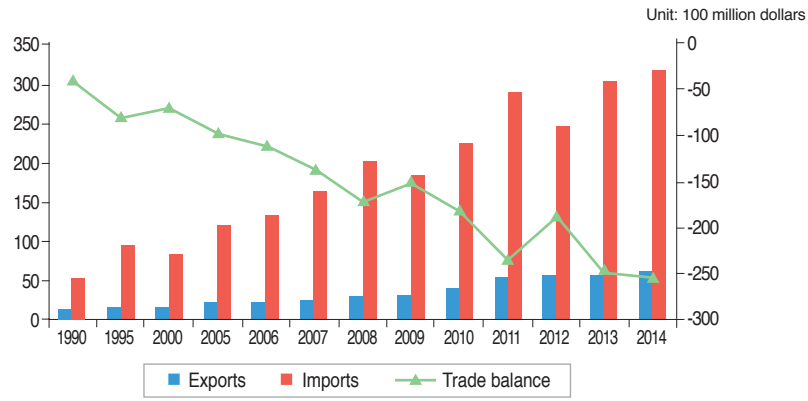
Food Exports and Imports

Food imports have continued to rise while exports have been slowing, causing a severe trade deficit. During 2000-2014, though exports jumped at an annual average of 10.5% from $1.53 billion to $6.18 billion, imports jumped 9.9% annually on average from $8.45 billion to $31.64 billion, widening the trade deficit from $6.92 billion to $25.46 billion. Exports are less diversified as a result of heavy reliance on a few products and trade partners. Korea ships mainly ramyeon noodles, sugar, coffee and beverages to Japan, the US, Russia and China.

Research and development (R&D) investments in the food industry stand at a mere around 1% of Korea's total R&D spending,

both by public and private sectors. Out of 49 trillion won spent in R&D in 2014, the food sector's expenditure was only 0.57 trillion won. Food companies used 0.21% of their sales for R&D, compared with 1.7% of the manufacturing sector (BOK, "Financial Statement Analysis for 2013"). As a result, Korea's food technology is only 30-65% level of industrialized nations, and requires an overall improvement in the technological base, including specialized workforce and technological infrastructure.

Figure 4-7 Food Export and Import



Source: Korea International Trade Association.

Linking the Food Industry to Agriculture

The agricultural sector contributes to the development of the food industry and better health of people by supplying high-quality agricultural products on a stable basis, while the food industry uses as many domestic food products as possible to increase the

value added of agricultural products and farm incomes, thereby contributing to a symbiotic relationship.

Strengthening the linkage between the domestic agricultural sector and the food industry is thus necessary to expand the demand for Korean agricultural products and promote their consumption. Linking the two industries together will also allow re-recognition of agriculture's role in the nation and contribute to succeeding and developing cultural heritage of Korea. The overseas expansion of the Korean food service industry and increasing export of the food industry, including export of traditional Korean foods will contribute to globalizing Korean food and culinary culture, enhancing national status around the world.

The promulgation of the Food Industry Promotion Act in 2007 and the amendment of the Framework Act on Agriculture and Fisheries, Rural Community and Food Industry shifted the focus of agricultural policy from agricultural production to food and consumers.

The food industry acts as the driving force for the growth of agriculture and is directly linked with food security. For these reasons, the food industry is considered to be a part of agricultural policy and must be managed accordingly. There is a demand for the food policy's shift from the traditional focus on the production and supply of agricultural products towards a more consumer-oriented approach, requiring a more efficient linkage between the food industry and agriculture.

In order to strengthen the ties between the two industries, the government is pursuing policies that aim to develop local food processing industries, expand the food processing demand for

domestic agricultural food products, revitalize the production and consumption of processed traditional foods, discover and commercialize traditional food items, and promote the globalization of Korean food.

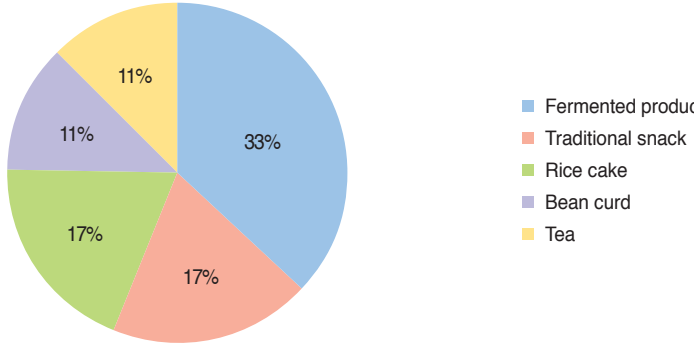
Local Agricultural Food Processing Industry

As of 2012, a total of 3,387 traditional food makers were estimated to be in operation, and 368 (around 11%) were certified by the Korean Traditional Food Quality Certification.

The survey of the traditional food industry, conducted by the Ministry for Food, Agriculture, Forestry and Fisheries in 2012, shows that fermented product makers account for 33% of the traditional food market, the biggest share, followed by companies of traditional snack and rice cake, both with 17%. Bean curd and tea firms hold 11% each. The Korean traditional food market is composed mainly of small-scale companies: small businesses with less than four employees make up the biggest portion of 63%; firms with sales of less than 50 million won and less than 100 million won represent 36% and 52%, respectively.

Agro-food Processing Plant in the Rural Area

Figure 4-8 Share of Firms by Processed Agricultural Product, 2012



Source: Ministry of Agriculture, Food and Rural Affairs.

The food processing industry in rural areas is burdened with low price competitiveness due to increasing price of agricultural produce. It also suffers from a lack of consumers' recognition of and preference for its products. Smaller operations in rural regions have less capability in technology, publicizing and marketing to develop new products and improve quality, and they also lack professional managerial ability of managers.

To overcome these difficulties and develop regional agricultural food processing industries, the government is initiating a variety of policies, including a restructuring policy that uses management evaluations to rank companies based on their performances for differential support. The government is also strengthening its support for advanced food safety management programs, including HACCP, GAP and an efficient operation system, thereby building consumer confidence and promoting the differentiation of domestic products from imported foods. The development of joint brands, as well as joint marketing networks in different product and

consumption zones through cooperative organizations, is another major policy task.

In order to expand the food processing demand for domestic agricultural products, the government is pursuing the creation of a certification system for food service companies and a distribution network to ensure the stable supply of superior domestic food products to the food industry and service companies. An information system will also link producers' organizations with clients and users in the industry.

Traditional and Regional Foods

Traditional foods, including unique regional and local foods, refer to the foods that have been eaten traditionally in Korea, including the foods traditionally served at weddings, commemorative ceremonies, temples, and palaces. Traditional foods are usually made from materials grown in local areas. Regional and local foods are more limited in geographical scope compared to general traditional foods, and defined as foods that use ingredients and recipes unique to a local area and have been customarily consumed by the residents of the region. Regional foods mesh well with the concepts of 'foods inseparable from the land,' 'slow foods' and 'local foods,' promoting healthy lifestyles through eating of fresh local foods.

A large number of traditional and regional foods have lost their unique flavors due to industrial development and improvements in transportation as regional boundaries began to be blurred and people began to turn to westernized foods and living environments. The recent rise in income levels and the rising demand for traditional foods, as well as the five-day workweek, have given people more


Korean Food

time to pursue leisure and cultural activities. Thus, the uniqueness of traditional and regional foods and their image as health foods can be utilized to develop foods that can meet people's demand for healthy food and more time spent on leisure. Regional foods could also be used to promote local economies by creating links between local food festivals, events and rural tourism.

The Agriculture Ministry created the 'master artisan system' to protect the valuable knowledge and techniques of traditional food crafts, with Songhwa Baekil-ju maker Cho Yeonggwi and three other traditional food producers designated as the first four liquor and spirit master artisans in 1994.

As of December 2014, there are 64 master artisans in total, including 20 for alcohol, 35 for food—6 for tea, 4 for kimchi, 3 for rice cakes, 6 for traditional snacks, 7 for fermented products, 2 for cooking, 2 for ginseng, and 5 for others—and 2 for fisheries. The government established the Traditional Food Quality Certification in 1991, a system that assures the quality of outstanding traditional food products made and processed with Korean domestic farm products. As of December 2014, 52 items, including kimchi and

traditional snacks, and 565 factories operated by 386 firms were certified under the system.

Since 2008, the Agriculture Ministry has pushed ahead with the Korean Food Globalization Policy, a program aimed to promote Korean food worldwide and create economic value. The ministry has spent 119.79 billion won until 2014 on various projects such as building foundations to globalize Korean food, enhancing the competitiveness of Korean restaurants abroad, and intensifying promotion of Korean food and culinary culture around the world. As concerns over the efforts continued to be raised, however, MAFRA renamed the program Korean Food Policy in January 2014 and changed its direction to strengthening domestic bases for Korean food as well as expanding into foreign food markets, instead of focusing only on promotion and events of Korean cuisine.

Agricultural Food Product Quality Certification and Safety Management: Traceability and GAP

Food Certification Systems

There are a number of certification systems for food quality management. As of August 2015, 84 traditional food items and 564 production factories have received the traditional food quality certification. The processed food KS certification system bestows the Korea Standard (KS) certification to processed foods that meet the quality requirements of the system through inspection of factories and items. There were 187 standards defined as of July 2015, and 56 companies (116 factories) have received certifications for 34 products. As for the Geographical Indication (GI) system, 136 products are

Table 4-12 Agricultural Food Product Certification Systems

Certification System	Details	Certifying Agency
Geographical Indication	Exclusively protect the place of origin of agricultural produce and agricultural processed products	National Agricultural Products Quality Management Service
Good Agricultural Practices (GAP)	Certify the safe production of agricultural food products	Private certification agencies (NACF, E-mart, Lotte Mart, Hankyoung University, etc.)
Environmentally friendly agricultural product certification	Certify the production of agricultural products with no or minimal use of synthetic pesticides or chemical fertilizers	National Agricultural Products Quality Management Service, private certifying agency
Traditional food master artisan designation	Certify master artisans for traditional foods	Ministry of Agriculture, Food and Rural Affairs
Traditional food quality certification	Certify superior traditional foods that use domestic ingredients	Korea Food Research Institute
Processed food KS certification	Certify agricultural products that fulfill quality standards	Korea Food Research Institute
Hazard Analysis and Critical Control Point (HACCP)	Certify the operation of scientific safety management systems that prevent bacterial or antibiotic residue	Livestock Products HACCP Accreditation Service

Source: Ministry of Agriculture, Food and Rural Affairs.

registered in the system as of 2015, including Bosung green tea.

The Hazard Analysis and Critical Control Point (HACCP) certification targets livestock food products, designed to prevent bacterial contamination or antibiotic residue in meat and other livestock products. The food items to which HACCP is applied include beef, pork, and chicken as well as ham, sausages, dressed meat, milk, cheese, butter and ice cream, and egg products.

Agricultural Product Safety Management System

The agricultural product traceability system records and manages information on the production, distribution and sales of agricultural products to ensure that any quality or safety problem that may arise can be traced back to its source in the production chain, and take actions if necessary. The purpose of this system where information on agricultural products can be traced is to secure food safety and gain consumer confidence in agricultural products by promptly figuring out causes of problems and taking necessary measures. The traceability system was introduced as a voluntary registration system in January of 2006 to record and manage information regarding production, distribution and final consumption of agricultural food products. For beef, a trial project is under way in Korea. For agricultural products, the traceability system and GAP are different systems, but traceability is a prerequisite for GAP.

The Good Agricultural Practices (GAP) system ensures safety of agricultural food products by providing standards for the management of risk factors including pesticides residue, heavy metals or other harmful organisms that may reside in soil, water or products from the production to harvest and packaging stages. The GAP system was created to minimize harm to the environment and supply safe agricultural products to consumers by allowing them to know about the management of pesticides, heavy metals and micro-organisms that may occur from the cultivation to harvest, processing and storage phases.

Traceability Certification Symbol

GAP was introduced as a means to

improve global competitiveness of agricultural products in April 2003 as countries pursued an agreement on GAP in international settings including FAO and Codex. GAP projects were conducted on a trial basis from 2003 to 2005. In 2003, five items including paprika and nine farms were subject to the project and they increased to 46,323 farms covering all items including fruits and vegetables in 2014. For legislation of the GAP project, the Korean government revised the Act on Quality Management of Agricultural Products in August 2005, and modified enforcement ordinances and regulations in January 2006. In addition, for the smooth introduction of GAP, standard guidelines for cultivation, GAP and traceability standards were set. GAP standards include standards for recording and storing information on GAP products that producers, distributers, and sellers deal with.

GAP Symbol

Table 4-13 Number of Items and Farms Subject to GAP

Year	Items	Farms
2007	100	16,796
2008	105	25,158
2009	All	28,562
2010	All	34,421
2011	All	37,146
2012	All	40,215
2013	All	46,000
2014	All	46,323

Source: National Agricultural Products Quality Management Service.

Shop for GAP-certified Agricultural Products

GAP certification has been officially implemented as a private certification system like in Europe since 2006, in which government manages and supervises private certifying agencies and the agencies issue certification and manage farm households. 44 institutions were designated as private certifying agencies including the NACF, Korea Agro-Fisheries Trade Corporation, E-Mart, and Lotte Mart as of December 2014. A total of 46,323 farm households are participating in the GAP certification system as of 2014.

The most immediate issue facing the GAP system is to increase consumer awareness of the system and foster experts with regard to GAP education and certification inspection.

Recently food safety issues are taking place in a large scale and consumers are becoming more interested in health, with more factors emerging that threaten the safety of livestock products. HACCP, being implemented against these backdrops, is a system that is designed to prevent the occurrence of food-related biological, chemical and physical hazards in livestock products from farm to consumer.

The HACCP system was first applied to slaughterhouses and processing plants for livestock products in 1997, and all slaughterhouses in the nation were mandated to comply with HACCP guidelines in July of 2003. The application standards of HACCP for transportation, storage, warehousing and sales associated with meat production were made in 2004, and standards for the livestock

Table 4-14 Current Status of Introduction of HACCP in Livestock Food Products, August 2015

Unit: number

Slaughterhouse	Processing plant for livestock products	Compound feed	Total
130	1,005	93	1,228

Note: Processing plants for livestock products include the dairy industry, the meat processing industry, the egg processing industry and the meat sales industry.
Source: Korea Livestock Products HACCP Accreditation Service.

rearing stage were set in 2006. As of 2015, HACCP is applied to 130 slaughterhouses, 1,005 processing plants for livestock products and 93 compound feed factories.

3. Agricultural Input Industry

High-quality farm materials and equipment enable agricultural development by increasing agricultural productivity. Seeds, fertilizers, pesticides, and precision agricultural machinery are the most important factors that lead the advancement of farming. For this reason, the development and supply of advanced agricultural input are a top priority for all countries' agricultural advancement.

Korea achieved remarkable agricultural growth due to the centralized government's development and supply policy of agro-materials. The government established diverse laws, policies, and research institutions and supported developing and supplying agricultural equipment and materials. The production and supply of agricultural input through cooperation among the government, systems, research institutes, universities, policy development institutions, and the agro-materials industry ultimately led to agricultural development.

The total demand for agricultural input is nearly 18 trillion won, 41% of the agricultural production value, 44 trillion won. Insufficient supply of agro-materials, especially feed, fertilizers, and seeds, limits agricultural production. The effect on the entire industry is three times the shortfall of supply.

In the future, the development and supply of agricultural input for smart agriculture will be important. Various useful agro-materials in harmony with the environment will be needed. Industry-academic-public-research cooperation is necessary for their development, supply and economically effective utilization beyond the present external growth.

Agricultural Machinery Industry

Agricultural Machinery Market Trends

Korea's agricultural mechanization was the fastest and most extensive in the 1990s when various farm machines were supplied under government support. More than 0.3 million agricultural machines were supplied a year, and their ownership reached 3.4 million units.

With agricultural machinery's performance, size and precision increasing in the 2000s, the number of farm machines supplied has decreased. The total annual supply of major models is fewer than 80,000 units. Overall, power tillers, rice transplanters, and combines declined. However, the supply of multipurpose tractors has continually grown to more than 40,000 units a year.

A decline in Korean agricultural machinery means a decrease in demand. This indicates a reduction in the market of domestic farm machinery producers. Korea's agricultural machinery market

Table 4-15 Production Status of Major Agricultural Machinery

Unit: unit

	1990	1995	2000	2005	2010	2011	2012	2013
Power tiller	52,707	89,350	7,005	4,793	3,877	3,462	3,355	3,553
Farm tractor	16,441	16,192	23,315	31,594	30,343	40,449	42,118	40,968
Rice-planting machine	41,603	29,345	20,854	5,640	7,312	5,995	6,037	5,461
Binder	10,015	3,768	-	-	-	-	-	-
Combine	15,392	6,754	11,714	4,136	4,665	2,438	2,522	2,746
Cultivator	25,479	51,091	9,890	17,837	18,525	18,956	22,732	24,798

Source: Korea Agricultural Machinery Industry Cooperative, Korean Society for Agricultural Machinery, *Agricultural Machinery Almanac*, each year.

has repeated stagnation and decreases since the 1990s, showing the stagnation of growth. The domestic market is estimated to be 1 trillion Korean won with a focus on models for loan support. On the other hand, exports are rising every year, which implies that export is a way out. In 2013, agricultural machinery exports amounted to 920 billion KRW, similar to domestic sales.

Table 4-16 Korean Companies' Agricultural Machinery Market

Unit: 100 million won

	1990	1995	2000	2005	2010	2013
Domestic consumption	4,523	9,064	10,561	6,363	10,506	9,252
Exports	104	329	1,698	3,751	4,770	9,188
Total	4,627	9,393	12,259	10,114	15,276	18,440

Source: Kang Changyong et al. 2014. *Forum Report: Plans to Develop the Agricultural Machinery Industry and Expand Exports.* D383. Korea Rural Economic Institute.

Table 4-17 Capacity Utilization Rate of Major Agricultural Machines

Unit: %

	2001	2009	2010	2012
Power tiller	49	32.8	36.6	71.6
Tractor	78.5	65.3	75.6	79.5
Combine	65	55.8	71.1	67.7
Walking-type rice transplanter	64	32.9	56.3	44.7
Riding rice transplanter	77.4	59.8	54.1	68.3
Walking-type cultivator	26	41.7	50.1	52.4
Total capacity utilization rate	56.7	50.0	60.2	66.2

Source: Korea Agricultural Machinery Industry Cooperative, *Agricultural Machinery Almanac,* each year.

As agricultural machinery exports have increased in the 2000s, the farm machine industry's capacity utilization rate has improved.

Main models' capacity utilization rate has risen from 57% in 2001 to 66% recently, enhancing management. Even if 10% responding to demand changes is considered, the rate is a low level below 80%. Nevertheless, it is increasing and tractors have the highest capacity utilization rate, about 80%.

Korea's agricultural machinery companies are mostly small and medium-sized enterprises. Of about 460 firms, only 3 are large companies with more than 500 employees. Enterprises with 10 or fewer employees account for 50.6%, and those with 30 or fewer employees are 86.1%.

Agricultural machinery ownership is declining with the decreasing supply. With their size, performance and precision growing and ride-on models increasing, the number of farm machines drops. However, the reduced supply and ownership do not mean the regression of mechanization. Agricultural mechanization at a higher level progresses.

Table 4-18 Number of Agricultural Machinery Companies by Employment Size

	1995	2000	2005	2010	2011	2012	2013
Sum	132	285	323	435	460	462	511
10 or fewer employees	26	73	123	206	225	234	270
11~30	59	119	143	166	168	164	167
31~50	18	44	26	30	28	27	34
51~100	14	24	13	14	15	16	18
101~500	7	19	15	16	21	18	19
501~1,000	2	6	3	2	2	2	2
More than 1,000	6			1	1	1	1

Source: Korea Agricultural Machinery Industry Cooperative, Korean Society for Agricultural Machinery, *Agricultural Machinery Almanac*, each year.

Table 4-19 Major Agricultural Machinery by Year

Unit: unit

	1990	1995	2000	2005	2010	2011	2012	2013
Tiller	756,489	868,870	939,219	819,684	698,145	666,897	653,420	639,517
Tractor	41,203	100,412	191,631	227,873	264,834	267,871	272,898	277,649
Rice transplanter	138,405	248,009	341,978	332,393	276,310	253,660	244,560	235,612
Binder	55,575	66,960	72,315	60,008	-	-	-	-
Combine	43,594	72,268	86,982	86,825	81,004	79,188	79,439	78,854
Cultivator	50,699	239,496	378,814	392,505	407,997	398,596	403,183	407,571
Grain drier	17,749	28,408	55,573	70,363	77,830	77,151	77,136	78,282

Source: Ministry for Food, Agriculture, Forestry and Fisheries, *Major Statistics of Agricultural, Forestry and Fishery Products*, each year.

The total amount of Agricultural machinery by type decreases in all types except tractors and grain driers. Tractor ownership rose rapidly in the 1990s but has increased gradually in the 2000s. Rice transplanter ownership has declined, as ride-on models replace walk-behind types. Combines are also decreasing, as 5- or 6-row models are replacing 2- or 3-row types.

The percentage of Korea's three main farm machines by size shows that all the three have become larger. Before the 1990s, most tractors had less than 40PS, but now the proportion of tractors with 40 or more PS is increasing. The percentage of tractors with more than 90PS is 13.5%. As for rice transplanters, 6-row, ride-on models are replacing walk-behind types. Also, 5 or more row combines are replacing 3- or 4-row models.

Table 4-20 Supply Rate of Agricultural Machinery by Size

Unit: %

		1980	1985	1990	1995	2000	2005	2010	2013
Tractor	-30PS	76.3	29.9	40.6	12.6	6.1	3.3	1.0	1.8
	30PS	0.0	60.0	48.2	17.4	29.4	13.1	3.9	3.9
	40PS	23.7	0.0	8.9	38.4	36.4	40.0	30.5	34.9
	50PS	0.0	10.1	2.3	23.6	15.4	19.0	22.6	22.3
	60-80PS	0.0	0.0	0.0	6.9	9.9	21.1	30.1	23.7
	90PS-	0.0	0.0	0.0	1.2	2.8	3.5	11.9	13.5
Rice transplanter	Walking-type	100.0	98.6	95.7	93.7	64.8	19.8	9.6	5.6
	Ride-on, 6-row	0.0	1.4	4.3	6.3	35.2	67.1	83.1	89.9
	Ride-on, 8 or more rows	0.0	0.0	0.0	0.0	0.0	13.1	7.4	5.5
Combine	2-row	100.0	55.2	29.7	6.2	4.7	1.0	0.0	0.3
	3-row	0.0	44.8	62.9	36.4	13.8	2.1	0.0	0.2
	4-row	0.0	0.0	7.4	57.4	81.6	81.1	46.4	33.1
	5-row	0.0	0.0	0.0	0.0	0.0	12.0	49.0	38.4
	6-row	0.0	0.0	0.0	0.0	0.0	3.9	4.5	28.0
Total		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

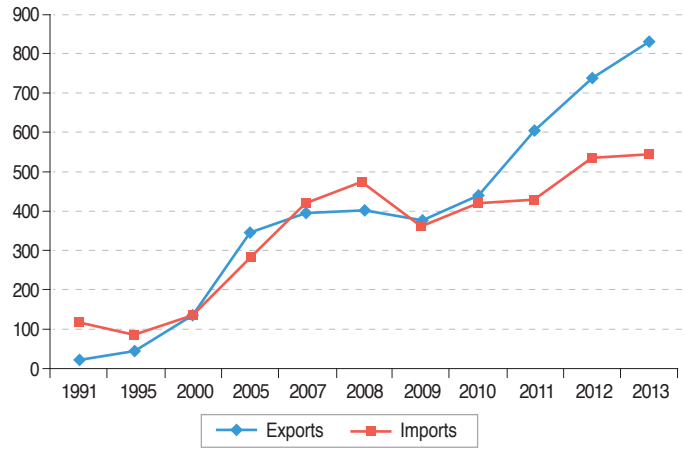
Source: Korea Agricultural Machinery Industry Cooperative, *Agricultural Machinery Almanac,* each year.

Import and Export of Agricultural Machinery

Korea's agricultural machinery companies focused on exporting farm machines to respond to the domestic stagnation of growth. As a result, total exports rose from less than 50 million dollars to 0.1 billion dollars in the 2000s. The trade balance has now turned into a surplus, about 0.3 billion dollars a year. Overall, an increase in agricultural machinery exports and the trade surplus is expected.

Figure 4-9 Import and Export Trends of Agricultural Machinery

Unit: million dollars



Source: Korea Agricultural Machinery Industry Cooperative, *Agricultural Machinery Almanac*, each year.

Tractors are major farm machine exports, accounting for half (0.42 billion dollars a year) of the total agricultural machinery exports, followed by components (0.14 billion dollars). In addition, various items including engines, milling machines, pest control machines, small farm tools, and threshers are exported, although their export size is small.

The U.S. imports about 33% (0.27 billion dollars) of Korea's agricultural machinery exports. Exports to China, Australia, Thailand, and Japan range from 2,600 dollars to 70 million dollars. The proportion of exports to the Asia-Pacific region, the largest in the world with growth potential, is forecast to be more than 25%. Also, exports to Middle East nations are not small and are expected to grow.

Table 4-21 Export Size by Major Agricultural Machinery

Unit: 1,000 dollars

	1995	2000	2005	2010	2013
Tractor	13,069	45,143	203,608	222,693	420,507
Component	15,979	28,622	46,769	47,128	141,792
Farm working machinery	372	2,083	8,138	51,929	87,482
Others	1,143	9,415	10,762	33,357	46,803
Water pump	1,742	16,260	-	-	35,578
Rice transplanter	192	1,484	11,284	10,631	31,946
Milling machine	217	4,968	28,242	44,807	31,087
Combine	3,181	4,417	8,543	14,573	27,711
Pest control machine	63	2,685	6,245	4,431	6,144
Engine	1,526	1,211	8,517	1,546	3,874
Small farm tool	2,396	16,236	8,695	2,149	1,748
Thresher	99	55	78	172	523
Tiller	2,542	2,225	59	141	90
Total	42,521	134,804	340,940	433,557	835,285

Source: Kang Changyong et al. 2014. *Forum Report: Plans to Develop the Agricultural Machinery Industry and Expand Exports.* D383. Korea Rural Economic Institute. Edited.

Table 4-22 Agricultural Machinery Exports to Major Countries (2013)

Country	Quantity (unit)	Amount (1,000 dollars)	Percentage of the amount
U.S.	68,198	272,225	32.6
China	51,173	69,726	8.3
Australia	17,725	35,058	4.2
Thailand	18,648	33,061	4.0
Japan	77,618	25,765	3.1
Myanmar	1,050	14,482	1.7
Vietnam	23,450	12,980	1.6
Iraq	5,492	23,639	2.8
Russia	114,686	17,724	2.1
Turkey	1,162	17,198	2.1
Netherlands	1,950	16,483	2.0
Others	253,841	296,945	35.6
Total	634,993	835,285	100.0

Source: Kang Changyong et al. 2014. *Forum Report: Plans to Develop the Agricultural Machinery Industry and Expand Exports.* D383. Korea Rural Economic Institute.

Production Outlook for Agricultural Machinery and Tasks

The growth of Korea's domestic agricultural machinery market has been stagnant. Farm machines' high performance and large size reduced their number. At the same time, foreign agricultural machinery has rapidly encroached on the domestic market. Fortunately, farm machine exports have increased fast with a trade surplus since 2009. Various methods are needed to expand exports in the long term.

Major problems of the domestic agricultural machinery industry are as follows. First, Korean farm machine companies are relatively small. Second, their technology level is lower than that of advanced

counties, and their small size results in insufficient technology development. Third, the National Agricultural Cooperative Federation (NACF)'s exclusive demand is strengthening in domestic marketing of farm machines, and the lowest bid system is distorting prices.

These problems cause unstable business performance and agricultural machinery companies' dissatisfaction because of low profitability. Therefore, the enterprises may want policy loans supported by the government and measures to increase demand for farm machines.

Development plans include Korean companies' stable securing of the domestic agricultural machinery market; restructuring among farm machine firms and in the firms; planning and implementation of industry-government joint R&D; strengthening of export centered on small and medium-sized enterprises; and the improvement of NACF's lowest bid system and of support for policy loans.

Fertilizer Industry

Domestic Fertilizer Market

The government's active policy for promoting consumption of inorganic fertilizers to increase agricultural production has contributed to a rapid rise in their consumption. Since the 1960s, their consumption has grown every year. In the mid-1900s, about 2.4 million tons were consumed annually. With inorganic fertilizer consumption increasing, the Korean fertilizer industry's production facilities have expanded, and their annual production capacity reached 4.6 million tons. Inorganic fertilizer self-sufficiency was already achieved in the 1970s.

Table 4-23 Fertilizer Supply and Demand by Year

Unit: 1,000 tons (net weight), %

	Production capacity (A)	Production (B)	Consumption (C)	Operational rate (B/A)	Self-sufficiency rate (B/C)	Consumption per cultivated area (kg/ha)
1990	4,032	3,752	2,365	93.1	158.6	458
1995	4,688	4,301	2,072	91.7	207.6	424
2000	4,588	3,729	1,875	81.3	198.9	382
2005	3,857	3,950	1,877	102.4	210.4	376
2010	3,257	2,815	1,106	86.4	254.5	233
2011	4,299	2,738	1,110	63.7	246.7	249
2012	4,299	2,577	1,182	59.9	218.0	267
2013	3,222	2,577	1,144	80.0	225.3	262

Source: Korea Fertilizer Industry Association, *Fertilizer Almanac,* each year.

Since the late 1990s environment-friendly agriculture has become important, and an issue of over-application of inorganic fertilizers has been raised. Additionally, with agricultural market opening and FTA implementation, government subsidies for inorganic fertilizers ceased. Under the circumstances, their consumption dropped more than 1 million tons, and the trend is continuing.

The features of Korea's fertilizer import and export are that most exports are complete products, while imports are mostly raw materials. It is because the country imports most raw materials for inorganic fertilizer production. This structure limits the improvement of domestic fertilizer companies' competitiveness.

Korea exports 130-150 tons of finished fertilizers and imports 2.7-3 million tons a year. Imports more than double exports. The amount of imports is also 1.28 billion dollars in 2013, more than

Table 4-24 Imports and Exports of Inorganic Fertilizers by Year

Unit: 1,000 tons, million dollars, dollar/ton

		1990	2000	2005	2010	2011	2012	2013
Quantity	Exports	1,169	1,342	1,479	1,529	1,637	1,395	1,279
	Imports	3,297	3,314	4,019	3,127	3,075	2,888	2,724
	(Trade balance)	-2,128	-1,972	-2,540	-1,598	-1,438	-1,493	-1,445
Amount	Exports	175	190	292	399	569	483	357
	Imports	264	366	826	1,003	1,310	1,411	1,283
	(Trade balance)	-89	-176	-534	-604	-741	-928	-926
Unit price	Exports	150	142	197	261	348	346	279
	Imports	80	110	206	321	426	489	471
	(Trade balance)	70	31	-8	-60	-78	-142	-192

Note: Aid to North Korea (0.3 million tons in 2000 and 0.35 million tons in 2005) is included.
Source: Korea Fertilizer Association, *Fertilizer Almanac*, each year.

3.5 times that of exports, 0.36 billion dollars. This trade deficit is a structural phenomenon.

Unit costs of fertilizer import and export are also disadvantageous to Korean fertilizer enterprises. Before 2000, export unit prices per ton exceeded import unit prices. In 1990, the export unit price was 150 dollars/ton, higher than the import unit price of 80 dollars/ton. Since 2000, however, the export unit price has been lower than the import unit price. In 2013, the former was 279 dollars/ton and the latter 471 dollars/ton.

Fertilizer Companies and Their Sales

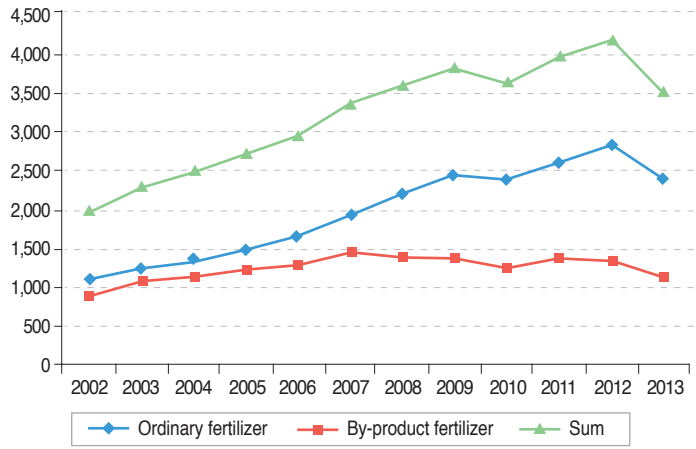
Korea's fertilizer enterprises have increased with the government's past policy for active consumption. Their number grew about 1,000 to around 3,600 in 2013 compared to about 10 years ago. Nonetheless,

the trend of increasing firms has flattened out recently. Fertilizers are divided into ordinary and by-product fertilizers. In 2013, there were 2,393 ordinary fertilizer companies and 1,355 by-product fertilizer companies.

Ordinary fertilizers are mainly chemical fertilizers (N, P, K), and 8 member companies of the Korea Fertilizer Association produce most of them. The rest are about 2,400 small enterprises producing trace elements, biofertilizers, and so on.

The annual production capacity of the 8 companies that account for more than 90% of the chemical fertilizer market in Korea is more than 4.2 million tons. Nevertheless, their annual production is 2.7 million tons, much smaller than their production capacity. That is, the capacity utilization rate of the production facilities is only 62.5%. More than half of produced fertilizers are exported.

Figure 4-10 Number of Fertilizer Producers



Source: NACF, *Fertilizer Industry Statistics,* each year.

Table 4-25 Major Producers of Inorganic Fertilizers (2010)

Unit: 1,000 tons (net weight)

	Type of fertilizer	Production capacity	Production	Exports
Namhae Chemical	Compound fertilizer	1,360	964	558.1
Dongbu Hannong	Compound fertilizer	580	409	239.9
Samsung Fine Chemicals	Urea	330	54	-
Pungnong	Compound fertilizer	350	155	2.2
	Fused phosphate	108		
Chobi	Compound fertilizer	192	38	-
Capro	Ammonia sulfate	740	763	694.4
KG Chemical	Compound fertilizer	300	209	34.3
	Superphosphate	35		
	Potassium sulfate	45		
Hyeophwa	Compound fertilizer	200	58	-
Total		4,240	2,650	1,528.9

Note: The compound fertilizer production capacity of Chobi, Pungnong, KG Chemical, and Hyeophwa is their assembling and mixing facilities' capacity.
Source: Korea Fertilizer Association data.

Fertilizer Supply System

In Korea, food production was the most important national policy in the 1960s and 70s. The agricultural policy focused on the supply of high-quality seeds of food crops and inorganic fertilizers. It was the reason why the government subsidized fertilizer prices and fertilizer supply increased rapidly.

The government intervened in the production and supply of fertilizers to expand their supply, and the government policy was implemented through the NACF. The government's management of fertilizer supply turned into the liberalization of fertilizer sales after 1988. Subsidies to fertilizer purchase prices were also abolished.

Table 4-26 Major Changes in the Inorganic Fertilizer Supply System

Features by period	Major contents
1988-1990: liberalization of fertilizer sales	The government's operation of the fertilizer account and NACF's government-commissioned fertilizer supply system were abolished, which enabled NACF's autonomous purchase and pricing.
1991-2005. 6: Compensation for the loss from the difference of selling prices	The government made up for a certain loss from price differentials to offset factors of increasing production costs due to soaring international prices of raw materials of fertilizers.
2005. 7-2008. 6: Liberalization of sales	-
2008. 6-2009: Compensation for the loss from the difference of selling prices	Same reason as above
2010-2012: Supply of customized fertilizers	Government support for customized fertilizers
2013-: Abolition of fertilizer support, liberalization	Abolition of all subsidies to ordinary fertilizers (excluding soil conditioners)

Source: Korean Fertilizer Association data.

Although there was temporary support due to sudden rises in raw material prices, the basic policy is "no subsidies."

From 2010 to 2012, customized fertilizers were subsidized for precision farming and eco-friendly agriculture, but the subsidy was also abolished in line with the chemical fertilizer reduction policy and the abolition of subsidies. At present, the supply and demand of fertilizers are operated autonomously by the fertilizer market.

NACF's Control of Fertilizers

The NACF has dominated fertilizer supply in Korea. The NACF supplies nearly 100% of fertilizers for rice farming, more than 80% of fertilizers for horticulture, and more than 97% of other fertilizers. In particular, Namhae Chemical, Korea's largest fertilizer producer, is NACF's subsidiary. That is, the NACF has absolute market power in the production and distribution of inorganic fertilizers.

NACF's volume-based share of the fertilizer market is 97.2% and its amount-based share is 95.9% as of 2013. The NACF, the market-controlling enterpriser, is divided into the national federation and regional agricultural cooperatives, and the regional cooperatives' proportion is below 10%. The national federation has absolute control of Korea's fertilizer market.

Table 4-27 NACF's Fertilizer Market Share (volume based)

Unit: %

	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013
Chemical fertilizer	100.0	99.8	100.0	98.7	99.3	99.4	98.6	98.9	99.0	99.1
Fertilizer for horticulture	54.5	48.4	49.6	50.4	55.0	55.1	63.7	74.1	82.9	80.6
Other fertilizers	93.1	91.1	53.5	82.7	96.0	73.4	93.2	82.9	88.6	98.4
Total	94.1	92.2	61.6	85.3	93.5	77.9	93.1	84.7	89.8	97.2

Note: Other fertilizers include organic, by-product and compound fertilizers.
Source: NACF, *Fertilizer Industry Statistics,* 2006.

Table 4-28 NACF's Fertilizer Market Share (2013)

Unit: 100 million KRW, 1,000 tons

		NACF						Sale on the market		Total
		National federation	Percentage	Regional cooperatives	Percentage	Sum	Percentage	Sale on the market	Percentage	
Quantity	Chemical fertilizer	843	96.6	22	2.5	865	99.1	8	0.9	873
	Fertilizer for horticulture	283	62.3	83	18.3	366	80.6	88	19.4	454
	Others (1)	4,475	88.9	482	9.6	4,957	98.4	79	1.6	5,036
	Subtotal	5,601	88.0	587	9.2	6,188	97.2	175	2.8	6,363
Amount	Chemical fertilizer	5,414	97.5	90	1.6	5,504	99.1	50	0.9	5,554
	Fertilizer for horticulture	1,812	70.5	256	10.0	2,068	80.4	503	19.6	2,571
	Others	8,632	93.3	473	5.1	9,105	98.4	151	1.6	9,256
	Subtotal	15,858	91.2	819	4.7	15,858	95.9	704	4.1	17,381

Note: The volume of other fertilizers (1) is based on the quantity of organic and by-product fertilizers which the NACF inspected.
Source: NACF data.

Fertilizer Industry Outlook and Tasks

The domestic inorganic fertilizer market is stagnant or on the decline owing to the overall stagnation of agricultural growth and the rise of environment-friendly agriculture. Korea imports most raw materials of fertilizers and its trade deficit is continuing.

The stagnation of the domestic fertilizer market growth leads to a decrease in the inorganic fertilizer industry's capacity utilization rates. In addition, NACF's consumer monopoly power is another difficulty in management of Korea's fertilizer sector.

Although biofertilizer and trace element fertilizer markets are important for future growth, domestic companies are not very interested in them yet.

To strengthen the Korean fertilizer industry's competitiveness in the long term, technology improvement and restructuring are needed. Also, active policies and the industry's efforts are required to expand exports. With this, it is necessary to stably secure raw materials, develop various functional products, establish a strong partnership with countries producing raw materials, and utilize agricultural ODA projects. At the same time, cooperation with the government is important, including information sessions and exhibitions of agricultural input and support for participation in overseas exhibitions.

Pesticide Industry

Korean Pesticide Market and Import and Export

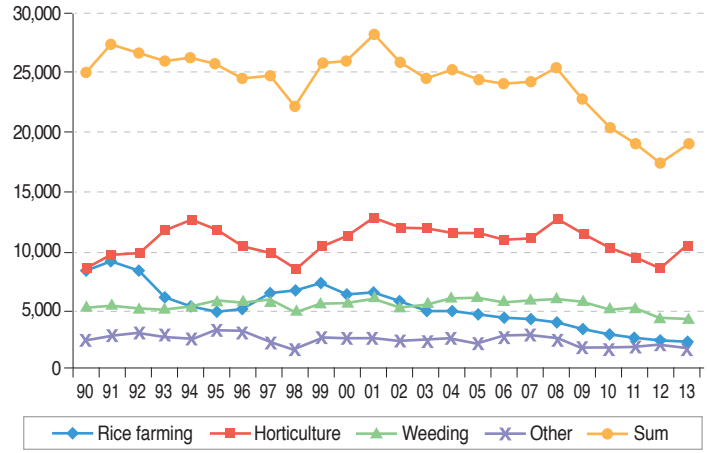
Korea's pesticide market has been reduced since the mid-2000s from 25,000 tons in 1990. Now its annual production is below 20,000 tons.

In the 1990s, pesticides for horticulture and pesticides for rice farming each had a similar proportion, about a third. Since the 2000s, however, the former's percentage has been higher than the latter's. At present, even the proportion of pesticides for weeding is higher than that for rice farming. In 2012-13, the percentage of pesticide shipments is 52.0% for horticulture, 24.4% for weeding, and 12.8% for rice farming.

Korea's pesticide shipment value exceeded 500 billion won in the early 1990s and 1 trillion won after the mid-2000s, and grew

Figure 4-11 Changes in Pesticide Shipments

Unit: quantity, M/T



Source: Korea Crop Protection Association, *Agrochemicals Yearbook,* each year.

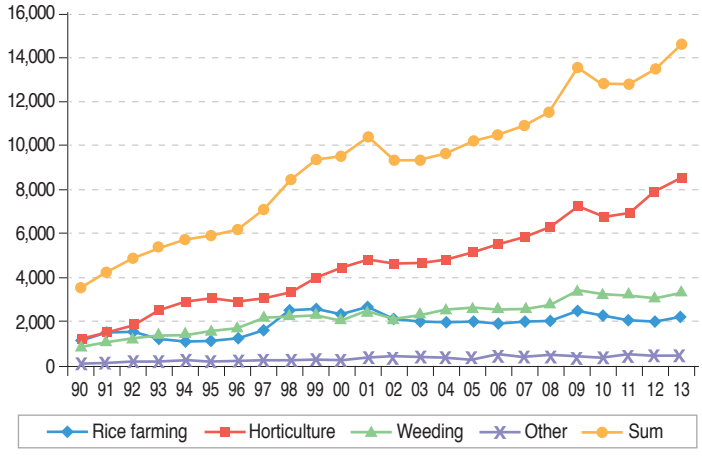
to nearly 1.5 trillion won in 2013. The percentage of pesticides for horticulture out of the total shipment value is 58.8% (858 billion won) as of 2013, and that for weeding 23.5% (343 billion won) and that for rice farming 14.6% (213 billion won). Due to a big rise in pesticide prices per unit, the value amount has increased despite the decreasing volume.

So far, Korean pesticide exports were below 0.1 billion won while imports are on the rise, which leads to the trade deficit. The average imports in 2011-13 were 0.46 billion dollars, and the trade deficit was about 0.4 billion dollars.

The biggest reason for an increase in pesticide imports is that domestic pesticide companies import most technical ingredients owing to their low ability to develop and produce them. The imports of technical ingredients are 0.38 billion dollars in 2012-2013 on average, 79.4% of the total imports.

Figure 4-12 Pesticide Shipment Trend

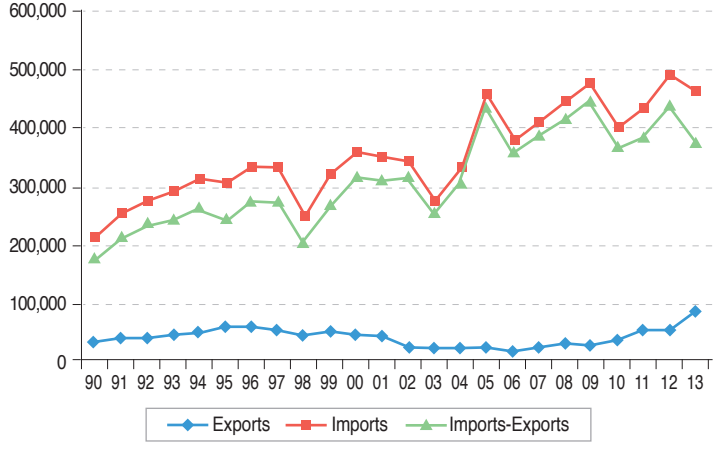
Unit: 100 million KRW



Source: Korea Crop Protection Association, *Agrochemicals Yearbook,* each year.

Figure 4-13 Pesticide Imports and Exports

Unit: 1,000 dollars



Source: Korea Crop Protection Association, *Agrochemicals Yearbook,* each year.

Pesticide Industry and Marketing

In 2009, Korea's pesticide market size reached 1 trillion 700 billion won. The top 5 companies in pesticide sales account for 70%, and the rest, about 40 enterprises, make up 30%. The pesticide shipment value grew from 500 billion won in the early 1990s to 1.5 trillion won in 2013.

The NACF is also dominant in the distribution of pesticides. The proportion of the NACF in the pesticide market increased from 44% in 2003 to 53% in 2011, growing every year. The percentage of its blanket purchase also rose from 30% to 43% in the same period. Moreover, the NACF has NongHyup Chemical, a pesticide producer, as its subsidiary. Recently, however, the national federation has set up only base prices, entrusting the decision on the purchase volume and prices to regional cooperatives.

Table 4-29 Percentage of NACF's Blanket Purchase of Pesticides

Unit: 100 million KRW

Year	2003	2005	2007	2009	2010	2011
Total	9,269	10,230	10,867	13,518	12,500	12,578
Blanket purchase	2,783	3,193	3,646	5,351	5,251	5,346
Percentage	30.0	31.2	33.5	39.6	42.0	42.5
Regional cooperatives' own purchase	1,249	1,479	1,435	1,565	1,363	1,310
NACF's total purchase	4,032	4,672	5,081	6,916	6,614	6,656
Percentage	43.5	45.7	46.8	51.2	52.9	52.9

Source: Korea Fair Trade Commission. 2012. 9. General Meeting Decision No. 2012-225.

Pesticide Industry Outlook and Tasks

The Korean pesticide market grew about 3 times based on the amount, although the ingredient-based volume declined. Environmental problems and the government's policy for reducing the use of pesticides decreased consumption. Nonetheless, the domestic pesticide market is growing to about 1.5 trillion won as of 2013, because the pesticide price per ton increased around 5 times between 1990 and 2013.

The country imports most technical and compound ingredients for pesticide production. Due to this, pesticide imports exceed exports, and this trend will continue.

The NACF has a high status in the pesticide market owing to its subsidiary producing pesticides and its increasing blanket purchase.

In the aspect of quantity, Korea's pesticide market has been already stagnant, so companies should have interest in export. Nevertheless, how to address the lack of technical ingredients is an important management task. With enterprises' effort, the government should provide related information and support various funds.

It is necessary to consider partnerships among domestic firms and with foreign companies to expand exports. Pesticide aid in ODA projects is also needed.

To foster the domestic pesticide industry, the relationship with the NACF needs to be improved.

Seed Industry

Domestic Market Size and the Number of Companies

The domestic seed market is estimated to be 911.3 billion won

as of 2010, excluding tree seeds, ground cover plants, and seaweed.

The seed market size is estimated as follows: food crop seeds 75.4 billion won; vegetable seeds 236.8 billion won; fruit seeds 116.6 billion won; and flowering plant seeds 259.2 billion won. The total amount is 688 billion won.

In addition, seeds of mushrooms, special crops, feed and green manure crops are also included in plant seeds. The following are their market sizes in 2010: mushroom seeds 40 billion won; special crop seeds 139.8 billion won; and seeds of feed and green manure crops 43.5 billion won.[1)]

The number of seed enterprises increased 3.2 times from 332 in 1998 to 1,073 in 2012. Fruit makes up the highest proportion, 31.6%, followed by vegetable (19.5%), flowering plants (16.0%), and mushrooms (11.1%).

Most seed companies in Korea are small. Only a small number of them have technologies regarding genetic resource management,

Table 4-30 Number of Registered Seed Companies

Unit: number of companies, %

	Food crop	Fruit	Vegetable	Flowering plant	Mushroom	Mulberry	Others	Sum
1998	11(3.3)	162(48.8)	50(15.1)	23 (6.9)	70(21.1)	11(3.3)	5 (1.5)	332
2002	8(1.6)	188(38.8)	93(19.2)	58(12.0)	100(20.6)	18(3.7)	20 (4.1)	485
2004	16(2.8)	210(36.8)	117(20.5)	78(13.7)	104(18.2)	20(3.5)	26 (4.6)	571
2006	18(2.4)	235(31.9)	163(22.1)	110(14.9)	115(15.6)	26(3.5)	69 (9.4)	736
2009	37(4.5)	250(30.5)	173(21.1)	121(14.8)	110(13.4)	30(3.7)	98(12.0)	819
2012	46(4.3)	339(31.6)	209(19.5)	172(16.0)	119(11.1)	37(3.4)	151(14.1)	1,073

Source: Korea Seed & Variety Service (2013. 1)

1) Sin Hyeonho et al. 2011. *Seed Market Survey Report*. Korea Seed Association.

development and quality control of new varieties, and processing, and most of these enterprises are run through foreign companies' investments.

Seed Supply and Demand

The government has led the production and supply of more than 35,000 tons of registered seeds of food crops each year. The seed replacement rate is not high, based on the demand for the seeds and the supply of certified seeds. The renewal rate of seeds of 6 food crops that the government supplied was 34.1% in 2010 and 31.6% in 2011. The rice seed replacement rate is the highest, 40.9% in 2010 and 40.2% in 2011, followed by that of corn, 37.9% in 2011. Other food crops' replacement rates are between 20% and 30%.

The production of vegetable seeds is divided into domestic and overseas production. Before the 1990s, most vegetable seeds were produced domestically. Since then, however, domestic production has been on the decline, while overseas production has been on the rise. The biggest reason is the technical difficulty in domestic production with increasing domestic production costs.

Table 4-31 Renewal Rate of Seeds of Food Crops

Unit: t, %

		Rice	Barley	Bean	Corn	Potato	Sum
2010	Demand	64,224	11,220	4,118	240	33,672	113,474
	Supply	26,252	3,084	1,019	83	8,281	38,719
	Renewal rate	40.9	27.5	24.7	34.6	24.6	34.1
2011	Demand	62,342	9,450	4,290	224	37,250	113,556
	Supply	25,068	1,718	1,194	85	7,794	35,859
	Renewal rate	40.2	18.2	27.8	37.9	20.9	31.6

Table 4-32 Production of Vegetable Seeds by Year

Unit: kg, 1,000 dollars

	Domestic production (A)	Overseas production	Sum (B)	A/B	Overseas production value (imports)
1990	753,909	-	753,909	1.00	-
1991	745,645	135,669	881,314	0.85	401
1993	955,731	1,068,122	2,023,853	0.47	5,117
1995	506,366	1,319,636	1,826,002	0.28	9,854
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
2011	224,982	1,376,414	1,601,396	0.14	37,425
2012	336,045	1,674,849	2,010,894	0.17	46,830

Source: Korea Seed Association.

With the application of acreage by kind of fruit in 2010, the production of and demand for fruit seedlings were estimated. The result shows that the demand is 10.863 million plants a year and the value amount is 116.6 billion won.

Table 4-33 Demand and Market Size of Fruit Seedlings

Unit: ha, 1,000 plants

	Acreage	Renewal period(year)	Renewed acreage	Planted seedlings	Seed demand	Seed unit price	Seed market size
Apple	30,992	15	2,066	1.9	3,925	11,000	43,175
Pear	16,239	30	541	1.2	649	6,000	3,894
Peach	13,908	15	927	0.55	510	12,000	6,120
Grape	17,572	15	1,772	1.1	1,949	7,000	13,643
Tangerine	21,143	30	705	2.5	1,763	20,000	35,260
Persimmon	31,808	15	2,120	0.55	1,166	7,000	8,162
Plum	5,870	15	391	0,55	215	7,000	1,505
Others	24,940	20	1,247	0.55	686	7,000	4,802
Sum	162,247		9,769		10,863		116,561

Source: Sin Hyeonho et al. 2011. *Seed Market Survey Report.* Korea Seed Association. p. 53-54.

Table 4-34 Sales of Flowering Plant Seeds and Seedlings

Unit: million KRW

	2000	2002	2004	2006	2008	2010	2011	2012	2013
Seeds and seedlings	1,605	2,881	4,619	9,349	7,024	12,949	11,887	9,845	9,657

Source: Ministry for Food, Agriculture, Forestry and Fisheries, *Floriculture Status*, each year.

The sales of flowering plant seeds and seedlings grew continuously each year but have shown a recent stagnation. The market has declined from 13 billion won in 2010 to 9.7 billion won recently, which seems to result from the overall reduction in demand for flowering plants.

More than 90% of seed exports are vegetable seeds. The exports of vegetable seeds have increased from less than 10 million dollars in the 1990s to more than 20 million dollars in the 2000s and to 40 million dollars recently. Major importers include Japan, the U.S., China, and India. Although the imports of seeds are growing with exports, the size and the rate of increase are relatively small and slow. As a result, the seed trade surplus rose from 3.7 million dollars in 1990 to 13.31 million dollars in 2010 and to 24 million dollars in 2014. Nevertheless, the trade surplus is showing a stagnation of growth with stagnant exports.

Table 4-35 Import and Exports of Vegetable Seeds by Year

Unit: 1,000 dollars

	1990	1995	2000	2005	2010	2011	2012	2013	2014
Exports (A)	6,095	7,388	18,002	15,277	23,042	32,507	40,080	40,507	39,816
Net imports (B)	2,397	7,835	11,521	5,710	9,729	13,501	14,307	16,253	15,997
A-B	3,697	△447	6,481	9,567	13,313	19,006	25,773	24,254	23,819

Note: Net imports are total imports excluding the overseas seed production value.
Source: Korea Seed Association.

Outlook and Tasks

Korean seed enterprises have lower technologies by variety than those of advanced global seed companies, and their investments in R&D of varieties are also low. However, for the strengthening of seed sovereignty, it is needed to intensively develop technology and nurture them into large companies. In the process, R&D investments in all varieties are not efficient financially. Therefore, an investment strategy by selection and concentration is necessary.

In the process of protecting native genetic resources and developing functional seeds including disaster-resistant seeds, it is also important to introduce the Access and Benefit Sharing (ABS) system for international cooperation.

The seed industry should secure its competitiveness and be nurtured into the promising export industry by developing Korea's native seed companies. The government needs to faithfully carry out the current Golden Seed Project (GSP).

The following are several strategies to foster companies. First, private participation should be considered carefully in the development and supply of food crop seeds. Second, policies are needed to strengthen capabilities of private breeders as well as experts. Third, it is important to protect the results of new variety development and support it for a certain period of time, which will promote R&D. Additionally, it is required to improve infrastructures of domestic seed development and production and to establish and implement strategies to nurture the seed sector into the export industry.

4. Rural Tourism & the 6th Industrialization of Agriculture

Rural Tourism

In Korea, unlike advanced countries in Europe, it has not been long since people started to enjoy leisure time; the scale and houses of farms are also small; and people are not really concerned about rural landscape. Accordingly, the rural tourism market, which encourages tourists to stay in farms and enjoy a variety of rural activities as in Europe, has not been invigorated in Korea. Therefore, the Korean government has made efforts to introduce the culture of rural tourism and develop the market based on relevant policies.

The Korean government, which realized that there were fundamental limitations on increasing the income of farms by relying only on agriculture, started to seek for policies to derive non-farm income. One of such measures is rural tourism. The government has been supporting rural tourism with policies since 1984. In the beginning, the then Ministry of Agriculture and Forestry released the Rural Tourism Resource Development Policy, which was aimed at supporting tour-farms as part of the non-farm income generation policy. Tour-farms, which refer to facilities that are equipped with farming-experience centers, accommodations and restaurants and provide places for resort and rest to visitors, were a new concept in Korea at that time.

The government's support for tour-farms included the indirect cash payment, through which the government provided funds up to USD 370,000 at low interest rate to farms that wanted to create a tour-farm. In addition, the government eased the regulations on

land use to help farms easily install facilities for tour programs. Thanks to these supports from the government, a total of 491 tour-farms were established throughout the country from 1984 to 2000 when the government's support for tour-farms ceased.

The government's support for tour-farms, particularly the easing of the regulations on land use, was excessive benefits to farms, given the characteristics of the Korean land market, where the price of land varies depending on the purpose of land use. Several issues were even brought up as urban citizens pretended to be rural residents living in farms to take advantage of the government's support. Accordingly, the government gradually reduced the support from 1997. Furthermore, as the Asian financial crisis occurred at the end of the 1990s, a majority of tour-farms went out of business. On the contrary, some acknowledge that tour-farm business, as a type of accommodation of rural tourism that emerged in Korea for the first time, contributed to raising the awareness of Korean people of rural tourism.

In 2002, the Korean government started to actively promote the Rural Tourism Village Development Project as a new type of the rural tourism policy. The government came up with this project since the direct support for individual farms provoked criticism from society, although rural tourism was an effective strategy for increasing non-farm income, considering the steady increase in demand of urban citizens for tourism.

In the Rural Tourism Village Development Project, the government conducts a public contest to select a village that has exceptional resources for tourism or a leader who can take the initiative of rural tourism, and supports the fund to the relevant

village. The village financially supported by the government utilizes the fund for installing facilities for the joint operation of rural tourism in the village, developing programs and carrying out marketing activities. This is a type of community-based business, in which residents become the owners of the business and run it on their own, and its characteristics are far different from those of the previous support for tour-farms, which was focused on individual farms.

Beneficiaries of the Rural Tourism Village Development Project are selected by a contest as the government evaluates business plans from village residents who wish to start rural tourism business and selects target villages. This is a different approach from the existing policies of the government. The previous supportive policies were implemented based on the top-down approach, by which the government selected target areas and decided to where residents should use subsidies. In case of rural tourism villages, on the contrary, beneficiaries are chosen by a contest, and residents decide how to utilize subsidies from the government by the bottom-up approach.

Since villages can be granted funds over USD 300,000 per village once they are designated as a rural tourism village, a host of villages have applied for this project, and multiple ministries, including the Ministry of Agriculture, Food and Rural Affairs (MAFRA), the Ministry of Public Administration and Security, and the Ministry of Culture and Tourism, have competitively pushed ahead with this project.

Aside from the Rural Tourism Village Development Project led by the central government, several local governments have also

promoted similar projects. If all the similar projects conducted by the central and local governments are combined, approximately 1,900 rural tourism village projects were implemented throughout the country between 2002 and 2014, and the target villages account for about 7% of the total of 36,300 rural villages in Korea.

In order to support the rural tourism village development project in rural areas by law, the government enacted the Promotion of Mutual Exchange between Cities and Agricultural or Fishing Villages Act in 2008. Under the law, the registration system of a rural tourism village in rural areas was introduced to help rural tour villages to smoothly operate tourism and related businesses. In accordance with the law, community councils or products cooperatives that wish to operate a rural tourism business can apply for business registration as a rural tourism village by submitting plans and rules for a tourism business operation and consent forms filled by local residents. In addition, any entities that have registered as a business operator of a rural tourism village are specially allowed to sell agricultural, forest and fishery products and provide accommodation and food services, being exempt from the existing laws and regulations: for example, the manufacturing and sale of food under the Food Sanitation Act, the sale of alcoholic beverages under the Liquor Tax Act, the operation of accommodation business under the Public Health Control Act, and the operation of horse-riding course under the Installation and Utilization of Sports Facilities Act. The Promotion of Mutual Exchange between Cities and Agricultural or Fishing Villages Act also specifies the training course certification systems, including those of the rural activity instructor

program and the rural culture and tourism guide program.[1)]

On the basis of such laws and regulations, rural village businesses registered as a rural activity and resort village can easily run tourism businesses, being free from complicated regulations on facilities, location and sanitation under other laws. Thanks to such legal supports, the number of rural tour villages registered as a rural activity and resort village among those supported by the central or local governments has been on the rise. As of late 2014, about 700 villages throughout the nation are registered as a rural activity and resort village.

Aside from the rural tourism policy implemented for each village, the Korean government established the law to allow residents in agricultural and fishing villages to run a B&B business by utilizing their houses. This law was enacted in 1994, and under the law, residents in agricultural and fishing villages (both farms and non-farms included) are allowed to operate a B&B business in a scale of 150m^2 or smaller. In accordance with the law, a total of 27,975 B&Bs in rural areas throughout the country are registered as of 2014. The government does not directly provide funds to such businesses, but it recognizes this kind of B&B as a farm house so that the operators are exempt from the regulations on the location of accommodation. They are also allowed to provide breakfast without an approval for a restaurant. Due to the alleviation of

1) The special alleviation of regulations includes the following actions: i) An operator of a rural tourism village who utilizes a joint facility of the village with the total floor area of 1,500 m^2 or smaller as accommodations for rural tourism business is exempt from the Public Health Control Act; ii) such an operator who runs a 3,000 m^2 or smaller outdoor horse-riding course or a 1,500 m^2 or smaller indoor horse-riding course is exempt from the Installation and Utilization of Sports Facilities Act; iii) such an operator who provides food as part of rural activity and resort programs or manufactures, sells or processes instant food made of local agricultural, forest and fishery products is exempt from the Food Sanitation Act and allowed to establish its own standard of business operation in accordance with the Presidential decree.

regulations, some accommodations pretend to be a rural B&B, operating their businesses around famous tourist attractions and beautiful landscapes.

The biggest factor that has triggered the expansion of rural tourism in Korea is the central government's steady and strong support policy. In particular, the business registration system of a rural activity and resort village in accordance with the Promotion of Mutual Exchange between Cities and Agricultural or Fishing Villages Act provided legal grounds for and vitalized the rural tour village business. However, some have criticized that rural tourism led by the government is not sustainable. Tourism businesses at the individual village level are well operated in the early stage when they are supported by the government, but after a certain period of time, residents' participation remarkably reduces when the government's support ceases and a business enters the self-operation phase. In a majority of rural tour villages, joint accommodations, activity centers and restaurants are established, but these facilities are not utilized in a frequent and efficient way. The fact that rural tour villages are operated based on loose joint groups of villages, not on a precise legal foundation, also undermines the sustainability of rural tour villages.

In response to such issues, the government has endeavored to combine rural tourism and the 6th industrialization policy for the industrialization of rural tourism business since 2014. The industrialization of rural tourism is aimed at creating an environment where rural tourism companies can survive in the market competition on their own, not relying on the government's support. To this end, the government has implemented the rural tourism grading system to assess the quality of facilities and services

of rural tourism villages and tour-farms and grade them. In terms of farm B&Bs, breakfast service, which used to be prohibited in the past, is now allowed. Meanwhile, activity facilities and programs, such as those related to food, horse-riding and archery, are being diversified to keep up with various demands of consumers for rural tourism.

In Korea, however, the rural tourism market is still guided by the government. In European countries with advanced rural tourism, private organizations consisting of staff engaged in rural tourism handle related works, including the inspection of rural tourism facilities and services, the installation of safety devices, and the standardization and grading of services. Korea, on the contrary, is short of such activities by voluntary organizations with rural-tourism-related staff. This is a challenge for the rural tourism industry in Korea to make a step forward. In recent years, the concept of rural tourism has expanded and diverse demands for rural tourism have emerged also in Korea as Europe. Therefore, it is crucial to develop rural tourism programs by connecting with newly-emerging values, such as slow life, local food and heritage, targeting young generations, a new group of consumers with individualities. As the rural tourism market is being globalized, it is also necessary to come up with programs featuring Korean culture for foreign visitors.

6th Industrialization of Agriculture

The 6th industrialization refers to utilizing low value-added products from primary industries to create higher value-added products through the processing and service activities of secondary

and tertiary industries. Naming a certain business as the 6th industry indicates that it connects primary industries with secondary industries such as the processing of agricultural products and the development of specialties and tertiary industries such as marketing, restaurant and tourism businesses.

The 6th industrialization is another expression of the strategy for expanding the value chain based on agriculture. All countries around the world have long pushed ahead the expansion strategy of the agricultural value chain. Nevertheless, the reason why the Korean government has set the policy of the 6th industrialization of agriculture as a key national challenge since 2013 is that the stagnation of farm income and local economies is becoming more aggravated due to the slowdown of the growth of agriculture. Moreover, considering that a large number of agricultural businesses in Korea are operated in a small scale, the 6th industrialization of agriculture can be an efficient strategy to nurture small farms with strong capability for innovation and improvement of added-value of agriculture.

In order to promote the 6th industrialization of agriculture, the Korean government announced the Comprehensive Plan for the 6th Industrialization in July 2013. The suggestions for the plan included measures for nurturing professional consultants to support the 6th industrialization, providing funds for startups for the 6th industrialization, running the 6th industry operator certification system, strengthening the networking system at regional level to implement the 6th industrialization, and creating the 6th industrialization zone. In May 2014, the government enacted the Rural Convergence Industry Development and Support Act (so-

called the 6th Industrialization Act) to establish legal grounds for implementing the Comprehensive Plan for the 6th Industrialization.

After the establishment of the Act, various policies were carried out to support the 6th industrialization. These policies can be divided into two categories: the first group is individual policies related to the expansion of the agricultural value chain, and the second group is those to cover such individual policies under the name of the 6th industrialization. Individual policies include financial support, consulting, export support, patent application and certification support, facility and business support, marketing brand support, and tour programs with activities. These policies are classified further into those utilizing the existing policies and special supportive policies for the 6th industrialization. For instance, the fund aid for nurturing operators of the 6th industries (financial support), the support with consulting for the 6th industry companies (consulting), the integration complex development project for the 6th industries (facility and business support), and the 6th industry profit model pilot project are those created to accelerate the 6th industrialization. However, most of the policies related to the promotion of the 6th industries are utilizing the existing measures. For example, projects for supporting the export of agro-food are also applied to the 6th industrialization.

The newly developed projects for the purpose of accelerating the 6th industrialization include the following measures. First, the government created the 6th industry (preliminary) operator certification system, aimed at providing an accreditation for operators to take charge in the 6th industrialization by utilizing agricultural and rural resources. The fund aid for nurturing

operators of the 6th industries is the system to provide loans as policy funds at low interest rate to farming association corporations, agricultural corporations and organization business operators who need funds to purchase equipment and operate businesses. To apply for loans, they should submit the 6th industrialization plan and be selected as beneficiaries.

Moreover, each province has established the 6th industry vitalization support centers. These centers mainly support consulting for business operators of the 6th industries. In other words, they provide financial aid to joint operators of a village and regional offices of the National Agricultural Cooperative Federation (NACF), which need funds for consulting to conduct investigations and development of resources for the 6th industrialization, establish and implement business plans, develop and produce test products, research and analyze the market, develop new brands, and conduct marketing and promotion.

The creation of the 6th industrialization complex is the project aimed at designating areas that are expected to realize the 6th industries by integrating upstream and downstream industries focusing on unique resources of the relevant region or connecting operators of the rural industries and specializing the relevant industry, and supporting funds for the installation and operation of joint facilities for manufacturing, sales and activities.

Local governments also implement a variety of policies to vitalize the 6th industrialization by connecting with the central government's policies or pursuing independent implementation. Local governments support improving processing facilities for agro-food, developing packaging materials and design, providing the

logistics expenses for export, marketing, participating in exhibitions and fairs, invigorating direct sales, developing new brands and pioneering new foreign markets. Several local governments run an independent quality certification system under the leadership of governors.

Thanks to policies implemented by the central and local governments, it was estimated that there were 10,097 agricultural enterprises related to the 6th industrialization, as of 2013. To be specific, the rural tourism companies as a combination of the primary and tertiary industries account for 33.4%, the largest proportion, followed by the marketing and distribution companies (18.2%) which take charge in processing and sales of agricultural products, and the marketing companies (17.5%) which directly sell and distribute agricultural products from primary industries.

Table 4-36 Status of Each Type of Agricultural Enterprise for the 6th Industrialization (2013)

Type		Number of enterprises	Proportion
Primary+ Secondary		1,019	10.1
Primary + Tertiary	Marketing (direct transactions/ sales)	1,777	17.5
	Tourism	3,369	33.4
	Eating out	301	3.0
	Subtotal	5,447	53.9
Primary + Secondary + Tertiary	Complex	1,630	16.1
	Marketing	1,839	18.2
	Tourism	132	1.3
	Eating out	30	0.4
	Subtotal	3,631	36
Total		10,097	100.0

Source: MAFRA.

The outcome of the 6th industrialization of agriculture depends on multiple factors, including an operator's capability of management and market responses rather than the government's support. The sales of 379 operators who had obtained the preliminary certification as the 6th industry business increased by 11.2% from the previous year, which was higher than the average annual growth rate of the sales of small- and medium-sized companies in the manufacturing industry in the same period. In addition, the establishment of the integrated processing support centers for agricultural products expanded, and the number of startups in the 6th industries increased by 8.8% in 2014 from the previous year thanks to startup training programs and support for field techniques. For the purpose of accelerating direct transactions related to the 6th industrialization and increasing the sales of local agro-food, the number of government-aided direct sales stores for local food jumped, leading to the increase in the total sales of these stores. Furthermore, about 35,800 regular jobs and 347,000 temporary jobs were created at agricultural corporations in the 6th industries.

It appears that the 6th industries have made some progress, but some still criticize that the 6th industrialization policies are a simple combination of the existing policies and that the 6th industrialization process lacks elaborate management consulting and systematic support from the government for certification.